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Special Issue Reprint

Management Challenges for Business in Digital Economy

New Pathways and Research Trends

Edited by
Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

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This is a reprint of articles from the Special Issue published online in the open access journal *Economies* (ISSN 2227-7099) (available at: https://www.mdpi.com/journal/economies/special_issues/Management_Challenges_Business_Digital_Economy).

For citation purposes, cite each article independently as indicated on the article page online and as indicated below:

LastName, A.A.; LastName, B.B.; LastName, C.C. Article Title. *Journal Name* **Year**, *Volume Number*, Page Range.

ISBN 978-3-0365-7968-9 (Hbk)
ISBN 978-3-0365-7969-6 (PDF)

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Article

Performance of Academic Staff during COVID-19 Pandemic-Induced Work Transformations: An IPO Model for Stress Management

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Abstract: The COVID-19 pandemic has adversely affected all spheres of services-related business, including the higher education sector. As a pre-emptive measure, almost all traditional educational institutions have been transformed into virtual organizations. This pandemic-induced work transition has created stress among academic staff and has hampered their performance. The present study aims to examine the impact of leadership behaviors, e-training, and employment security on the stress management process, consequently improving employee performance during and after the pandemic. Based on the IPO (input–process–output) model, this study examines the effect of leadership behavior, e-training, and employment security on teaching staff's tasks and adaptive and contextual performance, mediated by stress management. To test the conceptual model, data were collected from the teaching staff of Malaysian universities. The structural equation modeling technique was used for data analysis, while bootstrapping with the maximum likelihood estimator was used to confirm the mediational role of stress management. The study revealed that task- and relation-oriented leadership behavior, e-training, and employment security positively influence stress management and employee performance in virtual organizations. Moreover, stress management acts as a full mediator in the relationship between leadership behavior and employee performance, while partial mediation occurs between e-training, employment security, and employee performance. This study offers valuable insights into the literature by proposing leadership behavior, e-training, and employment security as input in the stress management process to attain the performance output of teaching staff. Higher education institutions should come forward to assist their teaching employees in managing their stress levels for better outcomes.

Keywords: leadership behaviors; e-training; employment security; stress management; employee performance; teaching staff

Citation: Shoaib, Muhammad, Ayesha Nawal, Renata Korsakienė, Roman Zámečník, Asad Ur Rehman, and Agota Giedrė Raišienė. 2022. Performance of Academic Staff during COVID-19 Pandemic-Induced Work Transformations: An IPO Model for Stress Management. *Economies* 10: 51. https://doi.org/10.3390/economies10020051

Academic Editor: Aleksander Panasiuk

Received: 7 January 2022
Accepted: 9 February 2022
Published: 18 February 2022

1. Introduction

During the year 2020, the coronavirus pandemic (COVID-19) outbreak has created unexpected challenges around the globe that has hit the service sector hard (Suneson 2020). This unprecedented global pandemic has caused economic disruptions in different ways (Tuzovic and Kabadayi 2020) that not only influence service organizations (McKinsey 2020) but also transform the ways of performing business services (Finsterwalder and Kuppelwieser 2020). Many organizations providing services, such as airlines, beauty salons, barbershops, hotels, were forced to close their operations during the lockdown. Meanwhile, service organizations involved in providing essential services, including health

care, logistics, and FMCGs retailing, were allowed to partially operate with adequate protection and security measures (Tuzovic and Kabadayi 2020).

Educational institutions were also closed as a preemptive measure against the COVID-19 pandemic. Meanwhile, educational institutions have been transformed into virtual organizations. During the phase of global isolation, the establishment of virtual organizations was the most appropriate option to regulate the functioning of the education system (Duraku and Hoxha 2020; Carnevale and Hatak 2020). Virtual organizations are categorized as sophisticated work arrangements where technology drives the outcomes (Kohntopp and McCann 2021), geographically dispersed employees interact with stakeholders through technology, and all operational activities are performed online (Zafar et al. 2015).

The disrupted outcomes of the pandemic may last longer for the education sector and negatively influence the interest and performance of educators (Onyema et al. 2020). Although the transformation of traditional educational institutions into virtual organizations facilitates teaching and learning practices, at the same time, it poses challenges for leaders (Kohntopp and McCann 2019; Kohntopp and McCann 2021; Bolden and O'Regan 2016; Vial 2019), organizations, and employees. Pandemic-induced work transformations have compelled educational institutions to reconsider their leadership practices toward staff (Wolor et al. 2020), have raised the concern about staff training to cope with the challenges of technological emergence (UNESCO 2020), and have created uncertainty to endure secure employment (Onyema et al. 2020). Besides, the traditional education system's transformation into virtual organizations has increased academic staff stress (García-González et al. 2020) that influenced their performance.

The present study aims to examine the impact of leadership behaviors, e-training, and employment security on the stress management process, consequently improving employee performance during and after the pandemic. Additionally, this study intends to offer insights into the literature by examining different aspects to improve the performance of teaching staff during the phase of pandemic-enforced transformations. First, literature on leadership behavior and its impact on teaching staff performance during pandemic transformations is scarce. This study adopted Hersey–Blanchard's situational leadership style to examine the effect of task-oriented leadership behavior and relation-oriented leadership behavior on stress management and teaching staff performance. Furthermore, the study proposed that e-training and employment security allow employees to manage their stress levels and improve the performance of teaching staff while working in a virtual environment during and after the pandemic. Second, based on the input–process–output model (Dulebohn and Hoch 2017; Bartsch et al. 2020), this study proposed a conceptual framework and examined stress management's mediating effect. Effective leadership behaviors, e-training, and employment security are inputs to the stress management process, consequently improving performance. Third, this study implemented job demands–resources (JD–R) theory to model teaching staff performance. Previously, some studies implemented job demands–resources theory to deal with stress and performance issues in non-crisis situations (Kim and Wang 2018; Bakker and Demerouti 2014; Bakker and de Vries 2020; Al-Homayan et al. 2013). However, applying the JD–R theory to manage stress during the pandemic is scarce (Meirun et al. 2020). No previous studies have used the JD–R theory to manage the stress of academic staff. Finally, this study attempts to integrate the JD–R theory with the input–process–output model to examine the influence on performance.

2. Literature Review and Conceptual Background

The pandemic phase has caused fear, stress, anxiety (Sundarasen et al. 2020), and economic instability (Cavallo and Forman 2020) around the world. Academic staff have also been influenced by factors other than the COVID-19 pandemic. Several factors, including leadership styles (Al Khajeh 2018; Abdul Wahab et al. 2014; Ibrahim et al. 2016), economic instability, security, working conditions (Royer 2010) and stress level (Khuong and Yen 2016), influence the performance of academic staff during change implementations. Transformation of the traditional workplace into virtual organizations has created stress

among staff members that harms their productivity, performance, and satisfaction (Gigauri 2020; Anderson 2020). Stress during the pandemic is a crucial occupational issue (Sahni 2020), and its negative impact on job performance has warranted managing stress for sustainable performance.

Stress management is essential for consistent performance, and leaders help staff members cope with stress during uncertain situations (Jyoti and Bhau 2017). The role of leaders influences workplace stress. Supportive leadership behaviors help subordinates manage stress and deal with ambiguous situations (Abbasi 2018). Moreover, training programs enable individuals to shift the mindset for stress management (Jamieson et al. 2018) by being mindful about the current situation rather than reacting emotionally. A "stress optimism mindset" can be developed to positively manage stress level (Crum et al. 2017). Meanwhile, employment insecurity due to the economic crisis during and after the pandemic was observed as a potential stressor (Giorgi et al. 2020; Pacheco et al. 2020; Gasparro et al. 2020; Zhou et al. 2020; Wilson et al. 2020) that adversely affected employee wellbeing (Pacheco et al. 2020) and productivity. These findings underpin the relevance of examining the integrated effect of leadership behaviors, e-training, and employment security to manage academic staff's stress level and performance during the phase of virtual transformations. However, there is a gap in the current literature on leadership behavior, e-training, and employment security for academic staff during the pandemic crisis.

A review of the available literature revealed that research on leadership behaviors in the educational context is scarce. Most studies have been conducted in traditional and non-virtual scenarios (Marfan and Pascual 2017; Ennis et al. 2016; Hallinger 2016; Hallinger et al. 2020). Rare studies examined different aspects of leadership behaviors and practices in the educational context, for instance, instructional leadership (Liu and Hallinger 2017), contextual leadership (Noman et al. 2016), and the role of leadership in financial management (Myende et al. 2018). Meanwhile, there is a lack of studies, which addressed the role of leaders in managing performance of academic staff at the virtual workplace. Based on the statement of Wieczorek and Manard (2018), more research is required on leadership experience with respect to the challenges posed by emerging policies and economic strains (Klar and Brewer 2013; Parson et al. 2016; Preston and Barnes 2017). Similarly, online training of academic staff and employment security during the pandemic situation are not yet addressed.

Thus, based on the need to examine the role of leadership behavior, training, and employment security, this study intended to offer insights into the influence of leadership behavior, e-training, and employment security on stress management and performance of academic staff. A conceptual framework is developed based on the input–process–output (IPO) model and integrated with the JD–R theory. This conceptual model extends the understanding that tolerance of work transition, complexity, work burden, skill discretion, and the physical environment are job demands during the pandemic crisis that cause employees stress, anxiety, and burnout. Meanwhile, leadership behaviors, e-training, and employment security are some of the job resources that serve as input in the process of stress management; hence, productivity, adaptability, and performance are key outputs.

2.1. Input

The transition of the traditional workplace to virtual organizations has created challenges for the systematic procedure of collective task performance. Hersey–Blanchard's situational leadership style is most appropriate and flexible to examine leadership behaviors in a dynamic work environment (Hersey and Blanchard 1969; McCleskey 2014). Hersey–Blanchard characterizes the task orientation on one side of the continuum, while relationship orientation is on the other side. According to the Hersey–Blanchard leadership model, this study focused on addressing task-related and people-related leadership behaviors.

In the services context, task- and relation-oriented leadership behaviors are key input factors in handling the challenges of virtual organizations (Liao 2017; Bartsch et al. 2020).

Task-oriented leadership behavior is mentioned as "initiating structures" and emphasizes accomplishing organizational objectives by explaining task goals and monitoring the work process (Judge et al. 2004). Meanwhile, relation-oriented leadership behaviors, also termed "consideration", emphasize enhancing collaboration among staff members and creating a supportive work environment. Leaders with task- and relation-oriented behaviors postulate team structures (task-orientation) and ensure smooth interactions among team members (relationship orientation) (Liao 2017). Leader behaviors are meant to support resources to manage stress in the workplace (Schmidt 2014).

At the same time, of significance is the role of training programs to cope with stress management and performance challenges (Salain 2017). Training programs focusing on improving resilience, relaxation, and mindfulness serve as essential contributors to improving eustress (positive stress management) and performance (Gharib et al. 2016; Botwe et al. 2017; Ismail et al. 2015). Along with training, the assurance of a resilient and sustainable career is indispensable for employees to cope with performance in a consistently dynamic environment (Foy 2015). Employment insecurity is a stressor (Urbanaviciute et al. 2018), and thus employment security can predict stress management. Performance improvement with the parameters of stress management is centered around the necessity to assist employees in managing stress by providing leadership support, secured employment (Katić et al. 2019), and training. Considering these findings, this study proposed that leadership behavior, e-training, and employment security are input factors in the process of stress management to yield better performance.

2.2. Process

In the context of services (Abbasi 2018), leadership behaviors improve performance and productivity of employees by managing occupational stress (Davidson 2018) that mediate the relationship between input and output. Supportive leadership behaviors are conducive to managing occupational stress, resulting from globalized radical transitions and technological integration (Jedynak and Bąk 2018). Meanwhile, online training sessions are inclusive for stress management (Heber et al. 2016). Training of managers and employees is a useful coping strategy to enhance resilience and stress management (Brooks et al. 2019). Stress interrelated to employment security and workplace demands can hamper employee performance (Yang et al. 2018). Many studies have stated that individuals with the ability to manage stress levels are happier, more productive, and motivated (Fried et al. 2008). Service personnel suffering from pandemics are more likely to be stressed and emotionally exhausted in personal and professional life, as perceived insecurity could cause behavioral changes toward performance (Bartsch et al. 2020). Therefore, this study proposed that in virtual organizations, employment security (Pacheco et al. 2020), effective leadership behavior, and e-training programs positively influence stress management, which consequently improves performance. This study focused on optimism, mindfulness, coping, and resilience as facets of stress management. Optimism is a psychological trait of positive outcome expectancies. Individuals with an optimistic attitude have a self-regulatory mechanism, positively accept challenges, respond confidently in stressful situations, and believe in the best possible outcomes even in adverse situations (Layard and Sachs 2017).

Mindfulness is a state of mind to deliberately accept the current situation rather than becoming judgmental and emotionally responsive (Zgierska et al. 2009). It is a way to experience reality by incorporating self-reliance, self-compassion, non-judgmental, non-striving, and letting-be attitude (Vanderhoof 2015). Mindfulness is a basis for effective stress management and intervention to develop positive organizational behavior (Aikens et al. 2014). In the organizational context, mindfulness-based stress reduction (MBSR) training allows individuals to recognize stress factors and to respond effectively to manage stress level (Mindfulness Initiative 2016; Carter and Halter 2019). Resilience is a dynamic phenomenon (Weber et al. 2014) and a stable personality trait that influences the self-regulatory process. Resilience is the ability of employees to develop interventions and adjustments

in a highly stressed work environment, thus regarded as a vital of the stress management process (Rees et al. 2015). Likewise, coping is the capability to adjust to a situation following an antagonistic event. Generally, coping abilities facilitate the stress management process in two-folded perspectives: problem-focused strategies emphasized considering the practicalities of circumstances. In contrast, emotion-focused strategies are emphasized to mitigate stressors' psychological and emotional effects (Baqutayan 2015). Therefore, this study proposed that stress management is a process of developing resilience, mindfulness, optimism, and coping behavior among employees during pandemic transformations that positively influence performance.

2.3. Output

Output, the final element of the IPO model, is typically denoted as the level to which academic staff accomplishes performance targets (Dulebohn and Hoch 2017). However, employees need to adapt to the dynamic environment in virtual organizations; thus, proactivity is more essential (Griffin et al. 2010). Therefore, proactivity, adaptability, and self-motivated work behaviors are appropriate performance indicators (Bartsch et al. 2020). Pradhan and Jena (2017) mentioned that employee performance combines effective task performance, adaptive performance, and contextual performance. Task performance is denoted as work explicit behavior that incorporates job responsibilities allocated in the job description. Task performance needs employees' cognitive skills, task knowledge (required technical knowledge to perform a task and ability to accomplish multiple assignments), task skill (implementation of technical knowledge to effectively accomplish the task with little or no supervision), and task habit (inner derive to respond the assigned task) (Conway 1999). Adaptive performance is the ability to acclimatize in dynamic situations and to adapt behaviors according to the varied job requirements in volatile circumstances, such as during technological transformations (Ilgen and Pulakos 1999). Contextual performance is the conduct of unstated prosocial or extra-role behaviors that are expected but not overtly stated in the job description (Bateman and Organ 1963). Referring to the above-mentioned references, this study considered task performance, adaptive performance, and contextual performance as outcome aspects of the input–process–output model.

2.4. Integration of Job Demands–Resources Theory

Demerouti et al. (2001) introduced the JD–R model that gained prominence as one of the leading occupational stress models (Hu et al. 2013). The JD–R model assumes that the balance between job demands and job resources influences the level of stress, wellbeing and productivity of employees. Bakker and Demerouti (2014) defined job demand as physically, psychologically, socially, and organizationally challenging aspects of a job that are potential stressors and require continuous psychological and physical costs. At the same time, job resources are physical, social, or organizational aspects that facilitate meeting job demands and reducing stress to facilitate goal accomplishments. Bakker et al. (2014) discussed two potential burnout processes. First, job demands, including workload, physical work environment, work transitions, and time pressure, lead to stress and exhaustion. Second, the lack of resources such as job control, employment security, rewards, leadership support, autonomy, and feedback are potential stressors and reasons for burnout. Likewise, two processes function independently: energy-driven process (job demand $\rightarrow$ Burnout $\rightarrow$ negative performance) and motivation-driven process (job resources $\rightarrow$ Engagement $\rightarrow$ positive performance) (Bakker and de Vries 2020). The integration of job demands–resources theory and performance is presented in Figure 1.

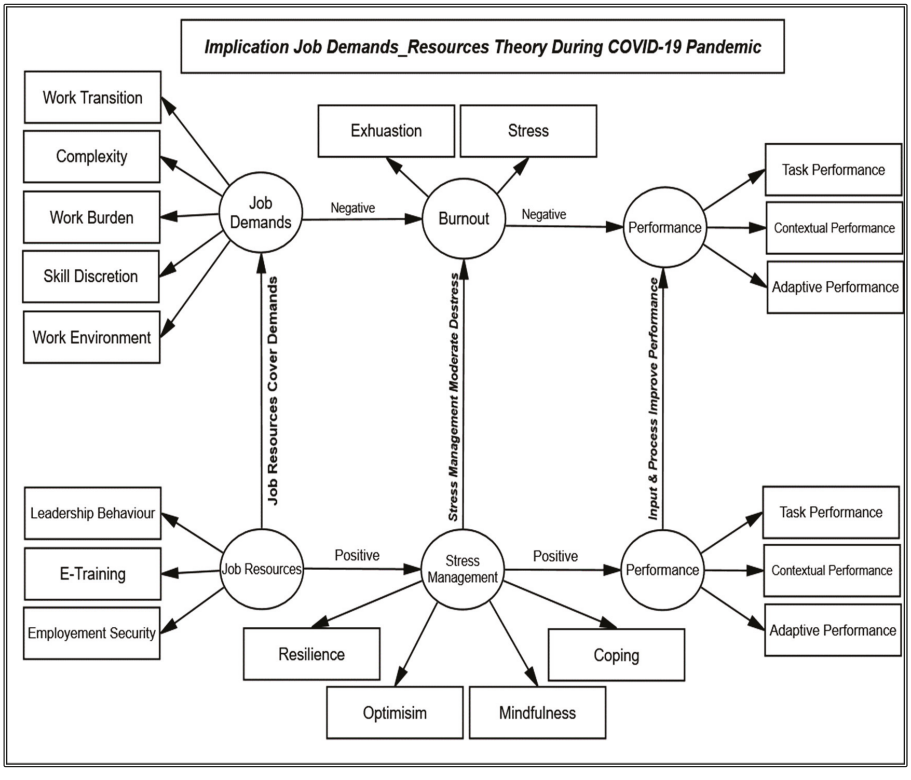

Figure 1. Integration of job demands–resources theory and performance.

3. Hypotheses Development

3.1. Impact of Leadership Behavior on Stress Management

The existing and post-pandemic transformations endured a huge impact on organizations and spotlighted the role of leaders in reshaping organizations for survival and better performance (Dirani et al. 2020). The prevailing pandemic crisis created stress among employees. Moreover, lack of job clarity during pandemic work transitions, unexpected workload, perception of being detached, and inadequate knowledge about the processes to perform assigned jobs caused stress among employees (Sahni 2020). Appropriate leadership behaviors support subordinates to reduce their stress in the workplace (Schmidt 2014). Supportive leadership behaviors encourage employees to positively deal with occupational stress (Schaufeli 2015; Bahkia et al. 2020). Leadership with an agile and adaptive mindset induces optimism and promotes resilience among employees (Dirani et al. 2020). Proactive and supportive leaders, through idealized influence, reinforce desired behaviors and perceptions among employees.

Virtual transformations challenge leaders to motivate and manage geographically dispersed employees (Cascio and Montealegre 2016). Thus, due to flexibility, Hersey–Blanchard's situational leadership behavior model (task and relation-oriented leadership behaviors) is appropriate to deal with employee stress in dynamic and uncertain situations (Katić et al. 2019). Virtual organizations, specifically during the pandemic crisis, challenged leaders to simultaneously practice task-oriented and relation-oriented behaviors (Bartsch et al. 2020). Task-oriented leaders encourage self-management abilities among employees (Carte et al. 2006) and enable them to manage task-related stress (Sonnentag and Schiffner 2019). Task-oriented leadership helps to cope with job-related stress by providing clear

structure, instructions, rules, and processes to accomplish the task, while relation-oriented leaders focus on developing team structure and facilitating team cohesiveness (Liao 2017).

Leaders continuously engage in direct interactions with employees (relation-oriented), tactically recognize potential stressors, and adopt behavioral patterns to facilitate the stress management process (Schmidt 2014). In a work environment where leaders are engaged with subordinates (relation-oriented), employees exhibit less stress, more energy, more enthusiasm, and greater focus (Zafar et al. 2015). Leaders incorporate influential behaviors to develop optimism, resilience, relaxation, and mindfulness among employees (Boyatzis et al. 2013; Roche et al. 2014), conducive to reducing stress (Kozusznik et al. 2015). Organizations focused on supportive leadership behaviors as essential phenomena within stress management since it is an influential aspect to deal with workplace stressors (Quick and Henderson 2016). Considering these findings, this study proposed that task-oriented and relation-oriented leadership behaviors facilitate academic staff in managing stress by encouraging optimism, resilience, mindful and coping behavior. Therefore, we hypothesized:

H1: *Leadership behavior has a positive influence on stress management.*

3.2. Impact of E-Training on Stress Management

E-training is a process to provide online training sessions to employees through the internet (Amara and Atia 2016). Training programs for employee growth and development essentially contribute to managing stress level. Organizations offer training programs to develop required skills among employees to effectively manage their stress (Grawitch et al. 2015). Training focused on stress management programs (SMPs) enhances employees' resilience, mindfulness, and relaxation (Van Wingerden and Derks 2018; Sahlin et al. 2014; Van der Riet et al. 2014). The definitions of resilience encapsulated the understanding that resilience has both aspects; one is more fixed and stable related to the personality of the individuals, while the other is flexible and changeable as a consequence of interactions with the environment (Fletcher and Sarkar 2012; Sarkar and Fletcher 2014) that consider the influence of well-designed training programs (Wagstaff et al. 2017). Thus, continuous training and learning develop resilience, adaptability, and coping behavior to effectively manage stress in dynamic situations (Grawitch et al. 2015). Mindfulness is also mental training to be aware and calmly accept the current situation rather than to be involved in adverse emotional reactions (Sahni 2020). Organizational leaders provide training programs for employees about coping and stress management strategies (Lacerenza et al. 2017). Training programs during uncertain situations develop relaxation, motivation and positive coping mechanisms skills among employees that are helpful for stress management by providing awareness of the situation and action plans to reduce the impact of stressors. Referring to the above presented insights, this study proposed that e-training facilitate academic staff in managing stress by encouraging optimism, resilience, mindful and coping behavior. Therefore, we hypothesized:

H2: *E-training has a positive influence on stress management.*

3.3. Impact of Employment Security on Stress Management

The current economic crisis due to the pandemic is a challenge for employment security (Sanchez et al. 2020). However, the impact of employment security on the psychological health and wellbeing of employees during the COVID pandemic and similar crises has been overlooked in previous literature (Pacheco et al. 2020). Employment security is referred to employees' expectations of enduring stable and long-lasting jobs in the organization (Piccoli et al. 2017). Employment insecurity during the pandemic is a potential stressor (Pacheco et al. 2020) that causes stress, anxiety, and depression among employees (Wang et al. 2018). The majority of previous studies stated employment insecurity as a predictor of distress and examined its influence on employee wellbeing (Blom et al. 2015). However, few studies addressed the role of job control, training, social support, and organizational

support to manage occupational stress (ILO 2016). Career uncertainty intensified stress and psychological hazards of employees (ILO 2016). On the contrary, this study argues that employment security has a positive influence on stress management. Therefore, we hypothesized:

H3: *Employment security has a positive influence on stress management.*

3.4. Impact of Stress Management on Employee Performance

Effective stress management influences employee productivity, task performance, efficiency, and daily functionality (Adim et al. 2018). Although the abundant literature on stress revealed the negative influence of stress on performance, Selye (1993) stated that stress (positively managed stress) is essential to achieve better performance. Adim et al. (2018) examined the impact of stress management on employee performance and concluded that stress management improves employee efficiency, effectiveness, and performance. Altindag (2020) investigated the impact of stress management on performance and stated that individuals who can manage stress level perform better. In addition, positive stress triggers employee performance and goal achievement. Optimism is a source to develop a favorable environment for accomplishing organizational objectives and positively influences work motivation and employee performance (Strauss et al. 2014; Jabbar et al. 2019). Besides, Zehir et al. (2016) examined the influence of resilience on productivity and concluded that resilience mediated the relationship between leadership and productivity. Employees' mindful behaviors enhance task accomplishment and adaptive performance in dynamic situations (Dane and Brummel 2015). In line with these findings, this study proposed that stress management (optimism, resilience, mindfulness, and coping behavior) during uncertain circumstances positively influences employee performance. Therefore, we hypothesized:

H4: *Stress management has a positive influence on employee performance.*

The IPO model refers to the specific potential to examine the moderating effect of context-related constructs (Dulebohn and Hoch 2017). However, by implementing the IPO model, this study intends to examine the mediational influence of stress management between leadership behavior, e-training, employment security, and employee performance. The dominant influence of leadership (Katić et al. 2019), training programs (Grawitch et al. 2015), and employment security on stress cannot be overlooked. Supportive leadership behaviors encourage optimism and resilience among employees (Dirani et al. 2020) that facilitate employee stress management (Schaufeli 2015). Leadership behavior, e-training, and employment security positively influence stress management, while stress management increases employee performance (Altindag 2020). Thus, this proposed that stress management acts as a mediator in the relationship of leadership behavior, e-training, employment security, and employee performance. Therefore, we hypothesized:

H5a: *Stress management mediates the relationship between leadership behavior and employee performance.*

H5b: *Stress management mediates the relationship between e-training and employee performance.*

H5c: *Stress management mediates the relationship between employment security and employee performance.*

The conceptual framework is presented in Figure 2.

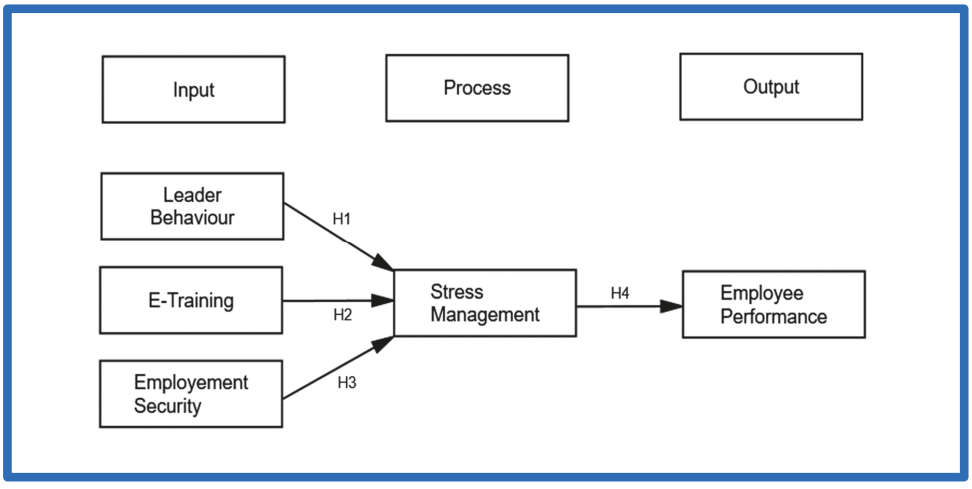

Figure 2. Conceptual framework.

4. Material and Methods

Based on the positivist research philosophy, this study is quantitative, with a deductive research approach and a cross-sectional time horizon. Structured close-ended questionnaires were used to collect data from respondents.

4.1. Study Context and Sample

Data were collected from teaching staff working in Malaysian universities. The data collection process was conducted during the phase of movement control order (MCO, January 2021–March 2021). The online survey was conducted, and a questionnaire was sent to academic staff (teaching) by email. The Malaysian higher education sector is based on four categories of institutions, including 20 public universities, 47 private universities, 34 university colleges, and 10 foreign university campuses in Malaysia (Webway e-Services 2020). In total, 56,235 of the teaching staff work in Malaysian universities (Department of Statistics Malaysia 2021). By using cluster random sampling technique, 5 universities were randomly selected from the 4 categories. After selecting 20 universities, 20 questionnaires were randomly sent to the teaching staff members of each selected university. In total, 400 questionnaires were sent by e-mail, and 279 questionnaires were returned. After data collection, analyses were performed, and 7 questionnaires were removed from the data set due to incomplete responses. Subsequently, multivariate outliers were checked for data preparation and cleaning, and 4 questionnaires were eliminated. In total, 268 questionnaires remained for the final analysis. In particular, 200 sample sizes appeared to be appropriate for SEM data analysis (Awang 2015). However, we distributed 400 questionnaires to improve the generalizability of the research sample. Therefore, the sample size of 268 was appropriate for the statistically significant findings of the study (Awang 2015). The response rate to the survey was 69.75%.

4.2. Measures

All constructs of this study were measured using the 10-point interval rating scale. Thus, "1" refers to "strongly disagree" and "10" refers to "strongly agree". The measurement instruments used in this study were validated in previous studies. Explicitly conferring to the pandemic-induced work transformations, the six-item scale of Weber et al. (2019) was used to measure relation-oriented leadership behavior, including items such as, "Being a leader, he/she enables non-hierarchical teamwork", and considering the context of virtual organizations, one item was added from the work of Bartsch et al. (2020),

"Being a leader, he/she enables virtual teamwork". Similarly, task-oriented leadership behavior was also measured using a six-item scale of Weber et al. (2019), including items such as, "Being a leader, he/she effectively pre-structure the tasks". The four-item scale validated by Quansah (2013) was used to measure the e-training construct, the sample item was, "There are training strategies and coherent training programs". Meanwhile one item, "Organization offers online training programs", was added to account for the context of virtual organizations. Similarly, a five-item scale validated by Quansah (2013) was used to measure the construct of employment security. The sample item was, "If the organization was facing economic problems, employees would be the last to downsize".

A scale developed and validated by Pradhan and Jena (2017) was used to measure the construct of employee performance. The scale comprised forty-two items; however, in this study, six items were used to measure task performance, such as, "I am capable of handling my assignments without much supervision". The adaptive performance was measured with six items, including, "I could manage change in my job very well whenever the situation demands", and six items were used to measure contextual performance, such as, "I extend my sympathy and empathy to my co-workers when they are in trouble". The stress management construct was measured with four dimensions: optimism, resilience, mindfulness, and coping behavior. Scheier and Carver (1985) measured optimism with a ten-item scale, including, "In uncertain times, I usually expect the best". The ten-item scale of Connor Davidson was used to measure resilience, including, "I am able to adapt to change" (Kašpárková et al. 2018). To assess mindfulness, a three-item Southampton Mindfulness Questionnaire (SMQ) was used (Baer 2011). Referring to Glazer and Liu (2017), coping was measured with a three-item scale. The sample item included, "Do you cope up with stress?".

5. Results

The final sample included 185 (69%) female academic staff and 83 (31%) male academic staff. The majority of staff were over 45 years old. Furthermore, 85.5 % of staff members were married, 26.8% of staff were working as lecturers and 32.5% as senior lecturers. The teachers received training in improving IT skills required for online classes. Demographic characteristics of the respondents are presented in Table 1.

Table 1. Demographic characteristics of academic staff.

Demographics	N (%)
Gender	
Male	83 (31)
Female	185 (69)
Age	
≤30	32 (11.9)
31–45	100 (37.4)
>45	136 (50.7)
Marital Status	
Single	39 (14.5)
Married	229 (85.5)
Job title	
Lecturer	72 (26.8)
Senior Lecturer	87 (32.5)
Associate Professor	76 (28.4)
Professor	33 (12.3)
IT skills training with regard to online classes	
Yes	268 (100)
No	0

Multivariate Data Analysis

The study employed structural equation modeling (SEM) in IBM-SPSS Amos 24.0. Before modeling the structural model and performing the SEM procedure, the confirmatory factor analysis (CFA) procedure to validate the measurement model of all the constructs in the model was conducted. The CFA procedure would assess the latent constructs for unidimensionality, validity and reliability (Raza and Awang 2020). The bootstrapping technique with the maximum likelihood method was used to analyze the mediational effect.

The reliability of the scales was tested by calculating the Cronbach alpha. The values obtained suggest that the items have a relatively high internal consistency. Descriptive statistics and discriminant validity of the constructs are presented in Table 2.

Table 2. Descriptive statistics and discriminant validity of constructs.

Construct	Mean	SD	Cronbach Alpha	VIF	LB	ET	ES	SM	EP
LB	9.076	0.936	0.875	1.221	**0.74**				
ET	8.943	0.913	0.922	1.453	0.61	**0.77**			
ES	8.771	0.966	0.786	1.113	0.51	0.64	**0.78**		
SM	8.734	0.937	0.883	1.765	0.56	0.59	0.55	**0.84**	
EP	8.852	0.960	0.845	1.232	0.54	0.58	0.56	0.65	**0.86**

The construct validity of the measurement model was assessed by comparing the fit indices categories. RMSEA value 0.044, CFI 0.974, TLI 0.969, ChiSq/df 1.694 and p value = 0.000 indicated the goodness of measurement model (Hair et al. 2014; Awang 2015). Table 3 indicates that the CR (composite reliability) of constructs ranged from 0.71 to 0.90, which ensured that measuring items were reliable for assessing the respective constructs. The average variance extracted (AVE) values fairly met the threshold (above 0.50), denoted as a satisfactory level of variance among underlying constructs (Hair et al. 2014).

Table 3. AVE and CR Values of Constructs.

Construct	Item	Factor Loading	CR (above 0.6)	AVE (above 0.5)
Leadership Behavior	T-Oriented	0.72	0.714	0.556
	R-Oriented	0.77		
E Training	ETR1	0.64	0.850	0.589
	ETR2	0.86		
	ETR3	0.72		
	ETR4	0.83		
	ETR5	0.82		
Employment Security	ES1	0.79	0.886	0.610
	ES2	0.82		
	ES3	0.82		
	ES4	0.74		
	ES5	0.73		
Stress Management	Optimism	0.84	0.908	0.711
	Resilience	0.88		
	Mindfulness	0.78		
	Coping	0.87		
Employee Performance	Contextual	0.84	0.892	0.734
	Adaptive	0.87		
	Task	0.86		

Discriminant validity was calculated by taking the square root of AVE values to assess differentiation among constructs (Fornell and Larcker 1981). It specified that the underlying constructs were not correlated with each other (Shah and Brown 2020). Values

of discriminant validity shown in Table 3 revealed that correlation among underlying constructs is less than the value of variance extracted that adequately meets the suggested criteria (Fornell and Larcker 1981).

The results of the structural model presented in Table 4 and Figure 3 indicated the significant positive effect of leadership behavior on stress management (β = 0.429, ρ < 0.001), thus supporting H1. E-training positively affects stress management (β = 0.306, ρ < 0.001), thus supporting H2. Employment security significantly affects stress management (β = 0.212, ρ < 0.001), thus supporting H3. Stress management positively influences employee performance (β = 0.256, ρ < 0.001), consequently supporting H4. The results of the mediational analysis revealed that stress management fully mediates the relationship between leadership behavior and employee performance, as the indirect effect is significant. However, the direct effect is not significant (*p* value = 0.146). Meanwhile stress management acts as a partial mediator between the relationship of e-training, employment security and employee performance, which is significant as both a direct and indirect effect.

Table 4. Unstandardized, standardized and mediational analyses.

Unstandardized Estimations							
Endogenous Construct	Path	Exogenous Construct	Estimate	S.E.	C.R.	*P*	Result
Stress Management	←	Leadership Behavior	0.429	0.066	6.520	***	Significant
Stress Management	←	Employment Security	0.212	0.091	2.342	0.019	Significant
Stress Management	←	E Training	0.306	0.087	3.506	***	Significant
Employee Performance	←	Stress Management	0.256	0.061	4.162	***	Significant
Standardized Estimations							
Endogenous Construct	Path	Exogenous Constructs	R2	Result			
Stress Management	←	Leadership Behavior, Employment Security and E-Training	0.74	Leadership Behavior, Employment Security and e-Training contribute 74 percent in Stress Management			
Employee Performance	←	Leadership Behavior, Employment Security, E-Training and Stress Management	0.52	Leadership Behavior, Employment Security, e-Training and Stress Management contribute 52 percent in Employee Performance			
Mediational Path Analysis							
Mediational Path		β (Indirect Path) a	β (Indirect Path) b	β (Direct Path) c		*p* value	Result
Employee Performance ← Stress Management ← Leadership Behavior		0.429	0.256	0.090		0.146	Full mediation
Employee Performance ← Stress Management ← e-Training		0.306	0.256	0.394		0.001	Partial mediation
Employee Performance ← Stress Management ← Employment Security		0.212	0.256	0.229		0.004	Partial mediation

Notes: n = 268, *** Significant at 5%, 1% or 0.1% respectively.

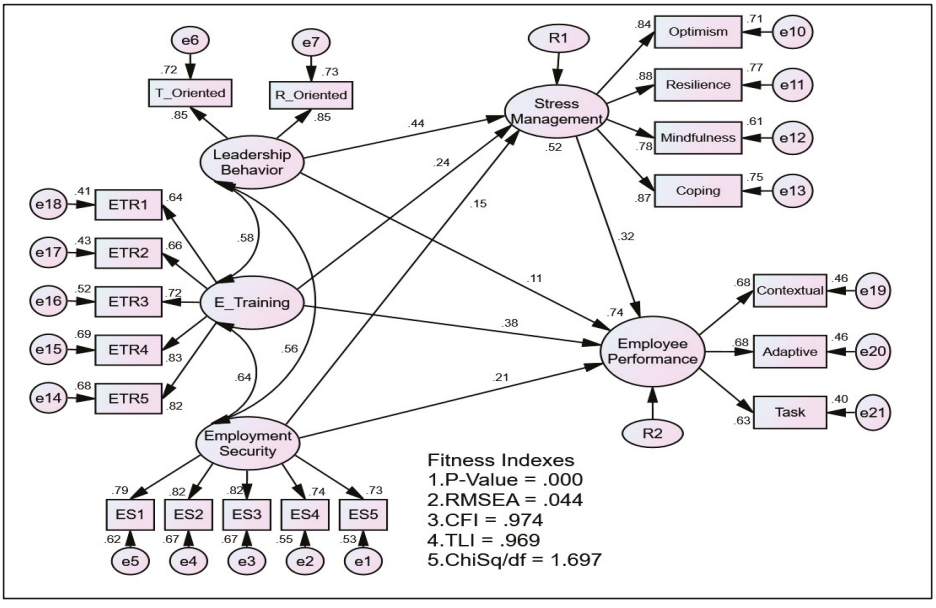

Figure 3. Structural model.

6. Discussion

This study aimed to investigate the influence of leadership behavior, e-training, and the effect of employment security on employee performance mediated by stress management while working in a virtual environment during the pandemic. The input–process–output model was adapted to measure the relationships among the constructs under the lens of job demands–resources (JD–R) theory implementation to measure the performance of academic staff. Due to pandemic transformation, the role of leadership, reshaping the organization for survival and better performance appeared to be significant (Dirani et al. 2020). Therefore, the appropriate behavior of the leader helped to manage the stress level of employees in the workplace (Schmidt 2014; Schaufeli 2015; Bahkia et al. 2020). The findings of this study are consistent with previous studies, emphasizing that the behavior of leaders had a significant positive effect on stress management during the COVID-19 pandemic (Dirani et al. 2020). A rapid virtual transformation had triggered challenges for managers on how to manage dispersed employees (Cascio and Montealegre 2016), and thus the appropriate leadership behavior contributed to the lower stress level during the pandemic (Katić et al. 2019; Bartsch et al. 2020).

Second, training is an important component in managing stress during unprecedented times. This study revealed that e-training sessions for teaching staff during the pandemic help to reduce their stress level and increase their resilience, optimism and make them more mindful during the major transformations from teaching in physical facilities to online classes. Our findings are similar to the studies, emphasizing that training sessions are helpful in developing skills of employees and managing stress effectively (Grawitch et al. 2015). Additionally, training helps to improve employee resilience and mindfulness (Van Wingerden and Derks 2018; Sahlin et al. 2014; Van der Riet et al. 2014). Furthermore, training programs lead to improved employee coping behavior (Lacerenza et al. 2017).

Third, the study examines that the security of the employees during the pandemic improves the management of stress level. The emergence of the COVID-19 pandemic exposed various employment security challenges (Carter and May 2020; Sanchez et al. 2020). Therefore, employee security concerns have a significant effect on the psychological health and wellbeing of employees during the pandemic (Pacheco et al. 2020). These

concerns appear to be a potential stressor in this era (Pacheco et al. 2020) that causes stress, anxiety, and depression among employees (Wang et al. 2018). The findings of this study demonstrate that the security of employment has a positive effect on the management of stress of teaching staff.

Fourth, the study revealed that the proper stress management of employees positively influences employee task and contextual and adaptive performance. Therefore, the findings are similar to previous studies, which evaluated the influence of stress management on employee productivity, task performance, efficiency, and day-to-day functionality (Adim et al. 2018; Bužavaitė and Korsakienė 2021). Individuals who are able to manage stress have better perspectives to accomplish their goals (Altindag 2020). Meanwhile, optimism is a source to improve performance (Strauss et al. 2014; Jabbar et al. 2019), resilience (Zehir et al. 2016) and mindfulness (Dane and Brummel 2015).

Finally, this study examines the mediating role of stress management between the relationship of leadership behavior, e-training, employment security, and employee performance. While previous studies suggest examination of the moderating effect of context-related constructs (Dulebohn and Hoch 2017), this study, under the lens of job demands–resources (JD–R) theory, with the implication of the IPO model, examines the mediating effect of stress management during the COVID-19 pandemic. The study revealed that stress management fully mediates the relationship between leadership behavior and employee performance. Finally, the study suggests that the effect of training programs (Grawitch et al. 2015) and employment security cannot be overlooked. The study disclosed that stress management partially mediates the relationship of e-training and employment security with employee performance.

7. Conclusions

This study offers several contributions to the literature on academic services. The study reveals that task- and relation-oriented leadership behavior, e-training, and employment security are crucial resources for teaching staff's stress management process and performance. Previously conducted studies addressed work transformations, stress, job insecurity, mental health, and performance of educators during the pandemic crisis (Korsakienė et al. 2015; Duraku and Hoxha 2020; Chapman et al. 2020; Onyema et al. 2020; Hamid et al. 2020; Davidescu et al. 2020; Sahni 2020). Some studies addressed the role of leaders and training to improve employee performance and work-life balance (Bartsch et al. 2020; Wolor et al. 2020). However, these studies examined the isolated role of leadership or training in performance. To the best of our knowledge, this is the first study to address the integrated effect of leadership behavior, e-training, and employment security on employee task and adaptive and contextual performance of academic staff.

7.1. Theoretical Implications

First, based on the input–process–output (IPO) model (Liao 2017), this study offers insights that task- and relation-oriented leadership behaviors, e-training, and employment security are input into the stress management process, leading to better performance during and after the pandemic crisis. This study supplements the work of Bartsch et al. (2020), who stated that effective leadership behavior is an input factor for better performance outcomes of service employees. In contrast, this study extends the IPO model by adding e-training and employment security and examined that, for better performance, pandemic-induced stress should be managed with effective leadership behavior, online training, and security of stable employment. In addition, many studies discussed that job insecurity caused stress among employees that negatively influenced performance (Patro and Kumar 2019). Few studies addressed the impact of employment security on stress management to improve performance outcomes. Therefore, this study contributes to the scarce literature.

Second, this study integrated JD–R theory with the IPO model, as pandemic-induced work transformations created stress, burnout, exhaustion, insecurity, and skill discretion. These changing aspects are job demands that require physical and psychological costs. At

the same time, effective leadership behavior, e-training, and employment security are job resources to manage stress that positively influence employee performance. Additionally, this study extends the stress management process by combining optimism, resilience, mindfulness, and coping behavior. Therefore, the study provides an aggregated understanding of leadership behavior, e-training, and employment security (as input and job resources), optimism, resilience, mindfulness, and coping behavior for stress management (process) to improve employee task, adaptive, and contextual performance (output).

7.2. Managerial Implications

Regardless of severe pandemic effects on performance and mental health of academic staff; leadership behavior, e-training, and employment security are decisive in managing stress and performance in uncertain circumstances. This study revealed that leadership behaviors, online training sessions, and employment security contribute to addressing the stress level among employees and lead to favorable outcomes regarding employee task and adaptive and contextual performance. This study offers implications to educational institutions that during work transitions and uncertain situations, task- and relation-oriented leadership behaviors, training programs, and employment security are mechanisms to improve and sustain employee performance. Furthermore, these factors contribute to the stress management process by developing optimism, resilience, mindfulness, and coping behavior in uncertain situations. Educational institutions could use these findings to manage employee stress for better performance during change orientation, work transformations, or uncertain circumstances.

7.3. Limitations and Future Recommendations

Research studies about the business and economic disciplines are typically encountered with several limitations for apparent reasons, and the current research has no exceptions to the phenomena. The limitations of this study indicate directions for future researchers. First, this study is cross-sectional in the time horizon, and academic staff were used as a single source of data collection. Future studies can address this shortcoming by taking data from secondary sources (Podsakoff et al. 2012). Moreover, a longitudinal survey can be conducted to examine the effect of leadership behavior, e-training, and employment security on stress management and its effect on the long-term performance of academic staff. Second, this study considered the performance outcomes during the pandemic crisis. However, a similar model can be applied to measure employee performance in a post-pandemic duration. Furthermore, the moderating role of work–life balance and self-motivated work behavior can be examined. Third, this study addressed the impact of work transformations on stress management and academic performance staff. Future studies can implement an IPO model to manage the stress level of front-line service providers working at the risk of their health.

Author Contributions: Conceptualization: M.S. and A.N., Data curation: M.S. and A.U.R., Formal analysis: M.S. and A.U.R., Investigation: M.S., A.U.R., R.K., R.Z. and A.G.R. Methodology: M.S., A.N. and A.U.R. Project administration: M.S., A.N., A.U.R., R.K., R.Z. and A.G.R. Software: A.U.R. Supervision: R.Z., R.K. and A.G.R. Validation: M.S. and A.U.R. Visualization: M.S. and A.U.R. Writing—original draft: M.S. and A.N. Writing—review & editing: M.S., A.U.R. and R.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: This does not apply to this article. The results of the surveys are presented in the article. The survey included information statement about agreed participation of respondents.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

References

Abbasi, Saliha Gul. 2018. Leadership Styles: Moderating Impact on Job Stress and Health. *Journal of Human Resources Management Research* 2018: 1–11. [CrossRef]

Abdul Wahab, Jamalullail, Che Fuzlina Mohd Fuad, Hazita Ismail, and Samsidah Majid. 2014. Headmasters' Transformational Leadership and Their Relationship with Headmasters' Transformational Leadership and Their Relationship with Teachers' Job Satisfaction 10 and Teachers' Commitments. *International Education Studies* 7: 40–48.

Adim, Chidiebere Victor, Wechie Ibekwe, and Odunayo Akintokumbo. 2018. Stress Management and Employee Performance of Deposit Money Banks in Port Harcourt, Nigeria. *American Journal of Humanities and Social Sciences Research* 2: 41–49.

Aikens, Kimberly, Jhon Astin, Kenneth R. Pelletier, Kristin Levanovich, Catherine M. Baase, Yeo Yung Park, and Catherine M. Bodnar. 2014. Mindfulness Goes to Work Impact of an Online Workplace Intervention. *Journal of Occupational and Environmental Medicine/American College of Occupational and Environmental Medicine* 56: 721–31. [CrossRef] [PubMed]

Al Khajeh, Ebrahim Hasan. 2018. Impact of Leadership Styles on Organizational Performance. *Journal of Human Resources Management Research* 2018: 1–10. [CrossRef]

Altindag, Ozden. 2020. Research in Business & Social Science Relationship between stress management and job performance in organizations. *International Journal of Research in Business and Social Sciences* 9: 43–49.

Amara, Naoual Ben, and Larbi Atia. 2016. E-Training and its role in human resources development. *Global Journal of Human Resource Management* 4: 1–12.

Anderson, George. 2020. Psychological Stress and Covid-19: Interactions with Gut Microbiome and Circadian Rhythm. In *Driving Symptom Severity*. London: CRC.

Awang, Ziauddin. 2015. *SEM Made Simple: A Gentle Approach to Learning Structural Equation Modeling*. Bangi: MPWS Rich Publication.

Baer, Ruth. 2011. Measuring Mindfulness. *Contemporary Buddhism* 12: 241–61. [CrossRef]

Bahkia, Ayu Suriawaty, Zainudin Awang, Asyraf Afthanorhan, Puspa Liza Ghazali, and Hazimi Foziah. 2020. Exploratory factor analysis on occupational stress in context of Malaysian sewerage operations. *AIP Publishing LLC* 2138. [CrossRef]

Bakker, Arnold B., and Evangelia Demerouti. 2014. Job Demands-Resources Theory. *Wellbeing: A Complete Reference Guide* 3: 37–64.

Bakker, Arnold B., Evangelia Demerouti, and Willem Verbeke. 2014. Using the Job Demands–Resources Model to Predict Burnout and Performance. *Human Resource Management Journal* 43: 83–104. [CrossRef]

Bakker, Arnold B., and Juriena D. de Vries. 2020. Job Demands–Resources theory and self-regulation: New explanations and remedies for job burnout. *Anxiety, Stress, & Coping* 34: 1–21.

Baqutayan, Shadiya Mohamed Saleh. 2015. Stress and Coping Mechanisms: A Historical Overview. *Mediterranean Journal of Social Sciences* 6: 479–88. [CrossRef]

Bartsch, Silke, Ellen Weber, Marion Büttgen, and Ariana Huber. 2020. Leadership matters in crisis-induced digital transformation: How to lead service employees effectively during the COVID-19 pandemic. *Journal of Service Management* 32: 71–85. [CrossRef]

Bateman, Thomas S., and Dennis W. Organ. 1963. Job satisfaction and the good soldier: The relationship between affect and employee "citizenship". *Academy of Management Journal* 26: 587–95.

Blom, Victoria, Anne Richter, Lennart Hallsten, and Pia Svedberg. 2015. The associations between job insecurity, depressive symptoms and burnout: The role of performance-based self-esteem. *Economic and Industrial Democracy* 39: 48–63. [CrossRef]

Bolden, Richard, and Nicholas O'Regan. 2016. Digital Disruption and the Future of Leadership: An Interview with Rick Haythornthwaite, Chairman of Centrica and MasterCard. *Journal of Management Inquiry* 25: 438–46. [CrossRef]

Botwe, Priscilla Bempah, Amoah-Binfoh Kenneth, and Enid Masih. 2017. Workplace Stress and its Effect on Performance; Special Reference to Educational Sector. *Saudi Journal of Humanities and Social Sciences* 2: 796–803.

Boyatzis, Richard E., Melvin L. Smith, Ellen Van Oosten, and Lauris Woolford. 2013. Developing resonant leaders through emotional intelligence, vision and coaching. *Organizational Dynamics* 42: 17–24. [CrossRef]

Brooks, Samantha K., Rebecca Dunn, Richard Amlôt, G. James Rubin, and Neil Greenberg. 2019. Protecting the psychological wellbeing of staff exposed to disaster or emergency at work: A qualitative study. *BMC Psychology* 7: 1–11. [CrossRef]

Bužavaitė, Monika, and Renata Korsakienė. 2021. *Characteristics of Top Management Teams and International Performance of SMEs in CEE Country's Context // Strategic Outlook in Business and Finance Innovation: Multidimensional Policies for Emerging Economies*. Bingley: Emerald Publishing Limited, vol. 13, pp. 149–60. [CrossRef]

Carnevale, Joel B., and Isabella Hatak. 2020. Employee adjustment and well-being in the era of COVID-19: Implications for human resource management. *Journal of Business Research* 116: 183–87. [CrossRef]

Carte, Traci A., Laku Chidambaram, and Aaron Becker. 2006. Emergent Leadership in Self-Managed Virtual Teams Emergent Leadership in Self-Managed Virtual Teams. *Group Decision and Negotiation* 15: 323–43. [CrossRef]

Carter, David P., and Peter J. May. 2020. Making sense of the US COVID-19 pandemic response: A policy regime perspective. *Administrative Theory & Praxis* 42: 265–77.

Carter, Mortlock, and Spiegel Halter. 2019. Mindfulness in Organisations. Available online: www.employment-studies.co.uk (accessed on 5 January 2021).

Cascio, Wayne F., and Ramiro Montealegre. 2016. How Technology Is Changing Work and Organizations. *Annual Review of Organizational Psychology and Organizational Behavior* 3: 349–75. [CrossRef]

Cavallo, Joseph J., and Howard P. Forman. 2020. The Economic Impact of the COVID-19 Pandemic on Radiology Practices. *Radiology* 296: E141–44. [CrossRef]
Chapman, Bethany, Jessica Swainston, Elizabeth A. Grunfeld, and Nazanin Derakshan. 2020. COVID-19 Outbreak Effects on Job Security and Emotional Functioning Amongst Women Living with Breast Cancer. *Frontiers in Psychology* 11: 582014. [CrossRef] [PubMed]
Conway, James M. 1999. Distinguishing contextual performance from task performance for managerial jobs. *Journal of Applied Psychology* 84: 3–13. [CrossRef]
Crum, Alia J., Modupe Akinola, Ashley Martin, and Sean Fath. 2017. The role of stress mindset in shaping cognitive, emotional, and physiological responses to challenging and threatening stress. *Anxiety, Stress, & Coping* 30: 1–17.
Dane, Erik, and Bradley J. Brummel. 2015. Examining workplace mindfulness and its relations to job performance and turnover intention. *Human Relations* 67: 105–28. [CrossRef]
Davidescu, Adriana AnaMaria, Simona-Andreea Apostu, Andreea Paul, and Ionut Casuneanu. 2020. Work Flexibility, Job Satisfaction, and Job Performance among Romanian Employees—Implications for Sustainable Human Resource Management. *Sustainability* 12: 6086. [CrossRef]
Davidson, Ransford George. 2018. *Leadership Strategies to Reduce Employees' Occupational Stress*. Minneapolis: Walden University.
Demerouti, Evangelia, Arnold B. Bakker, Friedhelm Nachreiner, and Wilmar B. Schaufeli. 2001. The Job Demands–Resources Model of Burnout. *Journal of Applied Psychology* 86: 499–512. [CrossRef]
Department of Statistics Malaysia. 2021. Available online: https://www.data.gov.my/data/en_US/organization/about/department-of-statistics (accessed on 5 January 2021).
Dirani, Khalil M., Mehrangiz Abadi, Amin Alizadeh, Bhagyashree Barhate, Rosemary Capuchino Garza, Noeline Gunasekara, Ghassan Ibrahim, and Zachery Majzun. 2020. Leadership competencies and the essential role of human resource development in times of crisis: A response to Covid-19 pandemic. *Human Resource Development International* 23: 1–15. [CrossRef]
Dulebohn, James H., and Julia E. Hoch. 2017. Virtual teams in organizations Human Resource Management Review. *Human Resource Management Review* 27: 569–74. [CrossRef]
Duraku, Zamira Hyseni, and Linda Hoxha. 2020. The Impact of COVID-19 on Higher Education: A Study of Interaction among Students' Mental Health, Attitudes toward Online Learning, Study Skills, and Changes in Students' Life. Available online: https://www.researchgate.net/publication/341599684_The_impact_of_COVID-19_on_higher_education_A_study_of_interaction_among_Kosovar_students\T1\textquoteright_mental_health_attitudes_toward_online_learning_study_skills_and_lifestyle_changes (accessed on 5 January 2021).
Ennis, Michele Campbell, Tao Gong, and Afokoghene Z. Okpozo. 2016. Examining the Mediating Roles of Affective and Normative Commitment in the Relationship between Transformational Leadership Practices and Turnover Intention of Government Employees. *International Journal of Public Administration* 41: 1–13. [CrossRef]
Finsterwalder, Jörg, and Volker G. Kuppelwieser. 2020. Equilibrating resources and challenges during crises: A framework for service ecosystem well-being. *Journal of Service Management* 31: 1107–29. [CrossRef]
Fletcher, David, and Mustafa Sarkar. 2012. A grounded theory of psychological resilience in Olympic champions. *Psychology of Sport & Exercise* 13: 669–78.
Fornell, Claes, and David F. Larcker. 1981. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research* 18: 39–50. [CrossRef]
Foy, Tommy. 2015. *Managing Workplace Stress for Increased Performance in an Irish Higher Education Institution*. Minneapolis: Walden University.
Fried, Yitzhak, Arie Shirom, Simona Gilboa, and Cary L. Cooper. 2008. The Mediating Effects of Job Satisfaction and Propensity to Leave on Role Stress-Job Performance Relationships: Combining Meta-Analysis and Structural Equation Modeling. *International Journal of Stress Management Psychological Association* 15: 305–28. [CrossRef]
García-González, Marialuz Arántzazu, Fermín Torrano, and Guillermo García-González. 2020. Analysis of Stress Factors for Female Professors at Online Universities. *International Journal of Environmental Research and Public Health* 17: 2958. [CrossRef]
Gasparro, Roberta, Cristiano Scandurra, Nelson Mauro Maldonato, Pasquale Dolce, Vincenzo Bochicchio, Alessandra Valletta, and Gilberto Sammartino. 2020. Perceived Job Insecurity and Depressive Symptoms among Italian Dentists: The Moderating Role of Fear of COVID-19. *International Journal of Environmental Research and Public Health* 17: 5338. [CrossRef]
Gharib, Moaz, Syed Ahsan Jamil, Moinuddin Ahmad, and Suhail Ghouse. 2016. The impact of job stress on job performance: A case study on academic staff at Dhofar University. *International Journal of Economic Research* 13: 21–33.
Gigauri, Iza. 2020. Effects of Covid-19 on Human Resource Management from the Perspective of Digitalization and Work-life-balance. *International Journal of Innovative Technologies in Economy* 4: 31. [CrossRef]
Giorgi, Gabriele, Luigi Isaia Lecca, Federico Alessio, Georgia Libera Finstad, Giorgia Bondanini, Lucrezia Ginevra Lulli, Giulio Arcangeli, and Nicola Mucci. 2020. COVID-19-Related Mental Health Effects in the Workplace: A Narrative Review. *International Journal of Environmental Research and Public Health* 17: 7857. [CrossRef] [PubMed]
Glazer, Sharon, and Cong Liu. 2017. Work, Stress, Coping, and Stress Management. Oxford Research Encyclopedia of Psychology. Available online: https://doi.org/10.1093/acrefore/9780190236557.013.30 (accessed on 5 January 2021).
Grawitch, Matthew J., David W. Ballard, and Kaitlyn R. Erb. 2015. To Be or Not to Be (Stressed): The Critical Role of a Psychologically Healthy Workplace in Effective Stress Management. *Stress and Health* 31: 264–73. [CrossRef] [PubMed]

Griffin, Mark A., Sharon K. Parker, and Claire M. Mason. 2010. Leader Vision and the Development of Adaptive and Proactive Performance: A Longitudinal Study. *Journal of Applied Psychology* 95: 174–82. [CrossRef] [PubMed]
Hair, Joe F., Marko Sarstedt, Lucas Hopkins, and Volker G. Kuppelwieser. 2014. Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review* 26: 106–21. [CrossRef]
Hallinger, Philip. 2016. Bringing context out of the shadows of leadership. *Educational Management Administration & Leadership* 46: 5–24.
Hallinger, Philip, Sedat Gümüş, and Mehmet Şükrü Bellibaş. 2020. Are principal's instructional leaders yet? A science map of the knowledge of the knowledge base on instructional leadership. *Scientometrics* 122: 1629–50. [CrossRef]
Hamid, Mahmud, Sazali Abdul Wahab, Asma Ul Hosna, and Mohammad Waliul Hasanat. 2020. Impact of Coronavirus (COVID-19) and Employees' Reaction to Changes on Employee Performance of Bangladesh. *The International Journal of Business & Management* 8: 34–43.
Heber, Elena, Dirk Lehr, David Daniel Ebert, Matthias Berking, and Heleen Riper. 2016. Web-Based and Mobile Stress Management Intervention for Employees: A Randomized Controlled Trial. *Journal of Medical Internet Research* 18: e5112. [CrossRef]
Hersey, Paul, and Kenneth H. Blanchard. 1969. Life cycle theory of leadership. *Training & Development Journal* 23: 26–34.
Hu, Qiao, Wilmar B. Schaufeli, and Toon W. Taris. 2013. Does equity mediate the effects of Job demands job demands and job resources on work outcomes? *Career Development International* 18: 357–76. [CrossRef]
Ibrahim, Nurshahira, Azman Ismail, Munirah Hanim Yusuf, and Siti Ngayesah Ab Hamid. 2016. Role of Transformational Leadership in Enhancing Followers' Psychological Empowerment. *Journal of Entrepreneurship and Business* 4: 42–53.
Ilgen, Daniel R., and Elaine D. Pulakos. 1999. *The Changing Nature of Performance: Implications for Staffing, Motivation, and Development*. San Francisco: Frontiers of Industrial and Organizational Psychology.
ILO. 2016. *Workplace Stress: A Collective Challenge*. Geneva: ILO.
Ismail, Azman, Noorshafine Saudin, Yusof Ismail, Ainon Jauhariah Abu Samah, Rizal Abu Bakar, and Norish Norsiah Aminudin. 2015. Effect of Workplace Stress on Job Performance. *Economic Review: Journal of Economics and Business* 13: 45–57.
Jabbar, Muhammad Naveed, Muhammad Nawaz, Faisal Ur Rehman, Ghulam Abbas Bhatti, and Anum Choudhary. 2019. Does Optimism and Work Engagement Matter to Improve Job Performance? Am Empirical Study. *Leadership and Management in Education* 11: 170–76.
Jamieson, Jeremy P., Alia J. Crum, J. Parker Goyer, Marisa E. Marotta, and Modupe Akinola. 2018. Optimizing stress responses with reappraisal and mindset interventions: An integrated model. *Anxiety Stress & Coping* 3: 1–17.
Jedynak, Piotr, and Sylwia Bąk. 2018. The Global Risk Landscape-Its Shape, Tendencies, and Consequences for Management. *Journal of Economics and Management* 32: 48–59. [CrossRef]
Judge, Timothy A., Ronald F. Piccolo, and Remus Ilies. 2004. The Forgotten Ones? The Validity of Consideration and Initiating Structure in Leadership Research. *Journal of Applied Psychology* 89: 36–51. [CrossRef]
Jyoti, Jeevan, and Sonia Bhau. 2017. Empirical investigation of moderating and mediating variables in between transformational leadership and related outcomes: A study of higher education sector in North India. *International Journal of Educational Management* 30: 1123–49. [CrossRef]
Kašpárková, Ludmila, Martin Vaculík, Jakub Procházka, and Wilmar B. Schaufeli. 2018. Why resilient workers perform better: The roles of job satisfaction and work engagement. *Journal of Workplace Behavioral Health* 33: 43–62. [CrossRef]
Katić, Ivana, Tatjana Knežević, Nemanja Berber, Andrea Ivanišević, and Marjan Leber. 2019. The Impact of Stress on Life, Working, and Management Styles: How to Make an Organization Healthier? *Sustainability* 11: 4026. [CrossRef]
Khuong, Mai Ngoc, and Vu Hai Yen. 2016. Investigate the Effects of Job Stress on Employee Job Performance—A Case Study at Dong Xuyen Industrial. *International Journal of Trade, Economics and Finance* 7: 31. [CrossRef]
Kim, Sunhee, and Jaesun Wang. 2018. The Role of Job Demand–Resources (JDR) between Service Workers' Emotional Labor and Burnout: New Directions for Labor Policy at Local Government. *International Journal of Environmental Research and Public Health* 15: 2894. [CrossRef] [PubMed]
Klar, Hans W., and Curtis A. Brewer. 2013. Successful leadership in a rural, high-poverty school: The case of County Line Middle School. *Journal of Educational Administration* 52: 422–45. [CrossRef]
Kohntopp, Thomas, and Jack McCann. 2021. Leadership in Virtual Organizations: Influence on Workplace Engagement. *The Palgrave Handbook of Workplace Well-Being* 141: 1–26.
Kohntopp, Thomas, and J. McCann. 2019. Virtual Leadership in Organizations: Potential Competitive Advantage. *School of Management Publications* 84: 26–34.
Korsakienė, Renata, Asta Stankevičienė, Agnė Šimelytė, and Milda Talačkienė. 2015. Factors driving turnover and retention of information technology professionals. *Journal of Business Economics and Management* 16: 1–17. [CrossRef]
Kozusznik, Malgorzata Wanda, Isabel Rodríguez, and José María Peiró. 2015. Eustress and Distress Climates in Teams: Patterns and Eustress and Distress Climates in Teams. *International Journal of Stress Management Psychological Association* 22: 1–23.
Lacerenza, Christina N., Denise L. Reyes, Shannon L. Marlow, Dana L. Joseph, and Eduardo Salas. 2017. Leadership Training Design, Delivery, and Implementation: A Meta-Analysis. *Journal of Applied Psychology* 102: 1686. [CrossRef]
Layard, Richard, and Jeffrey Sachs. 2017. World Happiness. Available online: https://worldhappiness.report/ed/2017/ (accessed on 10 February 2021).
Liao, Chenwei. 2017. Human Resource Management Review Leadership in virtual teams: A multilevel perspective. *Human Resource Management Review* 27: 648–59. [CrossRef]

Liu, Shengnan, and Philip Hallinger. 2017. Principal Instructional Leadership, Teacher Self-Efficacy, and Teacher Professional Learning in China: Testing a Mediated-Effects Model. *Educational Administration Quarterly* 54: 501–28. [CrossRef]
Marfan, Javiera, and Javier Pascual. 2017. Comparative study of school principals' leadership practices: Lessons for Chile from a cross-country analysis. *Educational Management Administration & Leadership* 46: 279–300.
McCleskey, Jim Allen. 2014. Situational, transformational, and transactional leadership and leadership development. *Journal of Business Studies Quarterly* 5: 117.
McKinsey. 2020. COVID-19: Implications for Business. Available online: https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business (accessed on 15 March 2021).
Meirun, Tang, Sobia Bano, Muhammad Umair Javaid, Muhammad Zulqarnain Arshad, Muhammad Umair Shah, Umair Rehman, Zar Ayesha Parvez, and Muhammad Ilyas. 2020. Nuances of COVID-19 and Psychosocial Work Environment on Nurses' Wellbeing: The Mediating Role of Stress and Eustress in Lieu to JD-R Theory. *Frontiers in Psychology* 11: 1–11. [CrossRef] [PubMed]
Mindfulness Initiative. 2016. Building the Case for Mindfulness in the Workplace. Available online: https://mindfulnessinschools.org/wp-content/uploads/2017/09/MI_Building-the-Case_v1.1_Oct16-1.pdf (accessed on 10 March 2021).
Al-Homayan, Abdullah Mohammad, Faridahwati Mohd Shamsudin, Chandrakantan Subramaniam, and Rabiul Islam. 2013. Impacts of Job Demands on Nurses' Performance Working in Public Hospitals. *American Journal of Applied Sciences* 10: 1050–60. [CrossRef]
Myende, Phumlani Erasmus, Michael Anthony Samuel, and Ansurie Pillay. 2018. Novice rural principals' successful leadership practices in financial management: Multiple accountabilities. *South African Journal of Education* 38: 1–11.
Noman, Mohammad, Rosna Awang Hashim, and Sarimah Shaik Abdullah. 2016. Contextual leadership practices: The case of a successful school principal in Malaysia. *Educational Management Administration and Leadership* 46: 474–90. [CrossRef]
Onyema, Edeh Michael, Nwafor Chika Eucheria, Faith Ayobamidele Obafemi, Shuvro Sen, Fyneface Grace Atonye, Aabha Sharma, and Alhuseen Omar Alsayed. 2020. Impact of Coronavirus Pandemic on Education. *Journal of Education and Practice* 11: 108–21.
Pacheco, Tyler, Simon Coulombe, Christine Khalil, Sophie Meunier, Marina Doucerain, Emilie Auger, and Emily Cox. 2020. Job security and the promotion of workers' wellbeing in the midest of the COVID-19 pandemic: A study with Canadian workers one to two weeks after the initiation of social distancing measures. *International Journal of Wellbeing* 10: 58–76. [CrossRef]
Parson, Laura, Cheryl A. Hunter, and Brenda Kallio. 2016. Exploring Educational Leadership in Rural Schools. *Planning and Changing ERIC* 47: 63–81.
Patro, Chandra Sekhar, and K. Sudesh Kumar. 2019. Effect of Workplace Stress Management Strategies on Employees' Efficiency. *International Journal of Scientific Development and Research* 4: 412–18.
Piccoli, Beatrice, Antonino Callea, Flavio Urbini, Antonio Chirumbolo, Emanuela Ingusci, and Hans De Witte. 2017. Job insecurity and performance: The mediating role of organizational identification Article information. *Personnel Review* 46: 1508–22. [CrossRef]
Podsakoff, Philip M., Scott B. MacKenzie, and Nathan P. Podsakoff. 2012. Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Annual Review of Psychology* 63: 539–69. [CrossRef] [PubMed]
Pradhan, Rabindra Kumar, and Lalatendu Kesari Jena. 2017. Employee Performance at Workplace: Conceptual Model and Empirical Validation. *Business Perspectives and Research* 5: 1–17. [CrossRef]
Preston, Jane P., and Kristopher ER Barnes. 2017. Successful Leadership in Rural Schools: Cultivating Collaboration. *National Rural Education Association ERIC* 38: 6–15. [CrossRef]
Quansah, Nancy. 2013. *The Impact of HRM Practices on Organisational Performance: The Case Study of Some Selected Rural Banks*. Kumasi: Kwame Nkrumah University of Science and Technology (KNUST).
Quick, James Campbell, and Demetria F. Henderson. 2016. Occupational Stress: Preventing Suffering, Enhancing Wellbeing. *International Journal of Environmental Research and Public Health* 15: 459. [CrossRef] [PubMed]
Raza, Irfan, and Zainudin Awang. 2020. Knowledge sharing in multicultural organizations: Evidence from Pakistan. *Higher Education, Skills and Work-Based Learning* 10: 497–517. [CrossRef]
Rees, Clare S., Lauren J. Breen, Lynette Cusack, and Desley Hegney. 2015. Understanding individual resilience in the workplace: The international collaboration of workforce resilience model. *Frontiers in Psychology* 6: 73. [CrossRef]
Roche, Maree, Jarrod M. Haar, and Fred Luthans. 2014. The Role of Mindfulness and Psychological Capital on the Well-Being of Leader. *Journal of Occupational Health Psychology* 19: 476–89. [CrossRef]
Royer, Kendra Palmer. 2010. *Via Sapientiae Job Descriptions and Job Analyses in Practice: How Research and Application Differ*. Chicago: DePaul University.
Sahlin, Eva, Gunnar Ahlborg, Josefa Vega Matuszczyk, and Patrik Grahn. 2014. Nature-Based Stress Management Course for Individuals at Risk of Adverse Health Effects from Work-Related Stress-Effects on Stress Related Symptoms, Workability and Sick Leave. *International Journal of Environmental Research and Public Health* 11: 6586–611. [CrossRef]
Sahni, Jolly. 2020. Impact of COVID-19 on Employee Behavior: Stress and Coping Mechanism During WFH (Work from Home) Among Service Industry Employees. *International Journal of Operations Management* 1: 35–48. [CrossRef]
Salain, Samantha Leigh Fields. 2017. *Stress Management Training, Gender, Level of Stress, and Coping in Police Officers*. Minneapolis: Walden University.
Sanchez, Daniel Garrote, Nicolas Gomez Parra, Caglar Ozden, and Bob Rijkers. 2020. *Research & Policy Briefs Which Jobs Are Most Vulnerable to COVID-19? What an Analysis of the European Union Reveals*. Washington: World Bank Group.
Sarkar, Mustafa, and David Fletcher. 2014. Psychological resilience in sport performers: A review of stressors and protective factors. *Journal of Sports Sciences* 32: 1419–34. [CrossRef] [PubMed]

Schaufeli, Wilmar B. 2015. Engaging leadership in the job demands-resources model. *Career Development International* 20. [CrossRef]
Scheier, Michael F., and Charles S. Carver. 1985. Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health psychology: Official journal of the Division of Health Psychology, American Psychological Association* 4: 219–47. [CrossRef]
Schmidt, Gordon B. 2014. Virtual leadership: An important leadership context. *Industrial and Organizational Psychology* 7: 182–87. [CrossRef]
Selye, Hans. 1993. History of the stress concept. In *Handbook of Stress: Theoretical and Clinical Aspects*, 2nd ed. New York: Free Press, pp. 7–17.
Shah, Chintal H., and Joshua D. Brown. 2020. Reliability and Validity of the Short-Form 12 Item Version 2 (SF−12v2) Health-Related Quality of Life Survey and Disutilities Associated with Relevant Conditions in the U.S. Older Adult Population. *Journal of Clinical Medicine* 9: 661. [CrossRef]
Sonnentag, Sabine, and Caterina Schiffner. 2019. Psychological Detachment from Work during Nonwork Time and Employee Well-Being: The Role of Leader's Detachment. *The Spanish Journal of Psychology* 22: 1–9. [CrossRef]
Strauss, Karoline, Karen Niven, Charlotte R. McClelland, and Bernard K. T. Cheung. 2014. Hope and Optimism in the Face of Change: Contributions to Task Adaptivity. *Journal of Business and Psychology* 30: 733–45. [CrossRef]
Sundarasen, Sheela, Karuthan Chinna, Kamilah Kamaludin, Mohammad Nurunnabi, Gul Mohammad Baloch, Heba Bakr Khoshaim, Syed Far Abid Hossain, and Areej Sukayt. 2020. Psychological Impact of COVID-19 and Lockdown among University Students in Malaysia: Implications and Policy Recommendations. *International Journal of Environmental Research and Public Health* 17: 6206. [CrossRef]
Suneson, Grant. 2020. Industries Hit Hardest by Coronavirus in the US include Retail, Transportation, and Travel. Available online: https://eu.usatoday.com/story/money/2020/03/20/us-industries-being-devastated-by-the-coronavirus-travel-hotels-food/111431804/ (accessed on 20 April 2021).
Tuzovic, Sven, and Sertan Kabadayi. 2020. The influence of social distancing on employee wellbeing: A conceptual framework and research agenda. *Journal of Service Management* 32: 145–60. [CrossRef]
UNESCO. 2020. *2020 Global Education Meeting Extraordinary Session on Education Post-COVID-19 Background Document*. Paris: UNESCO.
Urbanaviciute, Ieva, Shagini Udayar, Christian Maggiori, and Jérôme Rossier. 2018. Precariousness Profile and Career Adaptability as Determinants of Job Insecurity: A Three-Wave Study. *Journal of Career Development* 47: 146–61. [CrossRef]
Van der Riet, Pamela, Rachel Rossiter, Dianne Kirby, Teresa Dluzewska, and Charles Harmon. 2014. Piloting a stress management and mindfulness program for undergraduate nursing students: Student feedback and lessons learned. *Nurse Education Today* 35: 44–49. [CrossRef]
Van Wingerden, Jessica, and Daantje Derks. 2018. The Effectiveness of Online Stress Management Training Interventions: A Systematic Literature Review. *International Journal of Learning and Development* 8: 57–86. [CrossRef]
Vanderhoof. 2015. Mindfulness in the Workplace. *Strategic HR Review* 17: 76–80.
Vial, Gregory. 2019. Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems* 28: 118–44. [CrossRef]
Wagstaff, Christopher Robert David, Mustafa Sarkar, Claire L. Davidson, and David Fletcher. 2017. Resilience in sport: A critical review of psychological processes, sociocultural influences, and organizational dynamics. In *The Organizational Psychology of Sport: Key Issues and Practical Applications*. Edited by Christopher Robert David Wagstaff. London: Routledge, pp. 120–49.
Wang, Wen, Kim Mather, and Roger Seifert. 2018. Job insecurity, employee anxiety, and commitment: The moderating role of collective trust in management. *Journal of Trust Research* 8: 220–37. [CrossRef]
Weber, Ellen, Eva-Helen Krehl, Marion Buettgen, and Karsten Schweiker. 2014. A resilience framework for promoting stable remission from depression. *Clinical Psychology Review* 41: 49–60.
Weber, Ellen, Eva-Helen Krehl, Marion Buettgen, and Karsten Schweikert. 2019. The Digital Leadership Framework: Insights into New Leadership Roles Facing Digital Transformation. *Academy of Management Proceedings* 2019: 13650. [CrossRef]
Webway e-Services. 2020. List of Universities in Malaysia. Available online: https://www.studymalaysia.com/education/top-stories/list-of-universities-in-malaysia (accessed on 5 January 2021).
Wieczorek, Douglas, and Carolyn Manard. 2018. Instructional Leadership Challenges and Practices of Novice Principals in Rural Schools. *Journal of Research in Rural Education* 34: 1–21.
Wilson, Jenna M., Jerin Lee, Holly N. Fitzgerald, Benjamin Oosterhoff, Baris Sevi, and Natalie J. Shook. 2020. Job Insecurity and Financial Concern during the COVID-19 Pandemic are Associated with Worse Mental Health. *Journal of Occupational and Environmental Medicine* 62: 686–91. [CrossRef]
Wolor, Christian Wiradendi, Solikhah, Nadya Fadillah, and Deniar Puji Lestari. 2020. Effectiveness of E-Training, E-Leadership, and Work Life Balance on Employee Performance during COVID-19. *Journal of Asian Finance, Economics and Business* 7: 10. [CrossRef]
Yang, Jae Won, Chunhui Suh, Chae Kwan Lee, and Byung Chul Son. 2018. The work–life balance and psychosocial well-being of South Korean workers. *Annals of Occupational and Environmental Medicine* 30: 1–7. [CrossRef] [PubMed]
Zafar, Qadoos, Ayesha Ali, Tayyab Hameed, Toqeer Ilyas, and Hafiz Imran Younas. 2015. The Influence of Job Stress on Employees Performance in Pakistan. *American Journal of Social Science Research* 1: 221–25.
Zehir, Cemal, Ahmet Üzmez, and Hacer Yıldız. 2016. The Effect of SHRM Practices on Innovation Performance: The Mediating Role of Global Capabilities. *Procedia-Social and Behavioral Sciences* 235: 797–806. [CrossRef]

Zgierska, Aleksandra, David Rabago, Neharika Chawla, Kenneth Kushner, Robert Koehler, and Alan Marlatt. 2009. Mindfulness Meditation for Substance Use Disorders: A Systematic Review. *Substance Abuse, National Institute of Health* 30: 266–94. [CrossRef]
Zhou, Xiaoyun, Centaine L. Snoswell, Louise E. Harding, Matthew Bambling, Sisira Edirippulige, Xuejun Bai, and Anthony C. Smith. 2020. The Role of Telehealth in Reducing the Mental Health Burden from COVID-19. *Telemedicine and e-Health* 26: 377–79. [CrossRef]

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Digitalisation in Hospitals in COVID-19 Times—A Case Study of the Czech Republic

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Abstract: In COVID-19 times, the healthcare system needs more financial and other resources for covering all necessary medical products and services. On the other hand, we have observed pressure on the effectiveness and optimisation of resources in hospitals and healthcare facilities. Digitalisation represents an important source of information for various levels of management in hospitals. The main aim of our research is the identification of the benefits of digitalisation of medical devices in hospitals in COVID-19 times, focusing on a case study of the Czech Republic. For our methodological approach, a literature review, data analysis, correlation analysis, and regression analysis were used. The case study presents the changes to the equipment/facilities use in years 2019 and 2020 in a selected hospital in Prague and the impact of COVID-19 on such use of resources. Management and financial issues are discussed, together with recommendations for healthcare sector management. As a result, economic benefits are represented mainly by various kinds of savings and optimisation of both processes and employees. On the other hand, it is not easy to identify all possible savings, as some of them can be in non-financial expression.

Keywords: digitalisation; hospital; optimisation of resources; equipment/facilities; COVID-19; benefits; savings

Citation: Zimmermannova, Jarmila, Lukas Pavlik, and Ekaterina Chytilova. 2022. Digitalisation in Hospitals in COVID-19 Times—A Case Study of the Czech Republic. *Economies* 10: 68. https://doi.org/10.3390/economies10030068

Academic Editor: Renata Korsakienė

Received: 14 February 2022
Accepted: 12 March 2022
Published: 17 March 2022

1. Introduction

In COVID-19 times, the healthcare system needs more financial and other resources for covering all necessary medical products and services. On the other hand, we have observed pressure on the effectiveness and optimisation of resources in hospitals and healthcare facilities. All resources should be optimized—employees, medical products, medical services, rooms, capacities. For such optimisation and decision-making, the managers need suitable data resources and well-structured data inputs. Therefore, digitalisation in hospitals can represent an important source of information for management.

Several studies have recently focused on the importance of digitalisation for modern management. Regarding general studies, Hofmann (2021) underlines that digitalisation enables new, previously unimagined, innovative business models. Companies can be faster and more flexible in developing new business ideas and new products, thanks to more direct and faster contacts and a larger amount of data. This development also leads to increasing customer demands and ever shorter reaction times.

Another study (Hoerlsberger 2019) focuses on the impact of digitisation in the industries. Based on the results, existing business models are disrupted through new technology. Thus, the author indicates that businesses today have to open up their minds to innovation and continuous learning. In the modern world, there is a definite shift towards individualised products and services as well as a unique customer experience.

Based on Gigauri (2020), management strategies need resilience, flexibility, and adaptability in digitalisation time. In the quality management (QM) area, many future digitalised solutions for improving internal work will require collaboration between functions. In this respect, the explorative-internal role of digitalisation for QM practitioners includes planning, designing, and reviewing with internal stakeholders to provide solutions that create better opportunities for the provider to offer value for the customer (Rojas et al. 2021).

Ageron et al. (2020) focused in more detail on the issues related to the digitalisation of SME supply chains and indicated that public supply chains, such as public hospitals supply chains, are under-studied.

Regarding the impacts of digitalisation on healthcare services, Iadanza and Luschi (2020) support innovative approaches in healthcare institutions. Innovation, together with digitalisation and development in health technology, contribute significantly to the quality of health care provided by various health facilities (Austin et al. 2018). Moreover, it represents new challenges for both management and staff of health care services. Health care professionals need to understand the forces that add value to the cost-effectiveness and efficiency of health care delivery systems. Based on the study performed by Blythe et al. (2019), technology and health care equipment play a significant role in health care services. It is necessary to understand the role of technology management to communicate effectively about it to health planners (Cucciniello et al. 2016). The COVID-19 situation in particular represents a big challenge for health care management and innovative approaches.

The aspects of patient safety and integration of digitalisation into the professional context necessitate an assessment of healthcare professionals' competencies in digitalisation (Basu 2020). The key competencies from a healthcare perspective include encompassing knowledge of digital technology and the digital skills required to provide good patient care, including associated social and communication skills, and ethical considerations of digitalisation in patient care (Konttila et al. 2019).

Moreover, financial benefits are linked to the use of electronic documents (Geier and Smith 2019). A good drug inventory planning system is important for efficient budgeting, procurement, and cost control of drugs. When quantities of stagnant drugs in the inventory are too much, wastage due to expired and spoiled drugs could occur. This not only causes loss of income but could also jeopardize healthcare service delivery (Dewi et al. 2020). Pouloudi and Whitley (1997) focused on drug use management information systems help to manage information on patients. Moreover, these systems can be used on drugs and their costs to monitor and evaluate the effectiveness of drug use policies (Pouloudi and Whitley 1997).

Chan et al. (2020) proposed to optimize medical expenditure by focusing on the common diagnosis segment, as this segment of individuals is one of the largest groups that drive medical claims. This analysis helps to better understand the employees' medical claims and to have an overview of the current employee health population.

Choi et al. (2013) analysed the economic effects of an electronic medical record system in hospitals that used a cost-benefit analysis based on the differential costs of managerial accounting. The benefits included cost reductions after system adoption and additional revenues both from the remodelling of paper chart storage areas and medical transcriptionists' contributions.

The digitalisation of hospitals can improve financial management (Dasgupta and Narendran 2021). Moreover, it can identify how many beds are occupied and what is the expected revenue (Kawale et al. 2020). Adopting electronic documents can save organizations money by decreasing costs associated with paper records (e.g., storage, purchasing paper, printing) and by reducing duplicate testing and other redundant interventions (Geier and Smith 2019).

Besides the economic impact of COVID-19, both public and private expenditures connected with healthcare systems are increasing for a number of reasons. Carbonaro et al. (2018) examined the links between various variables influencing economic impacts, such

as population ageing, demographic development, local economic development prospects, and financial implications. Population ageing and demographic development tend to increase the demand for health services. Burian et al. (2018) compared the consumption expenditures of households of employees with households of pensioners and identified a group of significantly higher consumption expenditures of households of pensioners. Within this group, the most significant are the health expenditures of pensioners, including expenditures on medical products, medical services, dental services, paramedical services, and hospital services.

Searching for scientific studies focused simultaneously on COVID-19, healthcare institutions, and economic impact, we found 312 studies in total, published in the period 2020–2021 in scientific journals indexed on the Web of Science database (WoS 2021). Using the WoS tool Treemap (Wilkinson 2021) shows 10 results for scientific disciplines most connected with the keywords COVID-19, healthcare, and economy (Figure 1).

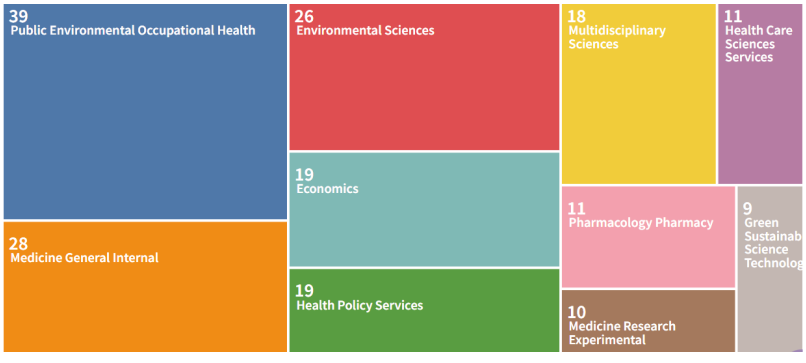

Figure 1. Scientific studies connected with the key words COVID-19, healthcare, and economy. Source: WoS (2021); own processing.

There are fewer studies focusing in more detail on the impact of COVID-19 on hospitals and their economic situation specifically. Using the keywords COVID-19, hospital, and economy, we found 124 relevant scientific studies (Figure 2). Regarding economic scientific studies, most of them are case studies, such as case studies from the United Kingdom (Mitha 2020), United States (Chen et al. 2020), Italy (Barbieri and Bonini 2021), France (Sainsaulieu 2021), and a complex study that presented an economic analysis for 94 countries (Vera-Valdés 2021).

Figure 2. Scientific studies connected with the key words COVID-19, hospital, and economy. Source: WoS (2021); own processing.

Looking for synergies between these scientific studies, there is one common link—hospital bed/beds. Such equipment is an important indicator for management and planning in hospitals. Moreover, it is a suitable indicator for the analysis of efficiency and economic approach. For example, healthcare and hospital beds are analysed in the study performed by Barbieri and Bonini (2021), while hospital beds and staff (permanent staff, administration staff, management) are focused on by Sainsaulieu (2021) and hospital beds per 1000 inhabitants are a statistically significant factor in reducing the number of deaths (Vera-Valdés 2021). Hospital bed capacity is discussed in Chen et al. (2020). The authors considered a case where HRRs share hospital beds among the neighbouring HRRs during a surge in demand beyond the available beds and the impact it has in controlling additional deaths.

Based on these studies, "use of hospital beds" was selected as an important indicator for the correlation and regression analysis also in our study.

The paper is divided as follows: key scientific studies are described in Section 1 "Introduction", Section 2 will focus on "Methodology", the key findings will be presented in Section 3, and Section 4 of the results within the broader context of answering the research questions will follow. Finally, Section 5 underline the key findings and formulate the recommendations.

2. Methodology

2.1. Data Sources

The research presented in this paper is based on the data collected in the selected hospital, obtained from the EFAS information system (EFAServices 2021), and official data of the Czech Statistical Office (CZSO 2021) and the Ministry of Health of the Czech Republic (MoH CR 2021a, 2021b).

The EFAS information system (EFAServices 2021) is primarily intended to provide facility management for healthcare organizations in digital form. From the point of view of practical use, the users of the system are managers of buildings and medical facilities. The EFAS system also offers the possibility of CAD visualization. It is, therefore, possible to create maps of the premises and individual departments of the hospital. With the help of the EFAS information system, we can obtain a very detailed overview of individual hospital departments and the use of facilities.

The identification of evidence in medical facilities in combination with one-factor or two-factor verification of the identity of the person using the device at a particular time can help set certain regime measures. These measures can then be implemented in the safety policy of the medical organization (Pavlík et al. 2021).

We worked with data on the use of equipment/facilities, provided to us by a significant hospital located in the Czech Republic, Prague. The data was extracted from a data file related to the use of equipment/facilities. In the data file, we can identify, for example, the name of the person who used the device, the name of the department, the time of start or end of the use of the device, the type of device, etc.

Based on the filtering of selected facilities, tables were compiled in which the use of selected types of facilities in a specified time range was compared. This step in the research aimed to determine the increase or decrease in the use of facilities in a particular hospital before and during the COVID-19 pandemic. For this purpose, the time interval from the end of August 2018 to March 2021 was selected. The obtained data were then processed in graphical form, which were then used for the further research purposes of this paper.

Table 1 shows the overview of all data/variables used for research presented in this paper, including abbreviations and units of the variables.

Table 1. List of variables.

Variable	Abbreviation	Unit
Equipment use frequency in hospital	EQUIP	Frequency of use per month (summary of equipment use below)
Infusion pump	INF	Frequency of use per month
Infusion pump ARGUS	INFA	Frequency of use per month
Linear dispenser	LIDI	Frequency of use per month
Injectomat	INJ	Frequency of use per month
Defibrillator LIFEPAK	DEFL	Frequency of use per month
Defibrillator	DEF	Frequency of use per month
Bed	BED	Frequency of use per month
Elegance bed	BEDE	Frequency of use per month
Lung ventilator	LUVE	Frequency of use per month
Number of COVID-19 positive people in Prague	COVP	Persons per month
Number of COVID-19 positive people	COV	Persons per month

Source: Own processing.

Table 2 summarizes the parameters of each of the variables. The minimum and maximum values, the mean, and the median are indicated for each of the variables. For the analyses, we used monthly data (monthly averages), ensuring precisely 24 observations (24 months) for each variable.

Table 2. Characteristics of variables.

Variable	Minimum	Maximum	Mean	Median
EQUIP	2865	5791	4107.292	4076
INF	827	1628	1211.625	1158
INFA	110	272	198.375	206.5
LIDI	966	2448	1576.208	1578.5
INJ	280	724	500.5	513.5
DEFL	21	162	61.91667	60.5
DEF	33	171	75.33333	69
BED	184	334	260.1667	276.5
BEDE	51	99	72.875	71
LUVE	113	200	150.2917	150
COVP	0	13,191	2143.417	0
COV	0	255,830	26,768.13	0

Source: Own processing, based on the data EFAServices (2021); CZSO (2021); MoH CR (2021a, 2021b).

2.2. Methods

As was mentioned in Section 1, the main aim of our research is the identification of the benefits of digitalisation of medical devices in hospitals in COVID-19 times, focusing on a case study of the Czech Republic. This case study presents the equipment/facilities use changes between the years 2019 and 2020 in a selected hospital in Prague and the influence of COVID-19 on the use of these resources. The possible differences in both distribution of resources and economic impact will be discussed.

The following research questions were proposed within the topic:

(RQ1). Is the impact of the COVID-19 pandemic on the distribution of resources and facility management in hospitals significant?

(RQ2). Is the digitalisation of medical devices beneficial for the selected hospital in Prague?

For our research, we used the following methods: literature review, data analysis, cost-benefit analysis, correlation analysis, and regression analysis.

Our case study will present results for the selected hospital in Prague, Czech Republic, which introduced a significant digitalisation tool (new software EFAS, described above) in 2018. The EFAS information system provides facility management for the hospital in

digital form, especially the digitalisation of medical devices. The year 2018 represented the pilot year of the software implementation; therefore, the data are not statistically relevant. For our research, we used data from the years 2019 and 2020.

Correlation analysis (Pearson's correlation coefficient) and regression analysis were carried out based on both the data collected in the selected hospital and official data of the Czech Statistical Office (CZSO 2021) and the Ministry of Health of the Czech Republic (MoH CR 2021a, 2021b) for the COVID-19 period (2020) and the previous year (2019). The possible links and connections between the variables were evaluated. The potential impact of the selected indicators in the Czech Republic was examined. The authors used linear regression models.

The key one is the general regression model MOD which counts the relation between the equipment/facilities use frequency and the number of COVID-19 positive people in the Czech Republic/number of COVID-19 positive people in Prague. The general regression equation is as follows:

$$Y = \beta 0 + \beta 1X1 + \mu \quad (1)$$

In this equation, parameters β0 and β1 represent regression coefficients that reflect the impact of the independent variable on the dependent variable. The dependent variable Y represents equipment/facilities use frequency in the hospital in Prague. The overview of such equipment/facilities used in the analysis is presented in Table 3. The parameter μ represents a random element of the model. The independent variable X1 in the regression equation is the number of COVID-19 positive people in the Czech Republic/number of COVID-19 positive people in Prague.

Table 3. Expected effect on equipment use in hospitals.

Variable	Role	Expected Effect
EQUIP	Dependent	-
INF	Dependent	-
INFA	Dependent	-
LIDI	Dependent	-
INJ	Dependent	-
DEFL	Dependent	-
DEF	Dependent	-
BED	Dependent	-
BEDE	Dependent	-
LUVE	Dependent	-
COVP	Key explanatory	Negative
COV	Control explanatory	Not clear

Source: Own processing.

Table 3 shows the overview of all variables and their expected/theoretical effect on the equipment/facilities use in a selected hospital in Prague.

3. Results

3.1. Temporal Changes in Equipment/Facilities Use

The first area of focus was on the development of COVID-19 positive citizens in the Czech Republic in 2020 (Figure 3).

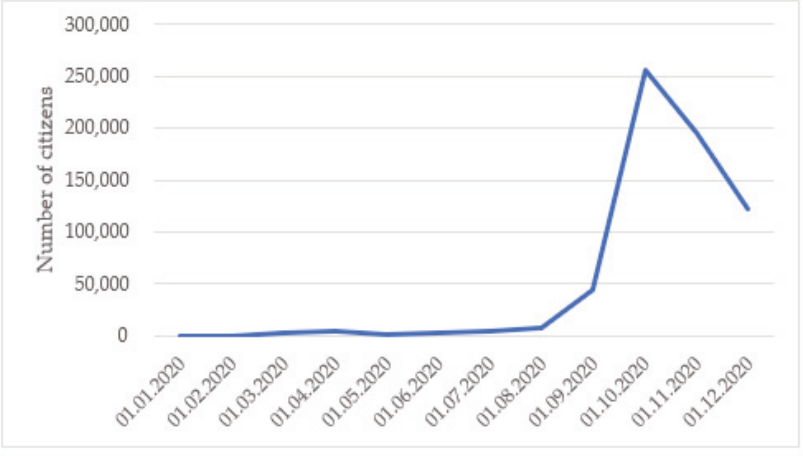

Figure 3. COVID-19 positive citizens in the Czech Republic in 2020, monthly data. Source: Own processing, based on the data CZSO (2021); MoH CR (2021a).

Regarding the situation in Prague in 2020, the development of COVID-19 positive citizens was slightly different from the whole Czech Republic, as is visible in Figures 4–6.

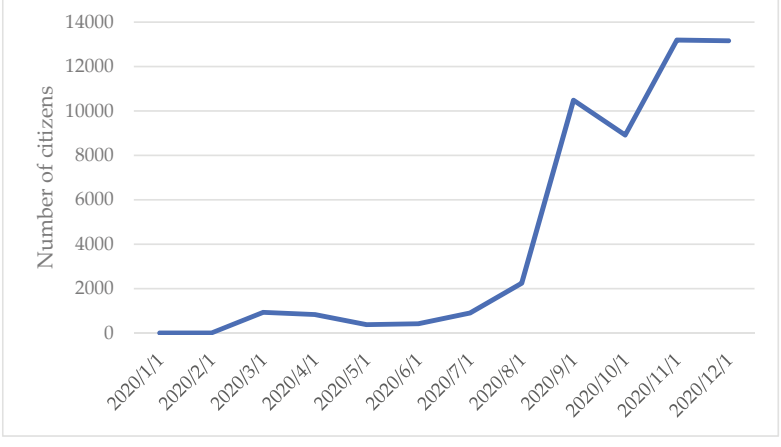

Figure 4. COVID-19 positive citizens in Prague in 2020, monthly data. Source: Own processing, based on the data CZSO (2021); MoH CR (2021b).

The increase in the number of COVID-19 positive people started earlier in Prague in 2020 than in the whole Czech Republic. Moreover, we can say that the development of time series and their peaks differ from the whole Czech Republic.

Therefore, for the case study of the selected hospital in Prague, the time series of COVID-19 positive citizens in Prague should be more significant and valuable. Concerning daily data connected with the situation in Prague in 2020, Figure 5 shows the period March–June 2020, and Figure 6 shows the development over the period July–December 2020.

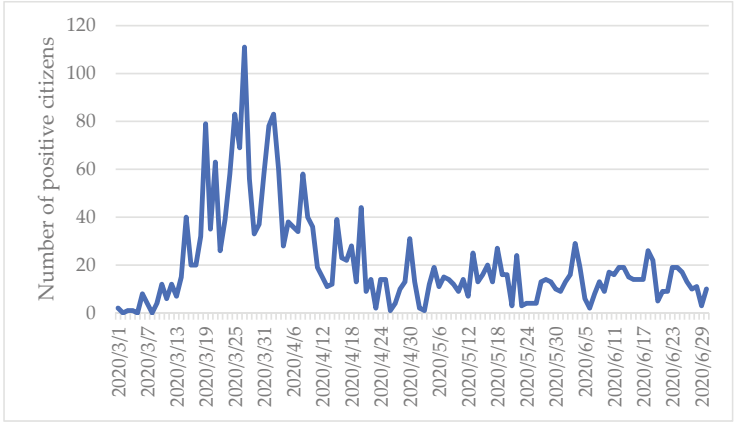

Figure 5. Increase in COVID-19 positive citizens in Prague in March–June 2020, daily data. Source: Own processing, based on the data CZSO (2021); MoH CR (2021b).

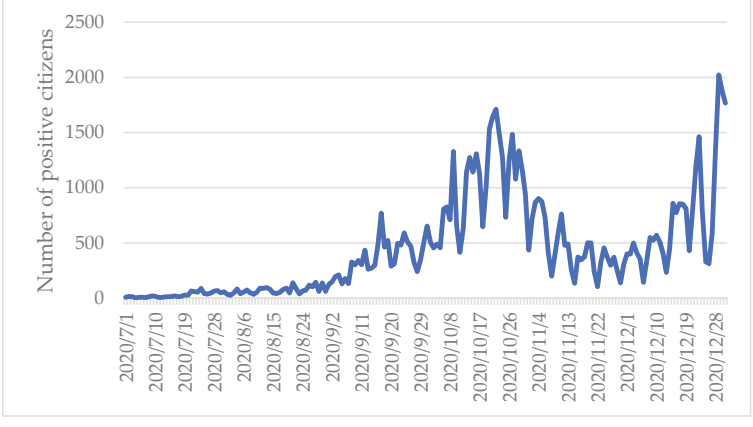

Figure 6. Increase in COVID-19 positive citizens in Prague in July–December 2020, daily data. Source: Own processing, based on the data CZSO (2021); MoH CR (2021b).

The next focus was on the aspects of the digitalisation of medical devices in the selected hospital in Prague. As was mentioned before, the new software EFAS was implemented in 2018 (the pilot year). The statistically valuable data are available for years 2019 and 2020. Figure 7 shows the development of selected equipment/facilities use in the years 2019–2020.

For COVID-19 period evaluation, Figure 6 shows equipment/facilities use in 2020 in more detail.

Observing Figures 4–6 and 8, an increase in COVID-19 positive people seems to relate to a decrease in the equipment/facilities use in the hospital. It shows a change in the distribution of resources, a decrease in the use of some equipment/facilities, and the equipment/facilities move between the departments, hospitals, and/or healthcare organizations. It can also show a change in equipment/facilities use and selected equipment move to COVID-19 departments. We will use more sophisticated tools for analysing the equipment/facilities use in the hospital in Prague, such as correlation, and regression analysis, gradually.

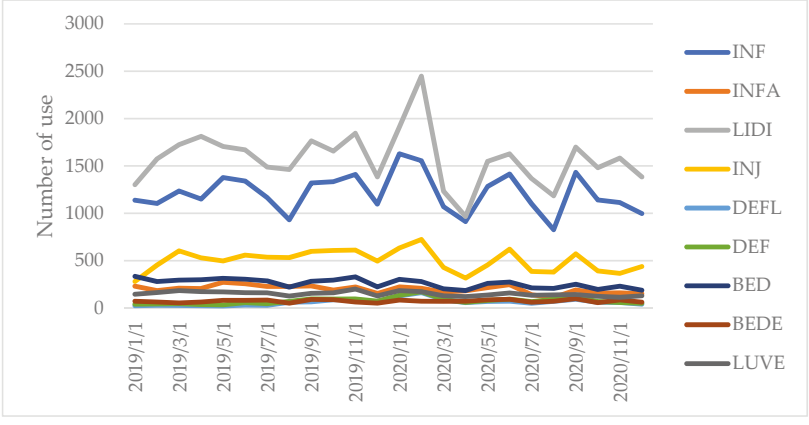

Figure 7. Equipment/facilities use in hospital in Prague in 2019–2020. Source: Own processing.

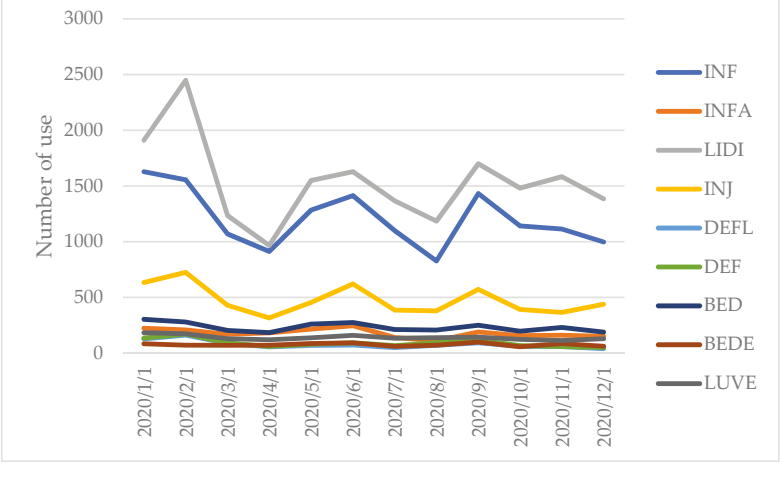

Figure 8. Equipment/facilities use in hospital in Prague in 2020. Source: Own processing.

3.2. Correlation and Regression Analysis

For the correlation analysis, variables connected with selected equipment/facilities use in the hospital in Prague and COVID-19 positive people in Prague were used. Table 4 shows the results of the correlation analysis.

With exception of elegance bed (BEDE), we can observe a negative correlation between COVID-19 positive people in Prague and equipment/facilities use in the hospital in Prague. Regarding statistical significance, there is a statistically significant correlation coefficient between COVID-19 positive people in Prague (COVP) and infusion pump ARGUS (INFA, −0.46), bed (BED, −0.49), and lung ventilator (LUVE, −0.51).

In the next step, we focused on regression analysis using variables INFA, BED, and LUVE as dependent variables and COVID-19 positive people in Prague as an independent variable. To be sure not to omit any important results, we created more regression models for all variables presented in Table 3, working with both single and multiply regression models. However, only the variables INFA, BED, and LUVE showed statistically significant results in single regression models. Such results are presented in Tables 5 and 6.

Table 4. Results of correlation analysis.

Variables	INF	INFA	LIDI	INJ	DEFL	DEF	BED	BEDE	LUVE	EQUIP	COVP
INF	1										
INFA	0.59	1									
LIDI	0.82	0.45	1								
INJ	0.75	0.49	0.82	1							
DEFL	0.49	−0.10	0.48	0.49	1						
DEF	0.55	−0.05	0.52	0.57	0.97	1					
BED	0.66	0.75	0.59	0.49	−0.07	0.002	1				
BEDE	0.52	0.37	0.21	0.23	0.23	0.31	0.31	1			
LUVE	0.68	0.57	0.69	0.70	0.12	0.19	0.83	0.11	1		
EQUIP	0.93	0.58	0.95	0.88	0.53	0.59	0.68	0.37	0.75	1	
COVP	−0.18	−0.46	−0.13	−0.30	−0.003	−0.05	−0.49	0.10	−0.51	−0.24	1

Statistical significance $p < 0.05$. Source: Own processing.

Table 5. Results of regression analysis.

	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.
Y1—INFA	0.024 **	−0.004	x	x	x	x	x	x
Y2—BED	x	x	0.014 **	−0.005	x	x	x	x
Y3—LUVE	x	x	x	x	0.011 **	−0.003	x	x
Y4—ALL	x	x	x	x	x	x	0.007 ***	−0.012
VIF	0.000		0.000		0.000		0.000	
Constant	207.460		271.524		156.122		635.106	
Observ.	310		310		310		310	
R2	0.460		0.493		0.509		0.533	
Signif.	0.024 **		0.014 **		0.011 **		0.007 ***	
DW	1.769		1.642		1.920		1.883	

Statistical significance *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: Own processing.

Table 6. Regression equations.

Model	Regression Equation
MOD1	$Y = 207.460 - 0.004\ x_1 + u$
MOD2	$Y = 271.524 - 0.005\ x_1 + u$
MOD3	$Y = 156.122 - 0.003\ x_1 + u$
MOD4	$Y = 635.106 - 0.012\ x_1 + u$

Source: Own processing.

Based on all regression models and equations, we can say that an increase in the number of COVID-19 positive people influenced a change/decrease in equipment/facilities use, such as infusion pump ARGUS, bed, and lung ventilator.

3.3. Cost-Benefit Analysis of Digitalisation of Medical Devices in Hospitals

It is not easy to identify, moreover to calculate, possible benefits and costs of digitalisation of medical devices in hospitals. In the previous chapter, the results of correlation and regression analysis show us that COVID-19 influenced the distribution of processes and equipment/facilities use in the hospital in Prague. It is connected both with the economic and financial aspects of management. However, COVID-19 is only one example of possible changes in hospital processes and facility management. It is necessary for all managers to have updated information for their decision-making.

It should be underlined that cost-benefit analysis of digitalisation of medical devices in hospitals is connected with various periods. We should distinguish between short-time and long-time costs and benefits.

Regarding the phase of implementation of digitalisation and new software in hospitals, it is clear that there are costs connected with system infrastructure, systems applications,

office administration, scanning of paper documents, technical support, and training of management and employees. The overview of such costs is described in Table 7.

Table 7. Cost-Benefit Analysis—Costs identification.

Areas	Possible Costs Identification
System infrastructure	System infrastructure costs—SW and HW; acquisition and maintenance costs
System applications	Development and maintenance costs
Office administration	PCs, monitors, printers, scanners; acquisition and maintenance costs
Scanning of paper documents	The cost of scanning existing documentation and converting materials online
Technical support	Costs connected with professionals—technicians
Management and employees	Costs of initial and ongoing training of management and responsible employees

Source: Own processing.

Most of these costs occur in a short time period. On the other hand, a long time period is connected more with possible benefits. These benefits are represented by various kinds of costs reductions and also with additional income. The overview of possible cost reduction is described in Table 8.

Table 8. Cost-Benefit Analysis—Benefits identification—Cost reduction.

Areas	Possible Benefits Identification—Cost Reduction
Time management	Time optimisation in equipment/facilities use
Paper documentation	Reduction in costs connected with storage boxes, cabinets, folders
The storage space	Reduced storage space
Management	Optimisation of processes
Employees	Reduced personnel and staff costs, optimisation of number of employees
Materials	Reduction in consumption of paper documents. Reduction of delivery materials
Orders to the departments	Minimize duplicate orders, order sets (quantity discount)
Services, outsourcing	Optimization of internal/external provision of services, cost reduction

Source: Own processing.

Generally, reduction in costs is connected with various processes and materials in the hospital, such as paper documentation, storage space, management, time management, employees, materials, orders to the departments, and services.

Besides cost reductions, digitalisation also helps to improve the income side of hospitals. The overview of possible additional income is described in Table 9.

Table 9. Cost-Benefit Analysis—Benefits identification—Additional income.

Areas	Possible Benefits Identification—Additional Income
Modified storage space	Additional annual income from the rooms
Modified occasional storage space	Additional annual income from the rooms
Medical records	Additional income from more served patients—speeding up medical records

Source: Own processing.

Free storage space (both regular and occasional) can be modified and adapted to other rooms. Moreover, hospitals can rent these rooms. Based on our case study, the hospital rented additional free rooms to providers of services connected with healthcare, such as massage salons, beauty salons, and/or nutritional counselling.

Focusing on the impact of digitalisation of medical devices in hospitals in time, based on our research, we can say that the costs occur mostly in a short time period and the benefits in a long time period.

4. Discussion

Digitalisation is one of the key tools of modern management. All its aspects now face the challenges of the post-COVID-19 period, and the process of digitalisation is very important in this development. Customization, flexibility, acceleration of all processes, and pressure to constantly streamline HR management are some of the features of modern management (Sternad Zabukovšek et al. 2021). Digitalisation permeates all spheres of business and should be an integral part of the component (active tool) of healthcare management. Generally, digital transformation relates to various fields of economic entities, including hospitals and health care facilities.

Regarding the first research question (RQ1)—"Is the impact of the COVID-19 pandemic on the distribution of resources and facility management in hospitals significant?", based on our research the answer is "rather yes". Concerning the literature review and case study data, COVID-19 caused a great acceleration in the use of technology, digitalisation of processes, and new forms of working. Moreover, COVID-19 represents a huge impetus for innovation in many sectors, including healthcare. As Fabiano (2020) highlighted: "Like a rocket blasting off for the moon, the global pandemic accelerated 20 years of pent-up innovation for the healthcare industry into 8 months." We agree with Ageron et al. (2020) and Tortorella et al. (2021) that this period is characterised by a complex and dynamic environment in hospitals, where digitalisation affects several aspects of life, such as internal logistics distribution and facility management.

A new system of distribution and connected facility management relates to financial issues. On the one side, the healthcare system needs more financial and other resources for covering all necessary medical products and services. On the other side, there is pressure on the effectiveness and optimisation of resources in hospitals and healthcare facilities. All resources are optimized—employees, medical products, medical services, rooms, and capacities. Economic optimisation represents the challenge for digitalisation and the new management approach.

Dealing with the second research question (RQ2)—"Is the digitalisation of medical devices beneficial for the selected hospital in Prague?", based on our research the answer is not so clear. Focusing on the impact of digitalisation of medical devices in hospitals in time, based on our research, we can say that the costs occur mostly in a short time period and the benefits over a long-time period. However, it is not easy to identify all possible savings, as some of them only have a non-financial expression. Therefore, the answer is "rather yes", but only over a long-time period.

Our results correspond with the study performed by Choi et al. (2013). The authors analysed the economic effects of an electronic medical record system in hospitals that used cost-benefit analysis based on the differential costs of managerial accounting. The benefits included both cost reductions and additional revenues.

As Dasgupta and Narendran (2021) underline, modern hospitals should be technologically sophisticated healthcare facilities with technologically specialised personnel. On the other hand, healthcare is a multidisciplinary sector and various professionals from different fields should cooperate. New solutions and ideas can emerge in interdisciplinary teams, using disruptive and out-of-box thinking.

Regarding this point, we agree with Ageron et al. (2020) that researchers should focus in more detail on the issues related to the digitalisation of public supply chains, such as public hospitals supply chains, which are under-studied. Innovations and developments in health technology can contribute significantly to the quality of health care provided by various health facilities, but have also brought new challenges in the management of health care services. Health service planners, hospital administrators, physicians, and other health

care professionals need to understand the forces that add value to the cost-effectiveness and efficiency of health care delivery systems.

Concerning further research, firstly, 2021 should be examined. This "second COVID-19 year" has specific characteristics, such as vaccination, new tools in hospitals, and a new managerial approach. Simultaneously, the economic impacts of COVID-19 are increasing. Secondly, qualitative research can help to add the personal view of employees and managers. The presented analysis is based on a dataset extracted from system EFAS. Expert interviews with managers can represent valuable input to the overall picture of the hospital.

5. Conclusions

Generally, COVID-19 has been a huge accelerator for R&D, innovation, optimization, and new ideas. Technology and health care equipment/facilities play a significant role in health care services. Therefore, effective facility management can contribute to the improvement of healthcare.

The main aim of our research was the identification of the benefits of digitalisation of medical devices in hospitals in COVID-19 times, focusing on a case study in the Czech Republic. Our methodological approach included a literature review, data analysis, correlation analysis, and regression analysis. The case study presented the changes of the equipment/facilities use in 2019 and 2020 in a selected hospital in Prague and the impact of COVID-19 on the use of these resources. Management and financial issues were discussed. Based on the results, COVID-19 influenced both the distribution of resources and facility management in hospitals. Economic benefits are represented mainly by various kinds of savings and optimization of both processes and employees.

It is clear that digitalisation represents an important source of information for management in hospitals. Based on the presented research, we can recommend digitalisation as a suitable tool for managers and headquarters in hospitals. They can easily observe all processes and persons and optimize the healthcare services provided.

Author Contributions: Conceptualization, J.Z.; methodology, J.Z.; software, L.P.; validation, E.C.; formal analysis, E.C.; investigation, L.P.; resources, L.P.; data curation, E.C.; writing—original draft preparation, J.Z.; writing—review and editing, L.P.; visualization, J.Z.; supervision, J.Z.; project administration, E.C.; funding acquisition, J.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by European Commission, project EFAS Season One CZ.01.1.02/0.0/0.0/19_274/0018/365, project ROKA, number CZ.02.2.69/0.0/0.0/18_054/0014592, and project EFAS Season Two CZ.01.1.02/0.0/0.0/20_321/0024495.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data supporting reported results are available after request.

Conflicts of Interest: The authors declare no conflict of interest.

References

Ageron, Blandine, Omar Bentahar, and Angappa Gunasekaran. 2020. Digital supply chain: Challenges and future directions. *Supply Chain Forum: An International Journal* 21: 133–38. [CrossRef]

Austin, Jodie A., Ian R. Smith, and Amina Tariq. 2018. The impact of closed-loop electronic medication management on time to first dose: A comparative study between paper and digital hospital environments. *International Journal of Pharmacy Practice* 26: 526–33. [CrossRef]

Barbieri, Paolo Nicola, and Beatrice Bonini. 2021. Political orientation and adherence to social distancing during the COVID-19 pandemic in Italy. *Economia Politica* 38: 483–504. [CrossRef]

Basu, Santanu. 2020. Modelling to Predict Hospital Bed Requirements for COVID-19 Patients in California. *medRxiv*. [CrossRef]

Blythe, Robin, Shamesh Naidoo, Cameron Abbott, Geoffrey Bryant, Amanda Dines, and Nicholas Graves. 2019. Development and pilot of a multicriteria decision analysis (MCDA) tool for health services administrators. *BMJ Open* 9: e025752. [CrossRef] [PubMed]

Burian, Jaroslav, Karel Macků, Jarmila Zimmermannová, and Barbora Kočvarová. 2018. Spatio-temporal changes and dependencies of land prices: A case study of the city of Olomouc. *Sustainability* 10: 4831. [CrossRef]

Carbonaro, Gianni, Eugenio Leanza, Philip McCann, and Francesca Medda. 2018. Demographic Decline, Population Aging, and Modern Financial Approaches to Urban Policy. *International Regional Science Review* 41: 210–32. [CrossRef]
Chen, Jiangzhuo, Anil Vullikanti, Stefan Hoops, Henning Mortveit, Bryan Lewis, Srinivasan Venkatramanan, Wen You, Stephen Eubank, Madhav Marathe, Chris Barrett, and et al. 2020. Medical costs of keeping the US economy open during COVID-19. *Scientific Reports* 10: 18422. [CrossRef] [PubMed]
Chan, Khin Whai, Angela Siew Hoong Lee, and Zuraini Zainol. 2020. Profiling Patterns in Healthcare System: A Preliminary Study. *International Journal of Advanced Computer Science and Applications* 11: 661–68. [CrossRef]
Choi, Jong Soo, Woo Baik Lee, and Poong-Lyul Rhee. 2013. Cost-benefit analysis of electronic medical record system at a tertiary care hospital. *Healthcare Informatics Research* 19: 205–14. [CrossRef]
Cucciniello, Maria, Irvine Lapsley, and Greta Nasi. 2016. Managing health care in the digital world: A comparative analysis. *Health Services Management Research* 29: 132–42. [CrossRef]
Czech Statistical Office (CZSO). 2021. Healthcare Statistics. Available online: https://www.czso.cz/csu/czso/health_care_lide (accessed on 17 November 2021).
Dasgupta, Prasanjit, and Rajeshwari Narendran. 2021. Strategies to Survive in Post-COVID 19 Pandemic Era: A Case Study on a Service Provider. *IIUM Journal of Case Studies in Management* 12: 28–39.
Dewi, EErtha Kusuma, Maznah Dahlui, Djazuly Chalidyanto, and Thinni Nurul Rochmah. 2020. Achieving cost-efficient management of drug supply via economic order quantity and minimum-maximum stock level. *Expert Review of Pharmacoeconomics & Outcomes Research* 20: 289–94. [CrossRef]
EFAServices. 2021. Informační Systém EFAS (Information System EFAS). Available online: http://www.efaservices.cz/informacni-system-efas.html (accessed on 10 October 2021).
Fabiano, Lindsey. 2020. 2021 on the Horizon: How Crisis Drives Innovation and What It Means for the Future of Healthcare. LinkedIn. Available online: https://www.linkedin.com/pulse/2021-horizon-how-crisis-drives-innovation-what-means-fabiano-mba/ (accessed on 15 April 2021).
Geier, Ann, and Daren Smith. 2019. The Role of Electronic Documentation in Ambulatory Surgery Centers. *AORN Journal* 109: 444–50. [CrossRef] [PubMed]
Gigauri, Iza. 2020. Influence of COVID-19 Crisis on Human Resource Management and Companies' Response: The Expert Study. *International Journal of Management Science and Business Administration* 6: 15–24. [CrossRef]
Hoerlsberger, Marianne. 2019. Innovation management in a digital world. *Journal of Manufacturing Technology Management* 30: 1117–26. [CrossRef]
Hofmann, Martin. 2021. Influence of Digitalisation on Process Optimisation. In *A Holistic Approach to Process Optimisation. Management for Professionals*. Wiesbaden: Springer. [CrossRef]
Iadanza, Ernesto, and Alessio Luschi. 2020. An integrated custom decision-support computer aided facility management informative system for healthcare facilities and analysis. *Health and Technology* 10: 135–45. [CrossRef]
Kawale, Paul, Liz Grant, and Claudia Pagliari. 2020. Digital health and financial good-governance: A mixed methods study of patient revenue capture in Malawi. *Journal of Global Health Reports* 4: e2020008. [CrossRef]
Konttila, Jenni, Heidi Siira, Helvi Kyngäs, Minna Lahtinen, Satu Elo, Maria Kääriäinen, Pirjo Kaakinen, Anne Oikarinen, Miyae Yamakawa, Sakiko Fukui, and et al. 2019. Healthcare professionals' competence in digitalisation: A systematic review. *Journal of Clinical Nursing* 28: 745–61. [CrossRef] [PubMed]
Mitha, Sam. 2020. UK COVID-19 diary: Policy and impacts. *National Tax Journal* 73: 847–78. [CrossRef]
Ministry of Health of the Czech Republic (MoH CR). 2021a. COVID-19 Statistics for Prague. Available online: https://onemocneni-aktualne.mzcr.cz/covid-19/kraje/PHA (accessed on 17 November 2021).
Ministry of Health of the Czech Republic (MoH CR). 2021b. COVID-19 Statistics for the Czech Republic. Available online: https://onemocneni-aktualne.mzcr.cz/covid-19 (accessed on 17 November 2021).
Pavlík, Lukáš, Ekaterina Chytilová, and Jarmila Zimmermannová. 2021. Security Aspects of Healthcare Organization from the Perspective of Digitization of Facility Management. *WSEAS Transactions on Business and Economics* 18: 360–66. [CrossRef]
Pouloudi, Athanasia, and Edgar A. Whitley. 1997. Stakeholder identification in inter-organizational systems: Gaining insights for drug use management systems. *European Journal of Information Systems* 6: 1–14. [CrossRef]
Rojas, Carolina I., Julio A. Pertuze, Amanda J. Williamson, Antoine Gilbert-Saad, and Luis F. Alarcón. 2021. Standardization can be good for exploration: A social capital view of the productivity dilemma in operational teams. *Production Planning & Control*. [CrossRef]
Sainsaulieu, Ivan. 2021. Over-Mobilization, Poor Integration of Care Groups: The French Hospital System in the Face of the Pandemic. In *Forum for Social Economics*. London: Routledge. [CrossRef]
Sternad Zabukovšek, Simona, Polona Tominc, Tjaša Štrukelj, and Samo Bobek. 2021. *Digitalna Transformacija in Poslovne Informacijske Rešitve—Digital Transformation and Business Information Solution*. Harlow: Pearson.
Tortorella, Guilherme, Guillermo Moliner Farjas, and Wen Li. 2021. Reliability of internal logistics distribution in a hospital. *The TQM Journal* 33: 596–617. [CrossRef]
Vera-Valdés, J. Eduardo. 2021. The political risk factors of COVID-19. *International Review of Applied Economics* 35: 269–87. [CrossRef]

Wilkinson, Joanna. 2021. Citation Analysis: How to Calibrate Your Library Collection in Uncertain Times. *Clarivate.* Available online: https://clarivate.com/blog/citation-analysis-for-collection-management/ (accessed on 9 May 2021).
Web of Science (WoS). 2021. Treemap. Analytical Tool. Available online: https://www.webofscience.com/wos/woscc/analyze-results/ (accessed on 28 December 2021).

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Leadership Styles, High-Involvement Human Resource Management Practices, and Individual Employee Performance in Small and Medium Enterprises in the Digital Era

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Abstract: This research investigates the positive relationship between leadership styles, high-involvement human resource management practices, and individual employee performance. In this study, we adopt servant, shared, and empowering leadership to explain leadership styles in the digital era. We propose four hypotheses and design a research framework to be analyzed. We develop a self-report questionnaire and distribute it online to three hundred targeted respondents, and collect two hundred and seventy-six complete responses from November 2021 to January 2022. This research applies a quantitative method, using structural equation modeling run by SPSS and AMOS. The results reveal well-distributed data, and all the indicators of the three variables are valid and reliable. The use of CFA confirms the indicators' validity and reliability. The GoF analysis ensures that the research model is feasible for SMEs. The hypothesis analysis shows the acceptance of H1 and H3, but the rejection of H2 and H4. Leadership styles positively affect individual employee performance and high-involvement human resource management practices in SMEs operating in Lubuklinggau. High-involvement human resource management is not a mediator of the relationship between leadership styles and individual employee performance.

Keywords: leadership styles; high-involvement human resource management practices; employee performance; small and medium enterprises; digital era

Citation: Cahyadi, Afriyadi, Taufiq Marwa, István Hágen, Mohammed Nuru Siraj, Parama Santati, József Poór, and Katalin Szabó. 2022. Leadership Styles, High-Involvement Human Resource Management Practices, and Individual Employee Performance in Small and Medium Enterprises in the Digital Era. *Economies* 10: 162. https://doi.org/10.3390/economies10070162

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 4 May 2022
Accepted: 8 June 2022
Published: 5 July 2022

1. Introduction

Economic and social forces have changed the models, strategies, structures, and processes of traditional business (Muafi et al. 2021). The new business opportunities related to these developments reduce international development inequality (Tayibnapis et al. 2018), local use and spatial effects (Mossberger et al. 2022), and encourage uniformity across industries (Reuschke et al. 2022). Leadership and human resource management (HRM) are crucial for companies using digital technology because of the transformation of human capital due to technological development (Grigorescu et al. 2021). Business leaders and HR managers are agents of digital change in the world of work. These leaders must adopt effective styles in their leadership. They must serve, share, and empower their employees. Credibility, competence, communication, coordination, and participation from employees reflect the success of leadership styles in the digital era. At the same time, HR managers must work with an appropriate approach to ensure the high performance of their employees. They need to conduct dialogue-based and open HRM practices (HRMPs)

to ensure acceptance from their employees. HR planning (HRP), training, compensation, and occupational safety and health (OSH) are not separate from digital transformation for companies.

Three leadership styles (LSs) for SMEs that are now emerging in the digital era are based on service from leaders to employees, interaction between leaders and employees, and empowerment from leaders to employees. These styles can be denoted as servant, shared, and empowering leadership. Different leadership styles relate to HRM from different perspectives. When servant, shared, and empowering leadership align with digitization, their relationship with IEP is interesting to study. Leadership styles are related to employee performance (Megawaty et al. 2022), as are HRMPs (Dela Crus and Cabaluna 2022). HRP, training, compensation, and OHS are HRMPs that are important and relevant to study in the digital economy. The basic idea of high-involvement human resource management practices (HIHRMPs) is to increase employees' motivation by developing their knowledge, skills, and abilities directly towards organizational issues (Rubel et al. 2016). HIHRMPs help employees to participate in the creation of attractive practices in companies (Renkema et al. 2021). SMEs need IT skills to prepare their digital businesses and resources (Wiliandri 2020). However, studies on the relationship between LSs, HIHRMPs, and employee performance are difficult to find.

Researchers have investigated servant, shared, and empowering leadership in various contexts, such as the digital economy and in small and medium enterprises (SMEs). For example, we found more than sixteen thousand results when we entered the keywords, "servant leadership, shared leadership, empowering leadership in the digital economy", in Google Scholar in mid-April 2022 (14 April 2022), and more than thirteen thousand results appeared for the keywords, "servant leadership, shared leadership, empowering leadership in SMEs". However, these results were generally studies conducted in a compartmentalized manner, offering no overarching measures to leaders seeking to apply a single leadership style. Research results that combine servant, shared, and empowering leadership are rare in various scientific journal databases, such as Scopus, Web of Science, PubMed, and Crossref, especially for the digital economy and SMEs. Meanwhile, HRMP studies on companies have not led to a viable approach that promotes dialogue and openness in these contexts. They are limited to the investigation of the role of HRM in the digital economy and, vice versa, the role of digitization in HRM.

Information technology (IT) expert Don Tapscott introduced the concept of the digital economy in his book, entitled *The Digital Economy in 1994: Promise and Peril in the Age of Networked Intelligence* (Teiușan and Deaconu 2021). Subsequently, Nicholas Negroponte reintroduced it from the University of Massachusetts in 1995 (Narmanov 2022). Indonesia has utilized technological developments over the last thirty years to enable all Indonesians to become part of the digital economy in Southeast Asia (Barata 2019). One of the economic effects is the increasing number of SMEs opening in Indonesia (Arief et al. 2021). These businesses drive the Indonesian economy, making up 99.9 percent of the total companies in Indonesia (Haryati et al. 2021). Furthermore, they drive digital change through their pursuit of competitive advantages in the context of sustainable competition (Fachrunnisa et al. 2020) in the era of the Industrial Revolution 4.0, characterized by the application of digital technology, big data, IoT, and robotics technology. The Indonesian government initiated a strategic plan focused on SMEs. Its aims were to encourage their participation in building the national economy, develop a roadmap of e-commerce based on the synchronization of thirty-nine strategic initiatives across eight ministries, establish friendly foreign direct investment policies to attract techno-based investment and strengthen the domestic base of venture capital, facilitate access to funding, enable the digitization of SMEs and the rapid growth of quality start-ups, and adopt pro-innovation policies (Ramli 2020). The large population and the fragmented geography of Indonesia are good reasons for SMEs to adopt e-commerce (Rahayu and Day 2017).

The adoption of digitization varies from using computers or the Internet to modern technologies such as cloud computing or big data. It even involves business models based

on digital products and services, or using elements from Industry 4.0 (Zimmermann 2016). The Internet enables automation and coordination, communication and collaboration, expands trade, creates jobs, and improves access to services (Falentina et al. 2021). Lubuklinggau is a city at the westernmost district level in South Sumatra province, Indonesia. LSs and HIHRMPs for SMEs in this city are interesting to study. Based on data from the Central Bureau of Statistics of Lubuklinggau accessed on 14 April 2022, more than five thousand SMEs were operating in this city in 2020. The economy grew in 2021, with the economic structure comprising construction, wholesale and retail trade, the repair of cars and motorcycles, real estate, manufacturing, transportation, and warehousing industries.

This research aims to identify the positive effects of servant, shared and empowering leadership styles on individual employee performance (IEP) mediated by HIHRMPs. Researchers have widely studied the causal relationship between LSs, HRMPs, and EP. However, it is rare to find research explaining this relationship in the context of the digital economy. Although many studies discuss the relationship between LSs and HRMPs, they are not in the context of the digital economy. When entering the keywords of leadership styles, HRM, and digital economy into Google and Google Scholar in mid-April 2022, we found that many research results focus on leadership and HRM in digitalization. However, they did not relate to each other in this context.

After this introductory section, we describe the relationship between LSs, HIHRMPs, and IEP in the literature review section. We propose four hypotheses regarding this relationship that form the basis of the research framework in this section. The following sections are the Methodology, Results and Discussion, and Conclusions. We describe the data used and the process for collecting them, the types of statistical analysis used, and the research instruments used in the methodology section. We present the Results and Discussion sections separately for a more detailed understanding. Then, we conclude in the context of the digital economy.

2. Literature Review

Amid an economy hit by the COVID-19 crisis, company leaders and managers must think critically to maintain the performance of their employees. Researchers have proven that the main challenges faced by SMEs in the time of COVID-19 include decreased customer purchasing power, restrictions on interaction and working hours, shortages of raw materials, cancellation of orders, cash flow difficulties, and supply chain disruption (Priyono et al. 2020). Of course, this requires effective leadership styles and an effective approach of HRM to realize employee performance.

2.1. LSs and IEP

Enterprise digitization involves the ability to convert existing products into digital variants. This advantage is crucial for today and future competition. Over the past two decades, this has challenged companies of all sizes and ages (Rossato and Castellani 2020). The digital era demands all employees in companies to work with high motivation, productivity, and task performance. These three requirements represent IEP (Leroy et al. 2018; Marescaux et al. 2019; He et al. 2021). LSs and HRMPs have roles in meeting these demands.

Greenleaf, 1970, introduced the concept of servant leadership (Winston 2022). Then, Eva et al., 2019, re-explained its essence (Aboramadan et al. 2022). This leadership emphasizes ethical, spiritual, and communal values. It is a particular style of prosocial leadership (Neubert et al. 2022). It is also service-oriented, knowledge-based, participatory, process-related, ethical, and socially responsible, reducing scandals or conflicts in organizations (Tantri et al. 2022). Servant leaders fulfill the psychological needs of followers through autonomy, relatedness, and competence (Kaltiainen and Hakanen 2022). They provide psychological resources to employees to deal with their job (Ruiz-Palomino et al. 2022), place the welfare of their followers above their own (Lv et al. 2022), contribute to overall employee development (Kumar et al. 2022), and engage employees in emotion and spirit

(Uymaz and Arslan 2022). Indeed, servant leaders service their employees individually, increasing credibility, competency, and communication (Russell and Stone 2002).

The idea of shared leadership has historical roots; almost a century ago, Follett suggested in 1924 that one should look not only to the designated leader but also to others on the team for leadership (D'Innocenzo et al. 2021). Then, Gibb introduced this form of leadership in 1954 (Salas-Vallina et al. 2022). Researchers have explained this leadership with different definitions and conceptualizations (Klasmeier and Rowold 2022). They have described that lateral influence among peers, team phenomenon emergence, and influence spreading across team members existing in this leadership type (Zhu et al. 2018). They have also described that while explained in any disciplines, they are still very much in their nascent stage with many theoretical approaches (Scott-Young et al. 2019). The leaders imply that members have the autonomy and discretion to make decisions and carry out actions (Liang et al. 2021) and encourage individuals to step forward to lead others or withdraw to lead others in the situation (Castellano et al. 2021). Contemporary organizational research recognizes shared leadership (Sinha et al. 2021). Indeed, shared leaders service the employee by coordinating with teamwork formally and informally (Song et al. 2020).

Researchers call for empowering leadership that creates a conducive environment that reduces feelings of powerlessness for high individual self-efficacy and control (Rohlfer et al. 2022; Lin et al. 2022). They understand that the historical development of empowering leadership coincides with leaders' superiority and employee self-esteem (Cheong et al. 2019). Researchers have also proven that this leadership form enables employees to achieve company goals by delegating responsibility, authority, influence, and power from the leaders to them. Indeed, empowering leaders consult with their employees about strategic decisions, employee abilities, and rules and regulations (Naqshbandi et al. 2018).

Recent research results show that servant leadership relates to IEP and affects employee motivation (Tran and Truong 2021), job performance (Alahbabi et al. 2021), and employee performance (Wanta and Augustine 2021; Pratiwi and Nawangsari 2021). This relationship can indirectly occur, for example, servant leadership and task performance are mediated by work engagement (Kaltiainen and Hakanen 2022; Peng and Chen 2021), and servant leadership and job performance by trust and knowledge sharing (Kadarusman and Bunyamin 2021). Shared leadership relates to employee performance (Ahmed et al. 2022; Ali et al. 2018) and individual performance (Humborstad et al. 2014). Indirectly, shared leadership relates to employee task performance and is mediated by employee feedback-seeking behavior (Qian et al. 2018) and employee motivation (Kim et al. 2018). Shared leadership also indirectly relates to adaptive performance through the mediating role of proactive behavior (Fu et al. 2020). Empowering leadership relates directly or indirectly to employee performance (Ali et al. 2018). Empowering leadership relates to employee performance (Kim et al. 2018; Ahmed et al. 2022). Researchers have found a positive relationship between employee psychological empowerment and performance over the last two decades (Shi et al. 2022). Empowering leadership is a specific set of leader behaviors about delegating authority and increasing individual motivation towards their tasks (Cheong et al. 2019). Based on the causal relationship between LSs and IEP, we assume that servant, shared, and empowering leadership improve IEP.

Hypothesis 1 (H1). *Positively, LSs in the scope of the servant, shared, and empowering leadership affect IEP.*

2.2. HIHRMPs and IEP for Sustainability

Researchers have agreed that SHRM includes many practices such as recruitment, training, performance appraisal, career management, and compensation (Da Silva et al. 2020; Alsafadi and Altahat 2021; Shaukat et al. 2015; Tabiu et al. 2016; Manzoor et al. 2019). They have also agreed that HIHRMPs emerge when employees have well-developed skills, the motivation to apply them, and platforms through which to contribute them (Huo

et al. 2015; Leroy et al. 2018). High involvement by employees supports the work of HR managers in realizing sustainability for a company.

The main objective of HRP is to ensure the best level of interaction between employees and their jobs (Gautam and Raj 2018). It is a procedure for anticipating and preparing for the departure of retiring workers and also replacing them with new workers (Ellinger and Svendsen 2021). HRP is one of the leading strategies to improve employee performance through detection (Muma et al. 2018). It is a rational and planned approach to staff recruitment, retention, utilization, and performance (Mansaray 2019). HRP includes obtaining the number of qualified employees and the appropriate employee allocation for improving productivity (Gomathy et al. 2022). Researchers have studied the relationship between recruitment and selection in HRP and employee performance (Al Qudah et al. 2014).

Training is a process relating to employee cognitive disposition to conform to an organization's expectations (John and Dickson 2022). Researchers have explained that it can be a systematic process or a learning experience of acquiring knowledge, skills, abilities, and attitudes and behaviors to meet job requirements (Karim 2019). Training builds original HRs through developing task-related skills and knowledge in education (Sung and Choi 2018). Researchers have explained that training is a business activity, a short-term educational process, and a planning process for developing attitudes, knowledge, or artistic experience through learning to improve performance (Rahayu et al. 2019). It relates to employee performance (Pramono and Prahiawan 2022; Handayani and Kasidin 2022; Arwab et al. 2022) and motivation (Tumi et al. 2021). Training increases productivity (Abba 2018).

Compensation is a tool that organizations use to influence employee behavior to increase their contribution and achieve organizational goals (Tumi et al. 2021). It refers to all forms of financial returns, tangible services, and benefits employees receive (Mohammed et al. 2022). Researchers have revealed that compensation refers to basic salaries and additional wages such as overtime pay in meeting needs and salary satisfaction (Widhy et al. 2021). Compensation includes all employee rewards for contributions made to companies (Nguyen et al. 2020) and relates to employee performance (Ramli 2020; Pratibha 2022; Jean et al. 2017).

OSH is an aspect of employee welfare that includes happiness and relationships (De Cieri and Lazarova 2021). The superintelligence revolution, based on the Internet of Things, cyber–physical systems, and artificial intelligence (AI), requires OSH (Min et al. 2019). Occupational health systems in companies also require organizational leaders and managers to take over responsibility (Silva and Amaral 2019). Researchers have found a relationship between OSH and employee well-being (Diaz-Carrion et al. 2019). It is a core responsibility of the HRM (Fan et al. 2020) that impacts on the economy (Mwangi and Waiganjo 2017). Researchers have integrated OSH management and operations management (Hasle et al. 2021). Its implementation creates work safety, reduces accidents (Ilyas et al. 2021), determines work motivation among employees (Nkrumah et al. 2021), and improves employee performance (Ekowati 2019).

Researchers have agreed that employee performance constitutes the quality and quantity of work achieved by an employee in carrying out the responsibilities assigned based on the standards set by the organization (Idris et al. 2022). Achieving a high level of performance through productivity has become the goal for the company (Kazmi and Javaid 2022). Thus, individual performance is appropriate to study in terms of motivation, productivity, and task performance. Employee performance includes high motivation and productivity (Leroy et al. 2018) and task performance (He et al. 2021; Marescaux et al. 2019). Companies will easily achieve their target organizational performance when employees reach the predetermined target. The performance of an organization reflects the performance of the employees who work in it.

Hypothesis 2 (H2). *HIHRMPSs in the scope of HRP, training, compensation, and OSH positively affect IEP.*

2.3. LSs and HIHRMPs

Leadership and HRM can interact when shaping various outcomes (Zhao et al. 2020), for example, they have an impact on employee performance. Indeed, leadership relates to HRMP (Demo et al. 2022). Different leadership styles relate to HRM from different perspectives, for example, green transformational leadership, green HRM (Zhao and Huang 2022), transformational leadership, and HRM practices (Kloutsiniotis et al. 2022; AlAbri et al. 2022). Thus, leadership in serving, sharing, and empowerment can relate to HRMP in the scope of HRP, training, compensation, and OSH. Rotundo and Sackett, 2002, explained that employee performance is a controlled behavior to support organizational goals (Lyubykh et al. 2022).

Hypothesis 3 (H3). *LSs in the scope of servant, shared and empowering leadership positively affect HIHRMPs.*

Hypothesis 4 (H4). *HIHRMPs in the scope of HRP, training, compensation, and OSH mediate the positive relationship between LSs and IEP.*

2.4. Research Framework

Based on the above hypotheses, we describe the research framework as shown in Figure 1. LSs are the independent variable that positively affect IEP and HIHRMPs. HIHRMPs are the mediating variable that positively affect IEP, which is the dependent variable.

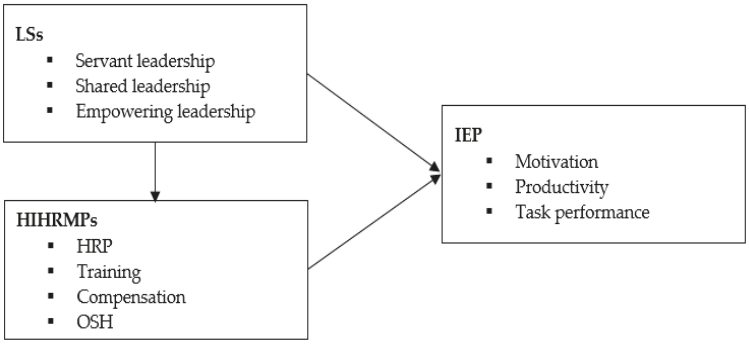

Figure 1. The positive relationship between LSs, HIHRMPs, and IEP.

3. Methodology

This research implements an explanatory approach that explains the relationship between the three variables measured based on existing theories. We measure LSs for the first indicator by service by the leaders in increasing credibility, competence, and communication among their employees. Formal and informal leader coordination with employee work teams indicates the sharing LS. The opportunities provided by leaders to employees to participate in making decisions characterize empowering LSs. We measure HIHRMPs by well-developed skills, motivation, and platforms owned by employees in HRP, training, compensation, and OSH. We measure IEP by motivation, productivity, and the task performance of employees. All measures of these three variables form the basis for developing a self-report questionnaire, as shown in Table 1. It contains six questions for LSs, four questions for HIHRMPs, and three for IEP. We use demographic characteristics consisting of gender, age, formal education, and work experience to describe the respondent's profile, as shown in Table 2.

Table 1. Questionnaire development.

No.	Indicators	Sources
	LSs: The chief executive officer of my company . . .	
1	Provides services to me in increasing my credibility and competence in working (servant leadership: X1.1).	(Russell and Stone 2002)
2	Provides services to me in improving communication skills (servant leadership: X1.2).	
3	Interacts formally in the coordination of my teamwork (shared leadership: X1.3).	(Song et al. 2020)
4	Interacts informally in the coordination of my work team (shared leadership: X1.4).	
5	Involves my participation in managerial decision-making (empowering leadership: X1.5).	(Naqshbandi et al. 2018)
6	Makes managerial decisions according to my participation (empowering leadership: X1.6).	
	HIHRMPs: I have well-developed skills, motivation, and platform to apply them in . . .	
7	HRP (X2.1).	(Huo et al. 2015; Leroy et al. 2018)
8	Training (X2.2).	
9	Compensation (X2.3).	
10	OSH (X2.4).	
	IEP: I have . . .	
11	High motivation at work (Y1).	(Leroy et al. 2018)
12	High productivity at work (Y2).	
13	high performance in completing tasks of work (Y3).	(He et al. 2021; Marescaux et al. 2019)

Table 2. Profile of respondents.

Demography	Percentage (%)
Gender	Female (44.56); Male (55.43)
Age	20–30 years old (23.55); 31–40 years old; (30.07); 41–50 years old (20.28); >50 years old (26.09)
Education	High schools (60); Universities (40)
Work experience	<5 years (26%); 5–10 years (55); >10 years (18.84)

The questionnaire was created online in Google Forms format and distributed to respondents with a target of 300 people. They were employees of SMEs in Lubuklinggau. We used the snowball sampling method by utilizing the social media platforms of WhatsApp and Messenger to distribute the questionnaire to respondents from November 2021 to January 2022. This method was adequate for the development of information technology for the people in the city. We provided a 5-point Likert scale to classify their answers, namely, strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). We did not ask for respondents' identities or their companies' identities. The cross-sectional data that we collected came to a total of 276 samples, and was then processed using SPSS and AMOS, which are programs appropriate for covariance-based structural equation modeling (CB-SEM) with more than 200 samples.

4. Results

We tested common method bias (CMB), validity, and reliability before testing and analyzing the data. Based on the results of the CMB, the percentage of the variance was 0.65 or above 0.50. This showed that the data had a CMB, which then needed to be tested for validity and reliability. The calculated R-value of all items was 0.534 to 0.696, higher than the table R-value (DF (N-2) or 276 − 2 = 274) with a significance level of 0.05, 0.118 (X.1 = 0.677, X.2 = 0.683, X.3 = 0.604, X.4 = 0.644, X.5 = 0.647, X.6 = 1, Y1.1 = 0.618, Y1.2 = 0.601, Y1.3 = 0.534, Y1.4 = 1, Y2.1 = 0.696, Y2.2 = 0.680, Y2.3 = 1). Additionally, the Cronbach alpha of X = 0.93, Y1 = 0.849, and Y2 = 0.869.

We explain these research results in four parts: descriptive analysis, confirmatory factor analysis (CFA), goodness of fit (GoF) analysis, and hypothesis analysis. The first part (Table 3) compares the mean, standard deviation, and variance of all data per indicator. The second part includes construct validity (Table 4), convergent validity and construct reliability (Table 5), average variance, and implied covariance extracted metrics (Table 6). The third part describes the chi-square model (CMIN)/the degrees of freedom (df), the root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis fit index (TLI), incremental fit index (IFI), relative fit index (RFI), normal fit index (NFI), root mean square residual (RMR), and goodness of fit (GFI). The last part shows the direct and indirect relationship between the variables, critical ratio, probability, and decision to accept or reduce the hypotheses.

Table 3. Mean, standard deviation, and variance.

No.	Indicators	N	Minimum	Maximum	Mean	Standard Deviation	Variance
1	X1.1	276	1	5	3.62	1.187	1.408
2	X1.2				3.50	1.165	1.356
3	X1.3				3.58	1.159	1.343
4	X1.4				3.65	1.167	1.362
5	X1.5				3.53	1.155	1.334
6	X1.6				3.72	1.158	1.342
7	Y1.1				3.61	1.121	1.257
8	Y1.2				3.67	1.129	1.275
9	Y1.3				3.67	1.106	1.224
10	Y1.4				3.67	1.106	1.224
11	Y2.1				3.58	1.114	1.241
12	Y2.2				3.69	1.107	1.225
13	Y2.3				3.63	1.182	1.397

Table 4. Construct validity.

No.	Correlation	Estimate	Standard Error	Critical Ratio	Probability
1	X1.1 ← LSs	1.000			
2	X1.2 ← LSs	0.977	0.055	17.776	***
3	X1.3 ← LSs	0.956	0.055	17.254	***
4	X1.4 ← LSs	0.961	0.056	17.218	***
5	X1.5 ← LSs	0.985	0.054	18.227	***
6	X1.6 ← LSs	0.909	0.057	15.944	***

Table 4. *Cont.*

No.	Correlation	Estimate	Standard Error	Critical Ratio	Probability
7	Y1.1 ← HIHRMPs	1.000			
8	Y1.2 ← HIHRMPs	0.928	0.066	13.973	***
9	Y1.3 ← HIHRMPs	0.908	0.065	14.042	***
10	Y1.4 ← HIHRMPs	0.891	0.065	13.700	***
11	Y2.1 ← IEP	1.000			
12	Y2.2 ← IEP	0.948	0.056	16.818	***
13	Y2.3 ← IEP	1.045	0.059	17.688	***

*** means that the probability < 0.001.

Table 5. Convergent validity and reliability.

Correlation	LF	AVE	CR and CA
X1.1 ← LSs	0.843	0.62	0.91 (CR) 0.93 (CA)
X1.2 ← LSs	0.839		
X1.3 ← LSs	0.826		
X1.4 ← LSs	0.824		
X1.5 ← LSs	0.853		
X1.6 ← LSs	0.785		
Y1.1 ← HIHRMPs	0.815	0.53	0.82 (CR) 0.849 (CA)
Y1.2 ← HIHRMPs	0.751		
Y1.3 ← HIHRMPs	0.750		
X2.4 ← HIHRMPs	0.736		
Y2.1 ← IEP	0.847	0.63	0.84 (CR) 0.869 (CA)
Y2.2 ← IEP	0.808		
Y2.3 ← IEP	0.834		

Table 6. Metric implied co-variances.

	Indicators												
	Y2.3	Y2.2	Y2.1	Y1.4	Y1.3	Y1.2	Y1.1	X1.6	X1.5	X1.4	X1.3	X1.2	X1.1
Y2.3	1.392												
Y2.2	0.878	1.220											
Y2.1	0.927	0.841	1.236										
Y1.4	0.782	0.709	0.748	1.220									
Y1.3	0.797	0.723	0.763	0.673	1.220								
Y1.2	0.814	0.738	0.779	0.688	0.701	1.270							
Y1.1	0.877	0.796	0.840	0.741	0.756	0.772	1.253						
X.6	0.890	0.807	0.852	0.715	0.728	0.744	0.802	1.337					
X.5	0.964	0.874	0.923	0.774	0.789	0.806	0.869	0.893	1.329				
X.4	0.941	0.853	0.900	0.755	0.770	0.786	0.848	0.872	0.944	1.357			
X.3	0.936	0.849	0.896	0.752	0.766	0.783	0.844	0.867	0.939	0.917	1.338		
X.2	0.956	0.867	0.915	0.768	0.783	0.799	0.862	0.886	0.960	0.937	0.932	1.351	
X.1	0.978	0.888	0.937	0.786	0.801	0.818	0.882	0.907	0.982	0.958	0.954	0.974	1.403

4.1. Descriptive Analysis

Based on Table 3, from a total of 13 indicators studied based on a sample of 276 (N), the answers from the respondents were spread from 1 (minimum value) to 5 (maximum value) on a 5-point Likert scale. The mean values were between 3.50 and 3.72. They reflected a statement agreeing to all statements in the questionnaire. The standard deviation values were between 1.106 and 1.182, and the variance values were between 1.224 and 1.408. These values were far below the average value, which means that the data were well distributed.

4.2. CFA

Based on Table 4, all estimated values ranged from 0.891 to 1.045. These values were more than 0.7 and well above the standard error (SE) values. This means that all indicators were constructively valid. The critical ratio (CR) values were between 13.700 and 18.227, and all probability values were 0.000. These CR values were well above 2.96, which means that all relationships between the indicators and variables were positive and significant.

Based on Table 5, all loading factor (LF) values were between 0.736 and 0.853 (>0.7). This means that, convergently, all indicators were valid. All average variance extracted (AVE) values were between 0.53 and 0.63 (>0.5). This means that all discriminatory indicators were valid. The construct reliability (CR) values were between 0.82 and 0.91, and the Cronbach Alpha (CA) values were between 0.849 and 0.93. Thus, all indicators were reliable.

Based on Table 6, all metric implied covariance values for each indicator were greater than the values on the left and below:

1. Y2.3 = 1.392 > all values in the lower columns (0.878, etc.);
2. Y2.2 = 1.220 > all values in the left-hand columns (0.878, etc.) and below (0.841, etc.);
3. Y2.1 = 1.236 > all values in the left-hand columns (0.841, etc.) and below (0.784 etc.);
4. Y1.4 = 1.220 > all values in the left-hand columns (0.784, etc.) and below (0.673, etc.);
5. Y1.3 = 1.220 > all values in the left-hand columns (0.673, etc.) and below (0.701 etc.);
6. Y1.2 = 1.270 > all values in the left-hand columns (0.701, etc.) and below (0.772, etc.);
7. Y1.1 = 1.253 > all values in the left-hand columns (0.772, etc.) and below (0.802, etc.);
8. X.6 = 1.337 > all values in the left-hand columns (0.802, etc.) and below (0.893, etc.);
9. X.5 = 1.329 > all values in the left-hand columns (0.893, etc.) and below (0.944, etc.);
10. X.4 = 1.357 > all values in the left-hand columns (0.944, etc.) and below (0.917, etc.);
11. X.3 = 1.338 > all values in the left-hand columns (0.917, etc.) and below (0.932 etc.);
12. X.2 = 1.351 > all values in the left-hand columns (0.932, etc.) and below (0.974 etc.);
13. X.1 = 1.403 > all values in the left-hand columns (0.974, etc.).

4.3. GoF and SEM

The results of the GoF analysis ensured that the research model was feasible to proceed to the hypothesis testing process with SEM. The CMIN value = 87.143 and the degrees of freedom (df) value = 62; thus, the CMIN/df value = 1.406 (<2). RMSEA value = 0.038 (<3); CFI value = 0.991 (>0.9); TLI value = 0.989 (>0.9); IFI value = 0.991 (>0.9); RFI value = 0.963 (>0.9); NFI = 0.971 (>0.9); RMR value = 0.027 (>0.9); and GFI value = 0.953 (>0.9). Figure 2 shows the SEM output of AMOS. The model was recursive with a sample size of 276. The number of different sample moments was 378. The number of variables was 60, with 27 observed variables and 33 unobserved variables. This could also be 31 exogenous variables and 29 endogenous variables.

Figure 2 explains the relationship between the three variables and between the indicators and variables. LSs, the independent variable, affected the two dependent variables, HIHRMPs and IEP. There were seven indicators of SLSs, four indicators of HIHRMPs, and three indicators of IEP. All values of the relationships between SLSs and IEP, HIHRMPs and IEP, SLSs and HIHRMPs were positive. These showed positive relationships.

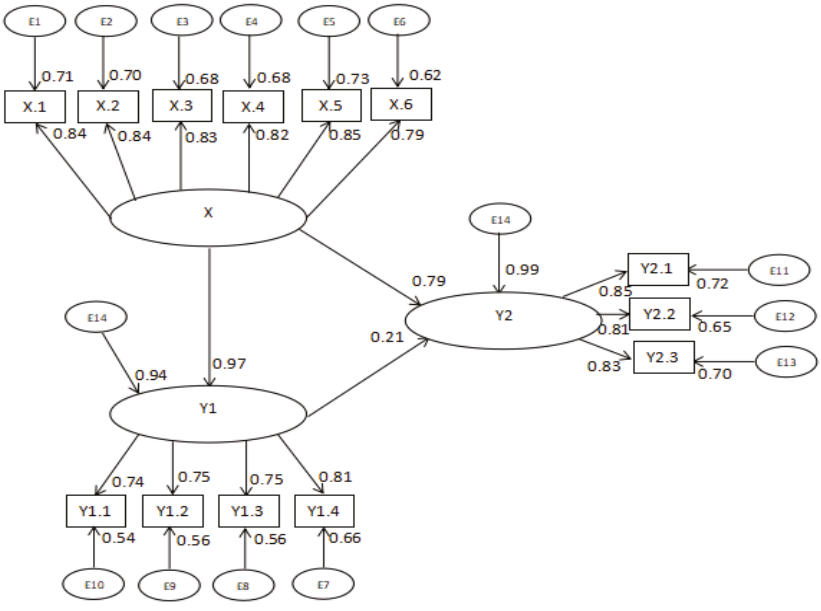

Figure 2. AMOS output in SEM.

4.4. Hypotheses

Table 7 shows two accepted hypotheses, H1 and H3, and two rejected hypotheses, H2 and H4. Thus, LSs significantly positively affected IEP and HIHRMPs. In contrast, HIHRMPs did not affect IEP significantly, and did not mediate the positive relationship between LSs and IEP. Thus, the results did not confirm the model in the research framework. It only provided a direct relationship, not an indirect relationship.

Table 7. Hypotheses.

Direct Effect	Indirect Effect	Total Effect	Critical Ratio	Probability	Decision
H1: LSs → IEP = 0.79	H4: LSs → HIHRMPs → IEP = 0.208	0.996	H1: 3.112	0.02	H1 is accepted, but H4 is rejected.
H2: HIHRMPs → IEP = 0.21		0.21	H2: 0.853	0.394	H2 is rejected.
H3: LSs → HIHRMPs = 0.97		0.97	H3: 16.006	***	H3 is accepted

*** means that the probability < 0.001.

5. Discussion

LSs positively relate to IEP. Employee motivation, productivity, and task performance improve when leaders provide service, sharing, and empowerment to their employees. Additionally, LSs positively relate to HIHRMPs. Employee involvement in HRP, training, compensation, and OSH improves when leaders provide service, sharing, and empowerment to their employees.

5.1. Theoretical Implications

To improve IEP in the digital era, SME employees need support from SME leaders through service, sharing, and empowerment. Employees improve their motivation, pro-

ductivity, and job performance when leaders provide services with credibility, competence, and communication skills. They also achieve high motivation, productivity, and job performance when leaders interact formally and informally in team coordination and involve their employees in making decisions.

To improve HIHRMPs in the digital era, SME HR managers need support from leaders through service, sharing, and empowerment. The involvement of SME employees in HRP, training, compensation, and OSH improves when their leader displays an understanding of their credibility, competence, and communication skills. Employee HIHRMPs also occur when leaders interact formally and informally in team coordination and involve their employees in managerial decision-making.

Thus, LSs have a crucial role in improving IEP and HIHRMPs in the digital era. Embracing digital technology in SMEs requires LSs and HIHRMPs. However, HIHRMPs do not influence IEP, nor do they act as mediators in the relationship between LSs and IEP.

Studies on the servant, shared, and empowering leadership in the digital economy and SMEs are inseparable. Multiple leadership styles are applicable in SMEs. Further researchers can apply a research framework that explains the positive relationship between LSs in servant, shared, and empowering leadership and IEP in terms of motivation, productivity, and task performance.

The positive relationship between LSs and IEP supports the results of research conducted by (Megawaty et al. 2022; Tran and Truong 2021; Alahbabi et al. 2021; Wanta and Augustine 2021; Pratiwi and Nawangsari 2021; Kaltiainen and Hakanen 2022; Peng and Chen 2021; Kadarusman and Bunyamin 2021; Ahmed et al. 2022; Ali et al. 2018; Humborstad et al. 2014; Qian et al. 2018; Kim et al. 2018; Fu et al. 2020; Shi et al. 2022; Cheong et al. 2019). The positive relationship between LSs and HIHRMPs strengthens the results of the research conducted by (Demo et al. 2022; Zhao and Huang 2022; Kloutsiniotis et al. 2022; AlAbri et al. 2022).

However, the results of this study contradict the results of studies conducted by authors that have explained the interaction between LSs and HIHRMPs in improving IEP. They are (Zhao et al. 2020; Lyubykh et al. 2022; Dela Crus and Cabaluna 2022; Muma et al. 2018; Gomathy et al. 2022; Al Qudah et al. 2014; Rahayu et al. 2019; Pramono and Prahiawan 2022; Handayani and Kasidin 2022; Arwab et al. 2022; Tumi et al. 2021; Abba 2018; Ramli 2020; Pratibha 2022; Jean et al. 2017; Min et al. 2019; Nkrumah et al. 2021; Ekowati 2019).

5.2. Practical Implications

There has been an economic impact due to the increasing number of SMEs opening in Indonesia (Arief et al. 2021). These businesses drive the Indonesian economy and comprise 99.9 percent of the total companies in Indonesia (Haryati et al. 2021). They are the subject of digital change, gaining an advantage by competing sustainably (Fachrunnisa et al. 2020) in the era of the Industrial Revolution 4.0 and applying digital technology, big data, IoT, and robotics technology. The government has initiated a strategic plan focused on SMEs. This is to encourage their participation in building the national economy; develop a roadmap of e-commerce, synchronizing thirty-nine strategic initiatives across eight ministries; establish friendly foreign direct investment policies to attract techno-based investment and strengthen the domestic base of venture capital; facilitate access to funding and enable the digitization of SMEs and the rapid growth of quality start-ups; and adopt pro-innovation policies (Ramli 2020). The large population and the fragmented geography of Indonesia have offered a good reason for SMEs to adopt e-commerce (Rahayu and Day 2017).

The SME leaders in Lubuk Linggau must serve, share, and empower their employees in post-COVID-19 globalization. They must be open to digitization for their employees. They have adopted servant, shared, and empowering leadership. They have applied combined leadership styles, which are not singular or compartmentalized. This is harmonious with the need to be digital leaders in today's digital era. HRM in SMEs comprises high involvement in HRP, training, compensation, and OSH. HRM realizes the importance

of digitalization in the digital demands of business. The employees of the SMEs in the city work with high motivation and productivity, and perform tasks optimally. Their performance is subject to servant, shared, and empowering leadership styles and HIHRMPs.

The practice of servant, shared, and empowering leadership by the CEOs of SMEs in the city, which are generally the owners and managers of the businesses, are relevant for improving IEP and implementing HIHRMPs in today's digital era. These leadership styles support the Indonesian government's strategic plan to build the national economy by strengthening SMEs.

The employees have used computers, the Internet, cloud computing, and big data in adopting business models based on digital products and services. These activities have reflected their involvement in Industry 4.0. They have high motivation, productivity, and job performance due to these leadership styles.

The SME leaders engaged in the construction, wholesale and retail, car and motorcycle repair, real estate, manufacturing, transportation, and warehousing industries in the city have implemented service, sharing, and empowerment LSs for their employees in today's digital era. They support the adoption of digitalization by their employees and the use of services that improve their credibility, competence, and communication skills in working. Leaders also support this by interacting formally and informally in the coordination of employee teamwork, and involving employees in managerial decision-making.

6. Conclusions

Servant, shared, and empowering leadership styles are appropriate to be applied in SMEs to improve the individual performance of employees and employee involvement in HRP, training, compensation, and OSH in the digital era. When SME leaders apply leadership effectively, the individual performance of the employees and their involvement in HRMPs are improved.

SME leaders can apply these leadership styles to realize the high motivation, productivity, and performance of their employees. In addition, leaders can become figures who serve, share, and empower their employees by displaying their involvement in HRPs, training, compensation, and OSH, even though these HRMPs cannot realize the high individual performance of these employees.

The combination of servant, shared, and empowering leadership styles can lead to digital leadership for SMEs. HIHRMPs also clarify digital HRMPs. However, we need further study to state that these leadership styles are digital leadership styles, and HIHRMPs are digital HRMPs.

Limitations

This research framework focuses on the individual performance of employees in SMEs. When high involvement in HRMPs occurs, the teamwork performance of employees can also improve. The concept of LSs in this research frames three leadership styles and one SHRMP approach. Many researchers have examined digital leadership styles in other contexts as measures. This research was limited to one city scope for data collection. Including other cities in Indonesia in this process could offer better results for our proposed hypotheses. We included a two-month primary data collection period. Longer data collections times could show better results with our research framework. We also used an online questionnaire as the research instrument. Direct data collection could possibly reduce bias (CMB) and increase the amount of data collected. The results only showed a direct relationship between the variables, with no indirect relationship or mediation in SEMs. We still have not found that all of our hypotheses are accepted.

Author Contributions: Conceptualization, A.C. and M.N.S.; methodology, A.C. and M.N.S.; software, A.C.; validation, A.C.; formal analysis, A.C and M.N.S.; investigation, A.C.; resources, A.C.; data curation, A.C.; writing—original draft preparation, A.C. and M.N.S.; writing—review and editing, A.C., T.M., P.S., M.N.S., J.P. and K.S.; supervision, T.M., I.H., J.P. and K.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to the fact that we used anonymous data that were not traceable to individuals at any time.

Informed Consent Statement: This was waived for this study due to the fact that we used anonymous data that were not traceable to individuals at any time.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

Abba, Maryam Tijjani. 2018. Effects of Training and Development on Employee Retention in Bauchi State Metropolis Banks. *International Journal of Operational Research in Management* 4: 24–39. Available online: http://internationalpolicybrief.org/journals/international-scientific-research-consortium-journals/intl-jrnl-of-operational-research-in-mgmt-soc-sci-edu-vol4-no1-june-2018 (accessed on 21 March 2021).

Aboramadan, Mohammed, Zeeshan Hamid, Yasir Mansoor Kundi, and Eissa El Hamalawi. 2022. The effect of servant leadership on employees' extra-role behaviors in NPOs: The role of work engagement. *Nonprofit Management and Leadership* 1–21. [CrossRef]

Ahmed, Tanveer, Yang Chaojun, Yang Hongjuan, and Salman Mahmood. 2022. The Impact of Empowering Leadership on Job Performance of Higher Education Institutions Employees: Mediating Role of Goal Clarity and Self-Efficacy. *Psychology Research and Behavior Management* 15: 677–94. [CrossRef] [PubMed]

Al Qudah, Hamzah Mohammad A., Abdullah Osman, and HamzahEdris M. Al Qudah. 2014. The Effect Of Human Resources Management Practices On Employee Performance. *International Journal of Scientific & Technology Research* 3: 9.

AlAbri, Ismail, Rusinah Bte Siron, and Mohammad Nurul Alam. 2022. Human Resource Management (HRM) Practices And Employees' Adaptive Performance: The Moderating Role Of Transformational Leadership. *Webology* 19: 2. Available online: http://www.webology.org (accessed on 21 March 2022).

Alahbabi, A. M. F. M., Robani Anidah, and Samer Ali Al-Shami. 2021. A Framework of Servant Leadership Impact on Job Performance: The Mediation Role of Employee Happiness in Uae Healthcare Sector. *Academy of Strategic Management Journal* 20: 1–14.

Ali, Muhammad, Shen Lei, Zheng Shi Jie, and Mohammad Anisur Rahman. 2018. Empowering leadership and employee performance: A mediating role of thriving at work. *International Journal of Asian Business and Information Management* 9: 1–14. [CrossRef]

Alsafadi, Yousef, and Shadi Altahat. 2021. Human Resource Management Practices and Employee Performance: The Role of Job Satisfaction. *Journal of Asian Finance, Economics, and Business* 8: 519–29. [CrossRef]

Arief, Abdul Samad, Petrus Jacob Pattiasina, and Sahat Parulian Remus. 2021. Relevance of human resource management on small business objective in the digital era: A critical review of research evidence. *International Journal of Social Sciences and Humanities* 5: 79–91. [CrossRef]

Arwab, Mohd, Jamal Abdul Nasir Ansari, Mohd Azhar, and Mohd Ashraf Ali. 2022. Exploring the influence of training and development on employee's performance: Empirical evidence from the Indian tourism industry. *Management Science Letters* 12: 89–100. [CrossRef]

Barata, Amrin. 2019. Strengthening National Economic Growth and Equitable Income through Sharia Digital Economy in Indonesia. *Journal of Islamic Monetary Economics and Finance* 5: 145–68. [CrossRef]

Castellano, Sylvaine, Komes Chandavimol, Insaf Khelladi, and Mehmet A. Orhan. 2021. Impact of self-leadership and shared leadership on the performance of virtual r&d teams. *Journal of Business Research* 128: 578–86. [CrossRef]

Cheong, Minyoung, Francis J. Yammarino, Shelley D. Dionne, Seth M. Spain, and Chou-Yu Tsai. 2019. A review of the effectiveness of empowering leadership. *Leadership Quarterly* 30: 34–58. [CrossRef]

D'Innocenzo, Lauren, Michael Kukenberger, Andrea C. Farro, and Jennifer A. Griffith. 2021. Shared leadership performance relationship trajectories as a function of team interventions and members' collective personalities. *Leadership Quarterly* 32: 101499. [CrossRef]

Da Silva, Justino, I. Gede Riana, and Augusto Da Conceicao Soares. 2020. The Effect of Human Resources Management Practices on Innovation and Employee Performance (Study Conducted at NGOs Members of FONGTIL) Dili. *International Journal of Multicultural and Multireligious Understanding* 7: 322–30.

De Cieri, Helen, and Mila Lazarova. 2021. "Your health and safety is of utmost importance to us": A review of research on the occupational health and safety of international employees. *Human Resource Management Review* 31: 1–30. [CrossRef]

Dela Crus, Mylene M., and Alan Y. Cabaluna. 2022. Investigating Human Resource Practices and its Impact on Employee Performance in Selected Banks in the Philippines. *Journal of Business and Management Studies*, 233–56.

Demo, Gisela, Karla Coura, Natasha Fogaça, Ana Carolina Costa, Fernanda Scussel, and Lana Montezano. 2022. How Are Leadership, Virtues, HRM Practices, and Citizenship Related in Organizations? Testing of Mediation Models in the Light of Positive Organizational Studies. *Sustainability* 14: 1508. [CrossRef]

Diaz-Carrion, Rosalia, Macarena López-Fernández, and Pedro M. Romero-Fernandez. 2019. Evidence of different models of socially responsible HRM in Europe. *Business Ethics* 28: 1–18. [CrossRef]

Ekowati, Vivin Maharani. 2019. The Effects of Occupational Health and Safety on Employee Performance through Work Satisfaction. *Advances in Economics, Business and Management Research* 101: 242–45. Available online: http://creativecommons.org/licenses/by-nc/4.0/ (accessed on 21 March 2021).

Ellinger, Davis Delery, and Schuler Svendsen. 2021. The Impact of Human Resource Planning on Organizational Performance; A Case of Manufacturing Firms in Austria. *Journal of Human Resource & Leadership* 5: 14–21.

Fachrunnisa, Olivia, Ardian Adhiatma, Najah Lukman, and Md Noh Ab Majid. 2020. Towards SMEs' digital transformation: The role of agile leadership and strategic flexibility. *Journal of Small Business Strategy* 30: 65–85. Available online: http://www.smallbusinessinstitute.biz (accessed on 21 March 2021).

Falentina, Anna T., Budy P. Resosudarmo, Danang Darmawan, and Eny Sulistyaningrum. 2021. Digitalisation and the Performance of Micro and Small Enterprises in Yogyakarta, Indonesia. *Bulletin of Indonesian Economic Studies* 57: 343–69. [CrossRef]

Fan, Di, Cherrie Jiuhua Zhu, Andrew R. Timming, Yiyi Su, Xinli Huang, and Ying Lu. 2020. Using the past to map out the future of occupational health and safety research: Where do we go from here? *International Journal of Human Resource Management* 31: 90–127. [CrossRef]

Fu, Hui, Ben Haobin Ye, and Xiaoyu Xu. 2020. The cross-level effect of shared leadership on tourism employee proactive behavior and adaptive performance. *Sustainability* 12: 6173. [CrossRef]

Gautam, Tara Prasad, and Santosh Raj. 2018. Human Resource Planning, Selection and Training Practices of Nepalese Pharmaceutical Companies of Nepal. *Nepal Journal of Multidisciplinary Research (NJMR)* 1: 58–70.

Gomathy, C. K., K. Varun Reddy, and K. Vikas Reddy. 2022. The Impact of Human Resource Planning on Productivity E-File System. *International Journal of Scientific Research in Engineering and Management* 6: 1–6. [CrossRef]

Grigorescu, Adriana, Elena Pelinescu, Amalia Elena Ion, and Monica Florica Dutcas. 2021. Human capital in the digital economy: An empirical analysis of central and Eastern European countries from the European Union. *Sustainability* 13: 2020. [CrossRef]

Handayani, Rini, and Kasidin Kasidin. 2022. Employee Performance Analysis Based on Human Resources Management Practices in Private Hospital in Surakarta. *Kinerja Karyawan Media Ekonomi Dan Manajemen* 37: 109–26. [CrossRef]

Haryati, Rice, Yasri Yasri, Hasdi Aimon, and Muhammad Darwin. 2021. Development of Small, Micro Enterprises Based (Smes) on Innovation and Environmental Sustainable Development in West Sumatera. *International Journal of Entrepreneurship* 25: 1–13.

Hasle, Peter, Christian Uhrenholdt Madsen, and David Hansen. 2021. Integrating operations management and occupational health and safety: A necessary part of safety science! *Safety Science* 139: 105247. [CrossRef]

He, Jie, Alastair M. Morrison, and Hao Zhang. 2021. Being sustainable: The three-way interactive effects of CSR, green human resource management, and responsible leadership on employee green behavior and task performance. *Corporate Social Responsibility and Environmental Management* 28: 1043–54. [CrossRef]

Humborstad, Sut I. Wong, Christina G. L. Nerstad, and Anders Dysvik. 2014. Empowering leadership, employee goal orientations and work performance: A competing hypothesis approach. *Personnel Review* 43: 246–71. [CrossRef]

Huo, Baofeng, Zhaojun Han, Haozhe Chen, and Xiande Zhao. 2015. The effect of high-involvement human resource management practices on supply chain integration. *International Journal of Physical Distribution and Logistics Management* 45: 716–46. [CrossRef]

Idris, Idris, Achmad Suyuti, Ahmad Sani Supriyanto, and Nanang As. 2022. Transformational Leadership, Political Skill, Organizational Culture, and Employee Performance: A Case from Tourism Company in Indonesia. *Geojournal of Tourism and Geosites* 40: 104–10. [CrossRef]

Ilyas, Muhammad, Aidin Hudani Awasinombu, and Moh Masri. 2021. The Effect of Work Discipline, Teamwork and Occupational Health and Safety on Employee Satisfaction of UPTD Pengelolaan Sampah Dinas Lingkungan Hidup Bombana District. *Journal on Management and Education Human Development* 4: 41–51. Available online: http://www.ijmehd.com (accessed on 20 April 2022).

Jean, Kimani N., Thomas Katua Ngui, and Arasa Robert. 2017. Effect of Compensation Strategies on Employee Performance: A Case Study of Mombasa Cement Limited. *International Journal of Innovative Social Sciences & Humanities Research* 5: 25–42. Available online: www.seahipaj.org (accessed on 21 April 2022).

John, Achanya Julius, and Cinjel Nandes Dickson. 2022. Employee Training and Employee Development in an Organization: Explaining the Difference for the Avoidance of Research Pitfalls. *Public Administration: Theory and Practice in Nigeria*.

Kadarusman, Kadarusman, and Benjamin Bunyamin. 2021. The role of knowledge sharing, and trust as mediation on servant leadership and job performance. *Management Science Letters* 11: 1509–20. [CrossRef]

Kaltiainen, Janne, and Jari Hakanen. 2022. Fostering task and adaptive performance through employee well-being: The role of servant leadership. *BRQ Business Research Quarterly* 25: 28–43. [CrossRef]

Karim, Al Rashed. 2019. Impact of Different Training and Development Programs on Employee Performance in Bangladesh Perspective. *International Journal of Entrepreneruial Research* 1: 8–14. [CrossRef]

Kazmi, Syeda Wajiha, and Syeda Tuba Javaid. 2022. Antecedents of organizational identification: Implications for employee performance. *RAUSP Management Journal* 57: 111–30. [CrossRef]

Kim, Minseo, Terry A. Beehr, and Matthew S. Prewett. 2018. Employee Responses to Empowering Leadership: A Meta-Analysis. *Journal of Leadership and Organizational Studies* 25: 257–76. [CrossRef]

Klasmeier, Kai N., and Jens Rowold. 2022. A diary study on shared leadership, teamwork engagement, and goal attainment. *Journal of Occupational and Organizational Psychology* 95: 36–59. [CrossRef]

Kloutsiniotis, Panagiotis V., Dimitrios M. Mihail, Naoum Mylonas, and Adamantia Pateli. 2022. Transformational Leadership, HRM practices and burnout during the COVID-19 pandemic: The role of personal stress, anxiety, and workplace loneliness. *International Journal of Hospitality Management* 102: 103177. [CrossRef]

Kumar, Aneel, Tayabba Gul Pathan, and Hira Rani Shaikh. 2022. Servant Leadership as Impetus for Teachers' Organisational Citizenship and In-role Behaviours: The Mediation of Felt Obligation. *International Journal of Organizational Leadership* 11: 44–54. Available online: https://www.ijol.cikd.ca (accessed on 19 April 2022). [CrossRef]

Leroy, Hannes, Jesse Segers, Dirk Van Dierendonck, and Deanne Den Hartog. 2018. Managing people in organizations: Integrating the study of HRM and leadership. *Human Resource Management Review* 28: 249–57. [CrossRef]

Liang, Bingqian, Daan van Knippenberg, and Qinxuan Gu. 2021. A cross-level model of shared leadership, meaning, and individual creativity. *Journal of Organizational Behavior* 42: 68–83. [CrossRef]

Lin, Meizhen, Xiujuan Zhang, Boon Ching Serene Ng, and Lirong Zhong. 2022. The dual influences of team cooperative and competitive orientations on the relationship between empowering leadership and team innovative behaviors. *International Journal of Hospitality Management* 102: 103160. [CrossRef]

Lv, Wan Qing, Li Chao Shen, Chin-Hsun Ken Tsai, Ching-Hui Joan Su, Hyun Jeong Kim, and Ming-Hsiang Chen. 2022. Servant leadership elevates supervisor-subordinate guanxi: An investigation of psychological safety and organizational identification. *International Journal of Hospitality Management* 101: 103114. [CrossRef]

Lyubykh, Zhanna, Jennifer Bozeman, M. Sandy Hershcovis, Nick Turner, and J. Valerie Shan. 2022. Employee performance and abusive supervision: The role of supervisor over-attributions. *Journal of Organizational Behavior* 43: 125–45. [CrossRef]

Mansaray, Hasan Elsan. 2019. The Consequence of Human Resource Planning on Organizational Performance: An Ephemeral Review. *Britain International of Humanities and Social Sciences (BIoHS) Journal* 1: 50–61. [CrossRef]

Manzoor, Faiza, Longbao Wei, Tamás Bányai, Mohammad Nurunnabi, and Qazi Abdul Subhan. 2019. An examination of sustainable HRM practices on job performance: An application of training as a moderator. *Sustainability* 11: 2663. [CrossRef]

Marescaux, Elise, Sophie De Winne, and Anneleen Forrier. 2019. Developmental HRM, employee well-being and performance: The moderating role of developing leadership. *European Management Review* 16: 317–31. [CrossRef]

Megawaty, M., Aminuddin Hamdat, and Nur Aida. 2022. Examining Linkage Leadership Style, Employee Commitment, Work Motivation, Work Climate on Satisfaction and Performance. *Golden Ratio of Human Resource Management* 2: 1–14. [CrossRef]

Min, Jeehee, Yangwoo Kim, Sujin Lee, Tae-Won Jang, Inah Kim, and Jaechul Song. 2019. The Fourth Industrial Revolution and Its Impact on Occupational Health and Safety, Worker's Compensation and Labor Conditions. *Safety and Health at Work* 10: 400–8. [CrossRef] [PubMed]

Mohammed, Ali Ibrahim, Zainab Fadhil Mohammed, and Harith Adnan Mohammad. 2022. The Effect of Compensation Management on Employee Performance: An Empirical Study in North Gas Company. *World Bulletin of Management and Law (WBML)* 7: 59–70. Available online: https://www.scholarexpress.net (accessed on 21 April 2022).

Mossberger, Karen, Scott LaCombe, and Caroline J. Tolbert. 2022. A new measure of digital economic activity and its impact on local opportunity. *Telecommunications Policy* 46: 102231. [CrossRef]

Muafi, Muafi, Wirman Syafri, Hadi Prabowo, and Sofyan Ashari Nur. 2021. Digital Entrepreneurship in Indonesia: A Human Capital Perspective. *Journal of Asian Finance, Economics, and Business* 8: 351–59. [CrossRef]

Muma, Michael Mboya, Joyce Nzulwa, Kepha Ombui, and Romanus Odhiambo. 2018. Influence of Human Resource Planning Strategies on Retention of Employees in Universities in Kenya. *International Journal of Thesis Projects and Dissertations (IJTPD)* 6: 1–14. Available online: www.researchpublish.com (accessed on 20 April 2022).

Mwangi, Jane Walth Ira, and Esther Waiganjo. 2017. Influence of Occupational Health and Safety on Limited, Thika Sub-County. *Strategic Journal* 4: 191–208. Available online: www.strategicjournals.com (accessed on 20 April 2022).

Naqshbandi, M. Muzamil, Ibrahim Tabche, and Neetu Choudhary. 2018. Managing open innovation: The roles of empowering leadership and employee involvement climate. *Management Decision* 57: 703–23. [CrossRef]

Narmanov, Ulugbek. 2022. The role and importance of the digital economy in the development of innovation. *Linguistics and Culture Review* 6: 121–33. [CrossRef]

Neubert, Mitchell J., Mary Sully de Luque, Matthew J. Quade, and Emily M. Hunter. 2022. Servant leadership across the globe: Assessing universal and culturally contingent relevance in organizational contexts. *Journal of World Business* 57: 2. [CrossRef]

Nguyen, Phong Thanh, Andri Yandi, and M. Rizky Mahaputra. 2020. Factors that Influence Employee Performance: Motivation, Leadership, Environment, Culture Organization, Work Achievement, Competence, and Compensation (A Study of Human Resource Management Literature Studies). *Dinasty international Journal of Digital Business Management* 1: 4. [CrossRef]

Nkrumah, Edmund Nana Kwame, Suxia Liu, David Doe Fiergbor, and Linda Serwah Akoto. 2021. Improving the safety–performance nexus: A study on the moderating and mediating influence of work motivation in the causal link between occupational health and safety management (ohms) practices and work performance in the oil and gas sector. *International Journal of Environmental Research and Public Health* 18: 5064. [CrossRef] [PubMed]

Peng, Jui-Chen, and Shou-Wei Chen. 2021. Servant Leadership and Service Performance: A Multilevel Mediation Model. *Psychological Reports* 124: 1738–60. [CrossRef]

Pramono, Abdul Chatim, and Wawan Prahiawan. 2022. Effect of Training on Employee Performance with Competence and Commitment as Intervening. *APTISI Transactions on Management (ATM)* 6: 142–50. [CrossRef]

Pratibha, S. 2022. HRM Practices on Employee Performance concerning Small-scale industries. *Journal of Positive School Psychology* 6: 915–20. Available online: http://journalppw.com (accessed on 20 April 2022).
Pratiwi, Lintang Arum, and Lenny Christina Nawangsari. 2021. Organizational Citizenship Behavior while mediating Self-Efficacy, Servant Leadership and Organization Culture on Employee Performance. *European Journal of Business and Management Research* 6: 225–31. [CrossRef]
Priyono, Anjar, Abdul Moin, and Vera Nur Aini Oktaviani Putri. 2020. Identifying Digital Transformation Paths in the Business Model of SMEs during the COVID-19 Pandemic. *Journal of Open Innovation: Technology, Market, and Complexity* 6: 104. [CrossRef]
Qian, Jing, Baihe Song, Zhuyun Jin, Bin Wang, and Hao Chen. 2018. Linking empowering leadership to task performance, taking charge, and voice: The mediating role of feedback-seeking. *Frontiers in Psychology* 9: 2025. [CrossRef]
Rahayu, Rita, and John Day. 2017. E-commerce adoption by SMEs in developing countries: Evidence from Indonesia. *Eurasian Business Review* 7: 25–41. [CrossRef]
Rahayu, Mieke, Fahmi Rasid, and Hendy Tannady. 2019. International Review of Management and Marketing The Effect of Career Training and Development on Job Satisfaction and its Implications for the Organizational Commitment of Regional Secretariat (SETDA) Employees of Jambi Provincial Government. *International Review of Management and Marketing* 9: 79–89. [CrossRef]
Ramli, Kalamullah. 2020. Indonesia on the Move: Improving Connectivity to Support E-commerce. In *E-commerce Connectivity in ASEAN*. Edited by L. Chen and F. Kimura. Jakarta: Economic Research Institute for ASEAN and East Asia, pp. 31–50.
Renkema, Maarten, Jan de Leede, and Llewellyn E. Van Zyl. 2021. High-involvement HRM and innovative behavior: The mediating roles of nursing staff's autonomy and affective commitment. *Journal of Nursing Management* 29: 2499–514. [CrossRef]
Reuschke, Darja, Colin Mason, and Stephen Syrett. 2022. Digital futures of small businesses and entrepreneurial opportunity. *Futures* 128: 102877. [CrossRef]
Rohlfer, Sylvia, Abderrahman Hassi, and Simon Jebsen. 2022. Management Innovation and Middle Managers: The Role of Empowering Leadership, Voice, and Collectivist Orientation. *Management and Organization Review* 18: 108–30. [CrossRef]
Rossato, Chiara, and Paola Castellani. 2020. The contribution of digitalization to business longevity from a competitiveness perspective. *TQM Journal* 32: 617–45. [CrossRef]
Rubel, Mohammad Rabiul Basher, Daisy Mui Hung Kee, Nadia Newaz Rimi, and Yusliza Mohd Yusoff. 2016. Adapting technology: Effect of high-involvement HRM and organizational trust. *Behavior and Information Technology* 36: 281–93. [CrossRef]
Ruiz-Palomino, Pablo, Benito Yáñez-Araque, Pedro Jiménez-Estévez, and Santiago Gutiérrez-Broncano. 2022. Can servant leadership prevent hotel employee depression during the COVID-19 pandemic? A mediating and multigroup analysis. *Technological Forecasting and Social Change* 174: 121192. [CrossRef] [PubMed]
Russell, Robert F., and A. Gregory Stone. 2002. A review of servant leadership attributes: Developing a practical model. *Leadership & Organization Development Journal* 23: 145–57. [CrossRef]
Salas-Vallina, Andrés, Yasin Rofcanin, and Mireia Las Heras. 2022. Building resilience and performance in turbulent times: The influence of shared leadership and passion at work across levels. *BRQ Business Research Quarterly* 25: 8–27. [CrossRef]
Scott-Young, Christina M., Maged Georgy, and Andrew Grisinger. 2019. Shared leadership in project teams: An integrative multi-level conceptual model and research agenda. *International Journal of Project Management* 37: 565–81. [CrossRef]
Shaukat, Hafsa, Namrah Ashraf, and Shahzad Ghafoor. 2015. Impact of Human Resource Management Practices on Employees Performance. *Middle-East Journal of Scientific Research* 23: 329–38. [CrossRef]
Shi, Renmin, Qian Meng, and Jie Huang. 2022. Impact of psychological empowerment on job performance of Chinese university faculty members: A cross-sectional study. *Social Behavior and Personality: An International Journal* 5: 1–11. [CrossRef]
Silva, Sabrina Letícia Couto da, and Fernando Gonçalves Amaral. 2019. Critical factors of success and barriers to the implementation of occupational health and safety management systems: A systematic review of literature. *Safety Science* 117: 123–32. [CrossRef]
Sinha, Ruchi, Chia-Yen Chiu, and Santosh B. Srinivas. 2021. Shared leadership and relationship conflict in teams: The moderating role of team power base diversity. *Journal of Organizational Behavior* 42: 649–67. [CrossRef]
Song, Zhigang, Qinxuan Gu, and Fang Lee Cooke. 2020. The effects of high-involvement work systems and shared leadership on team creativity: A multilevel investigation. *Human Resource Management* 59: 201–13. [CrossRef]
Sung, Sun Young, and Jin Nam Choi. 2018. Effects of training and development on employee outcomes and firm innovative performance: Moderating roles of voluntary participation and evaluation. *Human Resource Management* 57: 1339–53. [CrossRef]
Tabiu, Abubakar, Faizuniah Pangil, and Siti Zubaidah Othman. 2016. Examining the link between HRM Practices and Employees' performance in the Nigerian public sector. *Management Science Letters* 6: 395–408. [CrossRef]
Tantri, Sakina Nusarifa, Shine Pintor Siolemba Patiro, Hendrian Hendrian, and Lasando Lumban Gaol. 2022. The Role of Job Demands in Moderating the Relationship between Servant Leadership and Job Satisfaction: A Study on Civil Apparatus in Five Major Cities in Indonesia. *Jurnal Ilmiah Akuntansi* 6: 221. [CrossRef]
Tayibnapis, Ahmad Zafrullah, Lucia Endang Wuryaningsih, and Radita Gora. 2018. The Development of Digital Economy in Indonesia. *International Journal of Management and Business Studies (IJMBS)* 8: 14–18.
Teiușan, Sorin-Ciprian, and Sorin-Constantin Deaconu. 2021. A Bibliometric Analysis for Global Research Trends on Digital Economy. *Revista Economica* 73: 312–36.
Tran, Toan Khanh Pham, and Truc Trung Truong. 2021. Impact of Servant Leadership on Public Service Motivation of Civil Servants: Empirical Evidence from Vietnam. *Journal of Asian Finance, Economics, and Business* 8: 1057–66. [CrossRef]

Tumi, Najameddin Sadeg, Ali Nawari Hasan, and Jamshed Khalid. 2021. Impact of Compensation, Job Enrichment, and Enlargement, and Training on Employee Motivation. *Business Perspectives and Research* 10: 121–39. [CrossRef]
Uymaz, Ali Osman, and Serdar Arslan. 2022. Unethical pro-organizational behavior as an outcome of servant leadership. *Journal of Management and Organization* 28: 33–57. [CrossRef]
Wanta, Derry, and Yvonne Augustine. 2021. The Effect of Servant Leadership, Job Satisfaction, and Organizational Culture on Employee Performance Moderated by Good Governance in Women's Cooperative Institution. *Technium Sustainability* 1: 45–58. Available online: www.techniumscience.com (accessed on 16 April 2022).
Widhy, Sudirman, Hendro Yuliantoro, Muhammad Zulkarnain Anwar, and Anita Maharani. 2021. The Influence of Organizational Culture and Compensation on Organizational Commitment with Job Satisfaction as Mediation. *The Management Journal of Binaniaga* 6: 165–90. [CrossRef]
Wiliandri, Ruly. 2020. A Conceptual Approach to Identify Factors Affecting the Digital Transformation of Micro, Small, and Medium-sized Enterprises (MSMEs) during the COVID-19 Pandemic in Indonesia. *Ekonomi Bisnis* 25: 66. [CrossRef]
Winston, Bruce E. 2022. The Relationship of Servant Leadership, Perceived Organizational Support, and Work-family Conflict with Employee Well-being. *Servant Leadership: Theory & Practice* 9: 13–40.
Zhao, Wei, and Lihua Huang. 2022. The impact of green transformational leadership, green HRM, green innovation and organizational support on the sustainable business performance: Evidence from China. *Economic Research-Ekonomska Istrazivanja* 1–21. [CrossRef]
Zhao, Shuming, Mingwei Liu, Cherrie J. Zhu, and Hong Liu. 2020. The role of leadership in human resource management: Perspectives and evidence from the Asia Pacific. *Asia Pacific Business Review*, 1–5. [CrossRef]
Zhu, Jinlong, Zhenyu Liao, Kai Chi Yam, and Russell E. Johnson. 2018. Shared leadership: A state-of-the-art review and future research agenda. *Journal of Organizational Behavior* 39: 834–52. [CrossRef]
Zimmermann, Volker. 2016. SMEs and digitalization: The current position, recent developments, and challenges. *KfW Research Focus on Economics* 138: 1–7.

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The Mechanism of an Individual's Internal Process of Work Engagement, Active Learning and Adaptive Performance

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Abstract: This paper aims to investigate the mechanism linking an individual's internal processes, work engagement, active learning, and adaptive performance in three of Indonesia's digital technology-based companies. The research uses a mixed-method approach. The first study used a quantitative research method in which the data is based on a survey of 185 employees and the collected survey data is then analyzed using the Structural Equation Modeling technique. The second study used a qualitative research method where the data is gathered from 17 managers through semi-structured interviews. We found from the quantitative research that work engagement fully mediates the relationship between self-efficacy and a growth mindset toward active learning. Meanwhile, a partial mediating effect of active learning between work engagement and adaptive performance was also discovered. Based on our literature study, previous research has shown inconsistent findings on the relationship between growth mindset and work engagement. Our findings contribute to the existing literature by clarifying the direct relationship between growth mindset and work engagement. Meanwhile, the qualitative findings emphasized that there are two mechanisms underlies individual adaptive performance (i.e., work engagement and active learning). Additionally, the active learning process promotes continuous new knowledge accumulation to produce new innovation inside an organization.

Keywords: active learning; growth mindset; self-efficacy; engagement of employees; adaptive performance; innovation management

Citation: Nandini, Widya, Aurik Gustomo, and Dedy Sushandoyo. 2022. The Mechanism of an Individual's Internal Process of Work Engagement, Active Learning and Adaptive Performance. *Economies* 10: 165. https://doi.org/10.3390/economies10070165

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 9 June 2022
Accepted: 8 July 2022
Published: 12 July 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

The global economic situation and digital technology advancement have produced massive changes in markets and societies. In response, organizations require a mechanism that helps their employees to adapt by becoming more agile and efficient in all work processes (van den Heuvel et al. 2020). The construct used to measure individual capabilities to adapt is that of adaptive performance, which consists of five criteria: creative problem solving, handling emergencies and work stress, interpersonal adaptability and training effort (Charbonnier-Voirin and Roussel 2012). On the other hand, one of the most well-known factors affecting individual adaptive performance is work engagement. However, no significant impact of work engagement on adaptive performance in a change organizational context has been found. The insignificant result is explained as being caused by the different impact of work engagement in each dimension of adaptive performance (van den Heuvel et al. 2020). This indicates that our existing understanding of work engagement-related adaptivity requires further investigation.

Employee capabilities are also cited as a main factor in innovation processes, becoming the source of ideas and creativity underpinning a company's competitive advantage through a learning process (De Spiegelaere et al. 2015). Meanwhile, employee learning is also beneficial in supporting the skill acquisition process necessary to meeting organizational needs in adopting digital technological advancements (Richels et al. 2020). These

authors also stated that the learning process constitutes a switching-driven behavior within an individual adaptive mechanism. Bäckström and Bengtsson (2019) emphasized that studies of employee-driven innovation through a learning process are limited in number. Moreover, the role of knowledge exploitation is also essential to identifying the company's unlimited potential in terms of competitive advantage within a digital business context (Di Vaio et al. 2021). Significantly, the uniqueness of the innovation process in digital-based companies lies in knowledge exploitation based on the knowledge combination process. Furthermore, effective intervention in knowledge exploitation results from double-loop learning and knowledge sharing with external parties such as clients (Kohli and Melville 2019).

One of the optimal learning methods that promotes switching behavior within adaptive performance and involves a double-loop process is that of active learning. This learning approach features self-initiative, self-regulated learning behavior, and a resulting mastery of new skills (Bakker et al. 2012). Bell and Kozlowski (2008) previously argued that this method provides the opportunity for employees to explore, with continual feedback being provided by their superiors. During this double-loop mechanism, employees can adapt their behavior according to the problem-solving needs of their workplace, thereby enabling them to maximize their adaptive performance. Moreover, Bell and Kozlowski's (2008) analysis emphasized the need for future studies to explore the internal process underpinning the adaptive mechanism.

Thus, the explanation above shows that the optimal skill acquisition process will determine the success of the individual adaptation process in the workplace. Moreover, the current concept of adaptive performance is closely related to the changing needs of the market and digital-tech development. The research gap proposed by van den Heuvel et al. (2020) and Bell and Kozlowski (2008) explains that adaptive performance may form through a double-loop learning process. The double-loop learning will lead individuals to a better problem-solving scheme in response to the rapid changes in their workplaces. In addition, double-loop learning may optimize the product innovation process along with the new potential in the market. Therefore, we conclude that the learning process is critical in changing individual behavior to adapt to the external environment, such as supervisors and market demand.

Besides the learning process, individual internal processes, namely growth mindset and self-efficacy, are considered essential factors affecting work engagement and adaptive mechanisms. This is because individual internal processes, like personal resources, may optimize individual adaptive performance (Demerouti et al. 2010). Likewise, work engagement drives individuals to voluntarily invest more of their personal resources to fulfill their job demands (Hakanen and Roodt 2010). However, research on the empirical relations between growth mindset and work engagement is still limited (Caniëls et al. 2018). Bakker and van Wingerden (2021) explain that only a few studies of this mechanism have been conducted. Hence, the existing studies have not explicitly explained the relation between individuals' internal processes—such as growth mindset and self-efficacy—and adaptive performance, especially through work engagement and active learning mechanisms.

The previous research from van den Heuvel et al. (2020) explored the meaning-making factor which focuses on individual mechanisms based on the Conservation of Resources (COR) theory. COR theory emphasizes that the inherent personal resources of employees need to be retained and protected (Hobfoll et al. 2018). This theory then highlights that high job demand will lead individuals to higher emotional exhaustion. Meanwhile, based on the Job Demand-Resources (JD-R) theory, individuals with high job demands will retain good job outcomes through the role of work engagement. Therefore, our research aims to explore the perspective of personal resources such as self-efficacy and growth mindset through the perspective of the JD-R theory. The JD-R theory highlights the importance of organizations in disseminating personal resources through learning processes to generate higher adaptive performance and innovation inside organizations. Hence, our research

highlighted that these personal resources need both to be maintained and disseminated among other employees to maximize innovative ideas within a company's learning context.

Furthermore, we also underlined the optimal learning method of creating digital innovation within companies through double-loop and knowledge exploitation, namely the active learning approach. Our research is then expected to contribute to the literature by identifying that the learning process approach suitable for digital technology-based companies is the one that prioritizes a learner-centered mechanism. Therefore, we aim to explore the relationship between and mechanisms of an individual's internal processes (i.e., growth mindset, self-efficacy), work engagement, active learning, and adaptive performance. Thus, our research aims to fill the missing link between an individual's internal processes and adaptive performance through two mechanisms, work engagement and the active learning process.

2. Literature Review

2.1. Self-Efficacy and Work Engagement

Human resource management capability constitutes a key factor in maximizing a company's internal resources, particularly that of an individual's attitude towards his/her own abilities and strengths as indicated in their level of work engagement within the workplace (Bakker and van Wingerden 2021). According to Hakanen and Roodt (2010), work engagement can be portrayed in three dimensions of behavior, namely: Vigor, or high mental resilience at the workplace; Dedication, or high levels of enthusiasm in the workplace; and Absorption, which refers to high levels of long-term concentration on work. One determining factor of employee work engagement levels is the self-efficacy that emerges from individuals' internal processes. Del Libano et al. (2012) explain that those with high self-efficacy tend to be more resilient in facing changes, conflicts, and failure since they have considerable confidence in their self-ability. This positive mental condition subsequently provides greater energy for individuals to engage in their work, despite the new problems inherent in their job demands (Knight et al. 2021).

Studies that examine psychological processes within the context of work engagement from the point of Job Demand-Resources (JD-R) Theory remain limited in number. This is supported by the meta-analysis contained in the previous research by Lupșa et al. (2020), which found that personal resource intervention, particularly self-efficacy, remains inadequate in explaining its relationship with work engagement within the context of the Job Demand-Resources Theory. In addition, Bandura (2012) regards study of the self-efficacy concept within the realm of work as essential.

According to Bakker and Demerouti (2007), JD-R Theory is the main foundation of an understanding of an individual's level of work engagement within the workplace. They explain that the work engagement mechanism is activated according to the job demands of the organization balanced with the job resources available to individuals. Job demands usually take the form of time pressure, workloads, and emotional demands within the workplace (Knight et al. 2021). Meanwhile, one underlying factor of job resources is that of personal traits such as self-efficacy and a growth mindset. Del Libano et al. (2012) explain that high job demand will decrease when the individual has significant job resources, which leads him/her to higher work engagement. Moreover, Caesens and Stinglhamber (2014) state that individuals with significant self-efficacy tend to feel less frustrated by their work, despite being subject to huge job demands. Therefore, self-efficacy can be defined as an improvement process for individuals in which they view their high job resources positively. The pragmatic traits of individuals, namely their self-efficacy, will reduce their job demands, thereby enabling them to maintain persistence, dedication, and a high level of engagement in relation to their job (Schaufeli and Bakker 2004; Koyuncu et al. 2006; Halbesleben 2010; Christian et al. 2011; Bakker and Xanthopoulou 2013).

2.2. Growth Mindset and Work Engagement

The main goal of optimal human resource management is to enhance a company's competitive advantage in terms of innovation and creativity (Han and Stieha 2020). These authors explain that innovation is achieved through trial and error during the work process and market exploration. One internal individual factor that encourages a company's innovation is that of a growth mindset which constitutes an individual's way of thinking that perceives personal traits and abilities as properties that can be developed and changed (Dweck 2006).

A growth mindset is known to increase individual enthusiasm, focus, and effort and, in turn, an employee's work engagement. However, existing studies have not consistently provided empirical supporting data confirming the relationship between growth mindset and work engagement. A study conducted by Caniëls et al. (2018) found no direct relationship between a growth mindset and work engagement. In their analysis, they argue that a growth mindset restrained individual work engagement, which indirectly reduces individual performance. They recommended further study of the relationship between work engagement and a growth mindset using five mechanisms: enthusiasm for development, positive belief, effort, attention, and personal interaction (Keating and Heslin 2015). In our research, these concepts are studied within the variable of adaptive performance (Charbonnier-Voirin and Roussel 2012). Therefore, the concept of mindset within the context of human resource development needs to be studied more broadly, not only in traditional educational settings, but also in workplace learning (Han and Stieha 2020).

2.3. Work Engagement and Active Learning

As recommended by Han and Stieha (2020), further study of mindset within the context of workplace learning is required. Therefore, one of the concepts to be analyzed in our study is that of active learning, which is known as a medium for developing employees' skills and capabilities (Simmering et al. 2003). Bakker et al. (2012) explained that active learning has three main characteristics: the motivation to learn on one's own initiative, control over the learning process, and a high sense of mastery and self-efficacy. It can, therefore, be understood that the process of active learning focuses on the processes of control by the individual.

One theory that lays the foundation for active learning and work engagement is the job demand-control model. De Spiegelaere et al. (2015) explained that a higher level of job control fosters a more optimal active learning process despite high job demand. With this high level of job control, individuals would invest more effort in their labors, resulting in higher work engagement (Bakker et al. 2012). Additionally, those who are engaged in their work tend to be more willing to seek additional knowledge and develop their own capabilities (Fredrickson and Losada 2005).

2.4. Work Engagement and Individual Adaptive Performance

Employees' failure in adapting to organizational change is caused by a lack of the required behavioral intervention (Oreg et al. 2011; Vakola 2013). One behavior known to optimally support an individual's workplace adaptation process is work engagement. According to the job demand-resources theory, high job resources, such as high self-efficacy and a growth mindset, can balance the dynamic changes in job demands, resulting in higher adaptive performance (Christian et al. 2011). Moreover, Park et al. (2020) point out that studies of adaptive performance through the prism of the job demand-resource model remain extremely limited. They also explain that individuals with higher work engagement are more focused on expending their energy on their work and are more prepared for dynamic changes in the market.

Charbonnier-Voirin and Roussel (2012) defined adaptive performance as consisting of five dimensions: creativity, reactivity to emergencies, interpersonal adaptability, training effort, and handling work stress. These play an important role in maintaining an opti-

mal work process within organizational change as well as market demand fluctuations (Frese 2008).

2.5. Active Learning and Individual Adaptive Performance

Employee's adaptivity helps companies to build a sustained performance and seize new opportunities in the market (Babeľová et al. 2015; Babeľová and Stareček 2021). Moreover, there is an increasing body of research on the determinants of individual adaptive performance (Richels et al. 2020). In detail, Baard et al. (2014) reported a growth of current research interest in individual characteristics and learning processes that boost individual adaptive performance. Currently, the recent research conducted by Park et al. (2020) suggests that future research may explore the learning approach effective in enhancing individual adaptive performance. One of the learning approaches that is beneficial for individual adaptive mechanisms is active learning. The active learning approach enables higher control of employees' learning processes and the use of trial-error processes in exploring the market, gaining new knowledge, and developing new capabilities (Keith and Wolff 2014). This process allows individuals to employ positive behavior to deal with changes in the workplace and results in higher adaptive performance. Therefore, we propose that the concept of active learning can enhance adaptive performance.

Overall, this study aims to examine the relationship and mechanisms that have been built between the growth mindset and self-efficacy as personal resources with work engagement, active learning, and adaptive performance through the Job Demand-Resources Theory mechanism. Personal resources here refer to positive internal factors within the individual. Among them are a growth mindset and self-efficacy. Van Wingerden et al. (2017) explained that personal resources play an essential role in optimizing the level of individual work engagement through the job demand buffering mechanism and the job resources owned by employees. In addition, the Job Demand concept can maximize the active learning process as an intrinsic motivational factor. Personal resources also act as an intrinsic motivational process to enhance individual learning effort and adaptability in the workplace (Taris and Schaufeli 2015; Park et al. 2020).

3. Methods

This research investigates the mechanism between an individual's internal process, work engagement, active learning, and adaptive performance in digital technology-based companies. Details of the research questions are provided below:

RQ1: *What is the relationship between an individual's internal processes (i.e., growth mindset, self-efficacy), work engagement, active learning, and adaptive performance?*

RQ2: *What is the mechanism linking an individual's internal processes (i.e., growth mindset, self-efficacy), work engagement, active learning, and adaptive performance?*

This approach employs pragmatic understanding to gain a new and deeper appreciation of the underlying mechanism (Yvonne Feilzer 2010). Melão and Reis (2020) also emphasized that a qualitatively-driven explanatory sequential mixed method enables researchers to apply in-depth information mechanisms in obtaining quantitative results. Qualitative research produces an in-depth and detailed understanding of the mechanism, yet can be biased due to the limited number of participants. Therefore, through the mixed-method design, quantitative research offers a comprehensive understanding of the relationship between variables through more generalized results (Nunfam 2021).

In detail, based on the research aim outlined above, the question "What is the relationship between an individual's internal processes, work engagement, active learning, and adaptive performance" is examined using a quantitative method. Meanwhile, the question "What is the mechanism linking an individual's internal process, work engagement, active learning, and adaptive performance" is explored using a qualitative method. This sequence is known as the mixed method with an explanatory design. Thus, the explanatory mixed-

method approach can uncover deeper findings and clarify the mechanism and relationships in this research.

Regarding the data collection process, we implemented quota sampling techniques. This sampling allows researchers to select a certain characteristic representing the population (Acharya et al. 2013). The quota sampling method can also reduce bias during the selection step. The quota in this study is represented by a minimum of 2 years of work experience in the industry. Moreover, the use of quota sampling ensures the representation of different work experiences in the current company, which is the case study in our research.

The representation was divided into respondents with less than one year experience, one to three years' experience, and more than three years' experience inside those three companies. In detail, the survey respondents in our research were composed of 185 employees selected through quota sampling. On the other hand, the semi-structured interview includes 17 interviewees drawn from the top management of three digital startups in Indonesia employing purposive sampling. The purposive sampling is drawn from the amount of work experience of the managers in the industry, i.e., more than five years. Lastly, this research was conducted during a pandemic, so the data collection process was carried out using online forms for the survey and online interviews for the semi-structured interviews.

The measurement used in the survey of active learning utilizes four items from Taris et al. (2003) and Bakker et al. (2003). Self-efficacy is quantified based on four items proposed by Bandura (2006). The growth mindset is measured using three items from Dweck (2006). Work engagement is quantified using five items from Schaufeli et al. (2006), which include vigor, dedication, and absorption dimensions. Finally, individual adaptive performance employs five items from Charbonnier-Voirin and Roussel (2012): creativity, reactivity towards emergencies, interpersonal adaptability, training effort, and handling work stress.

This research used Smart-PLS designed by Ringle et al. (2015) and calculated the reliability, validity of path coefficients, and model fit, as well as the result of the indicator loading convergent validity, and composite reliability. To test validity, this research employs the standard AVE value of at least 0.5 (Fornell and Larcker 1981). Meanwhile, for the reliability test, the Cronbach Alpha value of more than 0.5 was adopted (Hair et al. 2010). This research analyzed 5000 bootstrap samples with a 95% confidence interval. To maintain the validity of the qualitative data, data and theoretical triangulation was employed (Oevermann 1979; Fielding and Fielding 1986). In detail, we collected the qualitative data to enrich the quantitative findings by exploring the mechanism between variables (see Figure 1).

As conducted by (Babeľová and Stareček 2021), the triangulation of this study is performed as follows. In the first research phase, we tested the relationships between variables such as self-efficacy, growth mindset, active learning, work engagement, and adaptive performance. In the second research phase, we clarified the underlying mechanism between those variables in the next phase using a qualitative approach. Our paper presents and compares both results.

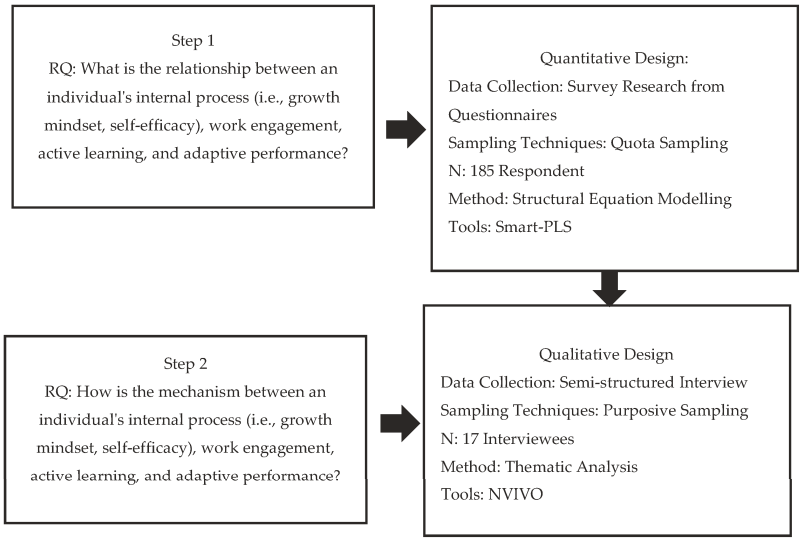

Figure 1. Research design.

4. Results

4.1. Survey Result

The results showed that the indicator for reliability, internal consistency reliability, and convergent validity were valid and reliable. The five variables had indicator loadings above 0.6 L, and Cronbach Alpha above 0.6. Active learning, work engagement, adaptive performance, self-efficacy, and a growth mindset were shown to be valid and reliable items (see Figure 2 and Table 1).

In order to produce an adequate goodness of fit model, path analysis was performed as shown in Figure 1 and Table 2. The Standardized Root Mean Square calculation result was 0.076. This number is below 0.10, thus fulfilling the criterion for the existing fit model (Cangur and Ercan 2015).

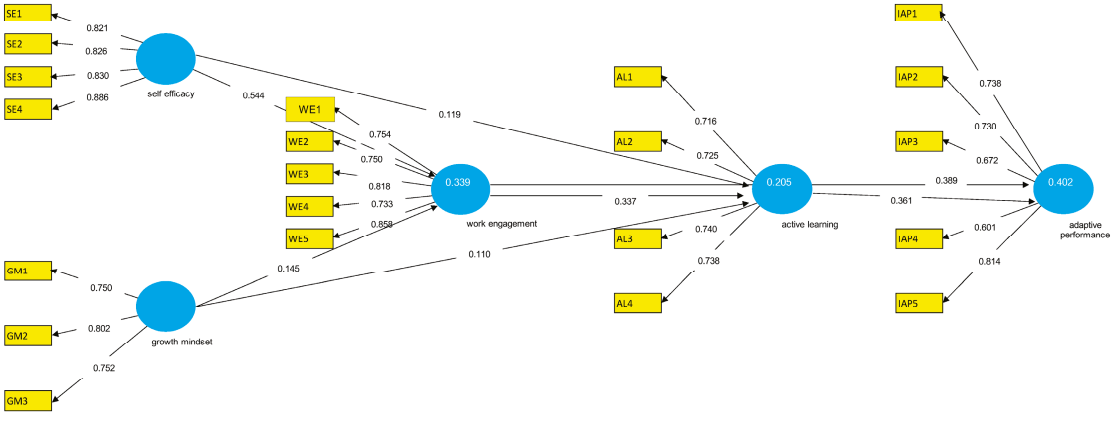

Figure 2. Smart-PLS result.

Table 1. Indicator reliability and convergent validity.

Construct	Items	Loadings	Cronbach's Alpha
Active Learning	AL1	0.716	
	AL2	0.725	
	AL3	0.740	
	AL4	0.738	0.708
Work Engagement	WE1	0.754	
	WE2	0.750	
	WE3	0.818	
	WE4	0.733	
	WE5	0.858	0.841
Individual Adaptive Performance	IAP1	0.738	
	IAP2	0.730	
	IAP3	0.672	
	IAP4	0.601	
	IAP5	0.804	0.758
Self-Efficacy	SE1	0.823	
	SE2	0.823	
	SE3	0.828	
	SE4	0.887	0.862
Growth Mindset	GM1	0.750	
	GM2	0.802	
	GM3	0.752	0.657

Table 2. Testing the significance of path coefficient relationships.

Relationships	Beta	S.D.	T-Stat	*p*-Value	Decision
Self-Efficacy → Work Engagement	0.537	0.066	8.083	0.000	Supported
Growth Mindset → Work Engagement	0.183	0.064	2.838	0.005	Supported
Work Engagement → Active Learning	0.418	0.074	5.549	0.000	Supported
Self-Efficacy → Active Learning	0.058	0.074	0.791	0.429	Not Supported
Growth Mindset → Active Learning	0.097	0.069	1.416	0.157	Not Supported
Work Engagement → Adaptive Performance	0.367	0.064	5.759	0.000	Supported
Active Learning → Adaptive Performance	0.454	0.060	7.624	0.000	Supported

The regression testing results in Table 2 indicate five direct relationships. The significant ones are those displaying T-stat results above 1.96 and *p*-value results below 0.05. Based on this standard, there are five significant direct relationships: the effect of self-efficacy and growth mindset on work engagement, the effect of work engagement on active learning and adaptive performance, and the significant influence of active learning on adaptive performance. The results above also indicated that work engagement fully mediates the relationship between self-efficacy and growth mindset and active learning. This is shown by the insignificant effect of self-efficacy and growth mindset on active learning together with the partial mediating effect of active learning on the relationship between work engagement and adaptive performance. This is shown by the direct significant relationship between work engagement and adaptive performance.

4.2. Interview Result

From the content analysis of the interviews, this research identified the detailed process underpinning the mechanism between self-efficacy, growth mindset, work engagement, active learning, and adaptive performance. The following sections explain the findings and insights from the process, involving the following variables (See Appendix A).

4.2.1. The Mechanism between an Individual's Internal Processes, Work Engagement, and Active Learning

The internal processes of an individual can optimally promote initiative on the part of each employee. Therefore, a growth mindset in individuals accompanied by high self-efficacy directly increases work effort, with specific regard to work engagement such as high enthusiasm at work (vigor), dedication toward new job demands, and enjoyment of long working hours (absorption). These positive internal processes also encourage individuals to be more open to new knowledge and dynamic changes in their external environment which encourages their self-initiative and trial-error learning that are defined as the constructs of active learning. Consequently, they can immediately adapt to the dynamic changes that exist at that time and demonstrate high work engagement within the context of digitally-based companies.

To maximize the digital innovation process, employees tend to be willing to learn new things and implement the exploration process unaided. Not only do they learn independently in creating digital innovation, but also implement a continuous knowledge-sharing process through an active learning mechanism. More specifically, this market exploration, new knowledge, and novel technologies encourage a knowledge combination process useful in introducing digital innovations to address problems or needs in the market.

4.2.2. The Mechanism between Work Engagement, Active Learning, and Adaptive Performance

Based on the foregoing analysis, work engagement plays a vital role in supporting employees in their adaptive mechanisms. In other words, work engagement allows an individual to quickly adapt to the dynamic changes in the market or in client demands through the three dimensions of behavior in work engagement. First, vigorous behavior leads individuals to willingly take the initiative in implementing a trial-error learning process as a means of obtaining new knowledge and satisfying higher job demands. Second, this dedicated behavior enables them to be more responsible and encourages an active learning process which helps them become more adaptive in the workplace. Finally, individuals with absorbing behavior tend to have highly self-regulated learning and explore problems in their job as an opportunity for further learning.

This behavior also allows them to optimally adapt their product features by following the changes in digital technologies. Work engagement also leads to higher interpersonal adaptation to different teams. These dynamic changes in team projects enable them to acquire additional new accumulative knowledge. These processes lead individuals to generate more innovative ideas. The accumulated knowledge process in the research is based on the active learning mechanism. Individuals with high engagement tend to implement independent and explorative learning processes, allowing them to fulfill client or market demands by making digital innovations to their products. This ultimately leads to more optimal active learning and helps individuals become more effective at creative problem-solving and applying interpersonal skills.

4.3. Triangulation of the Findings

This section explains the triangulation process, which is carried out by juxtaposing the findings of the quantitative and qualitative research. First, quantitative results showed an insignificant relationship between self-efficacy and a growth mindset toward active learning. Based on the transcript result in Appendix A Table A1, such as: "When he (employee) is engaged with his work, he will willingly learn and commit new knowledge related to product features or product development process. However, if they are not, they will know the information, but no new knowledge". It can be concluded that the mechanism of internal processes such as self-efficacy and growth mindset toward positive behavior such as active learning is indirect. It is shown that the switching behavior of employees is built through a positive psychological and mental state such as work engagement

before it directly affects their decision to act in the active learning process. Therefore, this finding emphasized the significant evidence of the Job Demand-Resources Theory that personal resources positively enhance work engagement and adaptive performance, as well as buffering the work stress or job demand. It also indicates that employees' personal resources in the active learning process create two different kinds of employee. The first are those with high self-efficacy and growth mindset but low work engagement. This group will become aware of, yet take no action to carry out the active learning process needed to seize new market opportunities. The second group consists of those with high self-efficacy and a growth mindset, along with high work engagement. They tend to directly take action to carry the active learning process. This emphasizes the importance of an organization maintaining their work engagement and a policy that allows optimal active learning inside the organization.

Strengthening those findings, the second mechanism among work engagement, active learning, and adaptive performance showed the missing link between work engagement and adaptive performance. The quantitative result significantly impacted work engagement toward active learning and adaptive performance. Meanwhile, the interview result revealed that employees with high work engagement would have an active learning process, resulting in new skill enhancement that allowed them to have high adaptive performance in dynamic market conditions. They are shown to have adaptive performance that is directly beneficial for product innovation; the organization needs to maintain employee work engagement and optimally facilitate employees' active learning processes.

5. Discussion

In this section, we intend to explain and discuss our findings. The result of this research shows that there are two distinct mechanisms in the relationship between growth mindset, self-efficacy, work engagement, active learning, and adaptive performance. The first is that between self-efficacy, a growth mindset, work engagement, and active learning. Along with the theories of Job Demand Resource and Job Demand-Control, personal resources such as growth mindset and self-efficacy significantly affect work engagement levels and represent the active learning of individuals (Caesens and Stinglhamber 2014; Keating and Heslin 2015). In line with the qualitative data findings, a growth mindset and self-efficacy directly increase the initiative and efforts of individuals, thereby enabling them to improve their work engagement under dynamic job-demand conditions (Del Libano et al. 2012). Enthusiasm, dedication, and higher employee focus on solving the novel problems of new job demands will encourage them to engage in active learning behavior.

Moreover, according to the quantitative data, work engagement fully mediates the relations between a growth mindset and self-efficacy. Therefore, optimizing the active learning process not only depends on individual self-regulation such as growth mindset and self-efficacy, but also on individuals' level of engagement at their workplace. Therefore, employees will explore new knowledge in adapting to advances in digital technology with the result that their active learning mechanism may produce more effective innovation in the company (Han and Stieha 2020). Therefore, employees will explore new knowledge in adapting to advances in digital technology with the result that their active learning mechanism may produce more beneficial innovation in the company (Han and Stieha 2020).

Our qualitative findings indicate that active learning behavior involves employees in knowledge sharing and results in new innovative ideas in product development. Based on the previous literature, this phenomenon is known as a knowledge combination process (Zheng et al. 2011). More specifically, active learning behavior enables knowledge exploitation and exploration beneficial for developing organizational capabilities to generate digital innovation (Dezi et al. 2019). In short, the active learning processes of each individual can create a variety of knowledge within the company, followed by digital innovation based on a combination of that knowledge (Tortora et al. 2021).

The second mechanism is the relationship developed between work engagement, active learning, and adaptive performance. Our findings emphasize the role of work engagement in enhancing employees' active learning and higher adaptive performance (Frese 2008; Fredrickson and Losada 2005). Based on the quantitative data, a partial mediation of active learning between work engagement and adaptive performance was found. Both work engagement and active learning help employees to apply more effective adaptive mechanisms in the workplace (Bakker et al. 2012; van den Heuvel et al. 2020). Our findings also indicate that interpersonal capabilities play an important role in the digital innovation process (Boeker et al. 2021), while emphasizing that the learning intervention that aligns with digital technological advancement and optimizes innovation within an organization is active learning.

The active learning process allows dynamic new knowledge accumulation on the part of employees and creates digital innovation through problem-solving processes (De Spiegelaere et al. 2015; Di Vaio et al. 2021). Our findings point out that the theory supporting the relationship between personal resources and adaptive performance using work engagement is the JD-R model. Our findings are shown to counteract the COR theory explaining the phenomenon of work engagement within an organizational change context. The model employed reveals that the indirect effect of an individual's internal processes on adaptive performance is counterbalanced by work engagement and active learning. In detail, this research underlined the role of work engagement as an intervention between individuals' internal processes such as a growth mindset toward positive behavior (i.e., active learning) and job outcomes (adaptive performance). These findings also highlighted the mechanism of a positive psychological state that leads individuals to positive behavior in the workplace, resulting in optimal adaptive performance. To produce employees with higher adaptive performance, the company needs to implement policy and facilitate employees to improve their work engagement and optimal active learning processes. Our findings also pointed out the importance of job resources as a buffering mechanism toward high job demand and allowing employees to employ more positive behavior in the workplace.

6. Conclusions

Our study found that there are two main mechanisms (i.e., behavior and learning process) in optimizing individual adaptive performance within the context of digital technology based companies. The first mechanism is through individual internal processes (i.e., growth mindset; self-efficacy) which affect the level of work engagement and the active learning processes of employees. Based on these findings, it can be concluded that the underlying mechanism as the mediator between individual internal process (i.e., self-efficacy, growth mindset) and active learning is a positive psychological state, such as work engagement. Meanwhile, the second mechanism is built upon the individual's level of engagement with their work and active learning process that manifests itself in employees' adaptive performance. These findings emphasized that personal resources optimized individual adaptive mechanisms through active learning behavior for the skill enhancement process. It also revealed the importance of new knowledge acquisition through an active learning process among employees in promoting greater digital innovation within organizations. Companies also need an active learning process as an effective and efficient learning approach for skill enhancement. This process is also pivotal to optimizing the innovation process inside the organization through employees' high adaptive performance. Therefore, the organization needs to create and maintain a policy and an organizational climate.

Moreover, we also note that sufficient learning intervention to maintain employees' adaptive performance constitutes the active learning process. According to our qualitative findings, we found an emergent phenomenon that active learning is beneficial for knowledge combination effectiveness in optimizing digital innovation within organizations. Therefore, we contribute to the significant empirical findings on the direct relations between a growth mindset and work engagement. Our research also highlights the importance of the JD-R Model within an organizational change context. However, our research includes only a com-

paratively limited number of respondents. Hence, future research should employ a broader respondent base to test the consistency of the relationships outlined in this investigation. Last but not least, our research is limited to the explanation of individual's internal processes. Future research may also explore the impact of external factors from individuals, such as job resources, organizational climate, structure, culture, and policy, that can boost individual's work engagement and facilitate an active learning behavior to increase the effectiveness and efficiency of new skill enhancement (Van Woerkom et al. 2016).

Author Contributions: Conceptualization, W.N. and D.S.; methodology, A.G.; software, W.N.; validation, W.N., A.G., D.S.; formal analysis, A.G.; investigation, W.N.; resources, W.N.; data curation, D.S.; writing—original draft preparation, W.N.; writing—review and editing, A.G. and D.S.; visualization, W.N.; supervision, A.G. and D.S..; project administration, W.N.; funding acquisition, A.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by School of Business and Management, Bandung Institute of Technology, grant number L14 year 2022.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Coding Structure Result.

Significant Example Quotes	Coding	Themes
"Individuals growth mindset are very needed in our company to face the rapid advancement of digital technology. The growth mindset leads people who are enthusiastic and willing to work more with dynamic job demands and constantly changing knowledge"	Growth Mindset leads individuals to have high self-initiative and enthusiasm regarding their job demand or market (dedication)	The Mechanism between Growth-Mindset and Work Engagement
"Individuals with a growth mindset tend to have more open to knowledge and change based on the dynamic market/tech advancement. This encourages them to work more and seek solutions for new job demands or new opportunities in the market"	Growth Mindset leads individuals to be resilient to change and stay engaged with their job even though the job demand is high (vigor)	
"This growth mindset is very necessary because our product requires individuals to continue to learn new knowledge or skills, so from that, they will immediately explore in-depth even outside their working hours to be able to complete the new job demand"	Growth Mindset leads individuals to explore new knowledge or skills even though it takes more energy and time out from their working time (absorption)	
"When they have high confidence in their own capabilities, they will want to work more even with new jobs or challenges at work"	Self-Efficacy enhances individuals' work effort (dedication)	The Mechanism between Self-Efficacy and Work Engagement
"This sense of belief in one's own capabilities will give confidence that can boost new innovative ideas. This makes employees enjoy it more and more deeply to explore their work"	Self-Efficacy allows individuals to easily initiate new ideas through their confidence (absorption)	
"Self-Efficacy is very influential in doing exploration in their production process. This individual belief gives more strength to their mentality to face changes or new challenges in the workplace"	Self-Efficacy provides more mental energy to deal with split work (vigor)	
"When he (employee) is engaged with his work, he will willingly learn and commit new knowledge related to product features or product development process. But if they are not, they will just know the information but no new knowledge"	Work engagement's vigor behavior drives individuals to learn more and absorb new knowledge effectively through active learning	The Mechanism between Work Engagement and Active Learning
"Employees who are engaged with their work tend to be responsible and explore and reflect deeply on new knowledge so that they can find new innovative ideas for products"	Absorption allows individuals to explore and learn independently, reflect on their new knowledge and build new ideas	
"Employees who are engaged with their work will be enthusiastic and willing to work longer at the desk. It directs them to share knowledge with colleagues from other divisions and combine different perspectives and knowledge into one new product innovation idea"	Dedication toward their work allows individuals to have effective knowledge sharing in building new innovative ideas in products resulting from the knowledge combination process	

Table A1. *Cont.*

Significant Example Quotes	Coding	Themes
"Individuals who want to take the initiative to learn the latest new things will have new knowledge that comes from new digital technology advancements, various perspectives from their colleagues or customers. This makes him more creative in building ideas in solving new challenges or problems in the workplace"	Self-Initiative in learning and mastery of new knowledge leads individuals to solve problems more creatively	The Mechanism between Active Learning and Adaptive Performance
"In our place, people who are actively learning tend to have no problem with changes from clients or superiors, and when there are changes, they will have more creative problem solving than their learning process"	Individuals who have active learning tend to be open to change and capable of solving emergencies effectively	
"Our employees who are actively learning are used to managing their time and energy well, so they can also easily manage the existing work stress"	Individuals who like to develop themselves and actively learn tend to be able to manage work stress well	
"Basically, the production process in our company consists of combining several ideas or knowledge from different divisions, so employees who are actively learning will usually be active in exploring knowledge from their colleagues. So, usually, he does have a good enough training effort and interpersonal skills"	Individuals who have active learning will actively seek new knowledge from their colleagues so that they will have good interpersonal skills and high training effort	
"My employees who are engaged with their work are usually easy to adapt to new knowledge or changing client requests. Even so, they can still be enthusiastic, like and explore deeply so that they can perform well"	Individuals who are engaged had a better adaptive mechanism	The Mechanism between Work Engagement and Adaptive Performance

References

Acharya, Anita Shankar, Anupam Prakash, Pikee Saxena, and Aruna Nigam. 2013. Sampling: Why and how of it. *Indian Journal of Medical Specialties* 4: 330–33. [CrossRef]

Baard, Samantha K., Tara A. Rench, and Steeve W. J. Kozlowski. 2014. Performance adaptation: A theoretical integration and review. *Journal of Management* 40: 48–99. [CrossRef]

Babeľová, Zdenka Gyurak, and Augustin Stareček. 2021. Evaluation of industrial enterprises' performance by different generations of employees. *Entrepreneurship and Sustainability Issues* 9: 346. [CrossRef]

Babeľová, Zdenka Gyurak, Marta Kučerová, and Maria Homokyová. 2015. Enterprise performance and workforce performance measurements in industrial enterprises in Slovakia. *Procedia Economics and Finance* 34: 376–81. [CrossRef]

Bäckström, Izabelle, and Lars Bengtsson. 2019. A mapping study of employee innovation: Proposing a research agenda. *European Journal of Innovation Management* 22: 468–92. [CrossRef]

Bakker, Arnold B., and Despoina Xanthopoulou. 2013. Creativity and charisma among female leaders: The role of resources and work engagement. *The International Journal of Human Resource Management* 24: 2760–79. [CrossRef]

Bakker, Arnold B., and Evangelia Demerouti. 2007. The job demands-resources model: State of the art. *Journal of Managerial Psychology* 22: 309–28. [CrossRef]

Bakker, Arnold B., Evangelia Demerouti, Toon W. Taris, Wilmar B. Schaufeli, and Paul J. Schreurs. 2003. A multigroup analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management* 10: 16–38. [CrossRef]

Bakker, Arnold B., Evangelia Demerouti, and L. ten Brummelhuis Lieke. 2012. Work engagement, performance, and active learning: The role of conscientiousness. *Journal of Vocational Behavior* 80: 555–64. [CrossRef]

Bakker, Arnold B., and Jessica van Wingerden. 2021. Do personal resources and strengths use increase work engagement? The effects of a training intervention. *Journal of Occupational Health Psychology* 26: 20–30. [CrossRef]

Bandura, Albert. 2006. Guide for constructing self-efficacy scales. *Self-Efficacy Beliefs of Adolescents* 5: 307–37.

Bandura, Albert. 2012. On the functional properties of perceived self-efficacy revisited. *Journal of Management* 38: 9–44. [CrossRef]

Bell, Bradford S., and Steve W. J. Kozlowski. 2008. Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology* 93: 296–316. [CrossRef]

Boeker, Warren, Michael D. Howard, Sandip Basu, and Arvin Sahaym. 2021. Interpersonal relationships, digital technologies, and innovation in entrepreneurial ventures. *Journal of Business Research* 125: 495–507. [CrossRef]

Caesens, Gaetane, and Florence Stinglhamber. 2014. The relationship between perceived organizational support and work engagement: The role of self-efficacy and its outcomes. *European Review of Applied Psychology* 64: 259–67. [CrossRef]

Cangur, Sengul, and Ilker Ercan. 2015. Comparison of model fit indices used in structural equation modeling under multivariate normality. *Journal of Modern Applied Statistical Methods* 14: 152–67. [CrossRef]

Caniëls, Marjolein C. J., Judith H. Semeijn, and Irma H. M. Renders. 2018. Mind the mindset! The interaction of proactive personality, transformational leadership and growth mindset for engagement at work. *Career Development International* 23: 48–66. [CrossRef]

Charbonnier-Voirin, Audrey, and Patrice Roussel. 2012. Adaptive performance: A new scale to measure individual performance in organizations. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration* 29: 280–93. [CrossRef]

Christian, Michael S., Adela S. Garza, and Jerel E. Slaughter. 2011. Work engagement: A quantitative review and test of its relations with task and contextual performance. *Personnel Psychology* 64: 89–136. [CrossRef]
De Spiegelaere, Stan, Guy Van Gyes, Hans De Witte, and Geert Van Hootegem. 2015. Job design, work engagement and innovative work behavior: A multi-level study on Karasek's learning hypothesis. *Management Revue* 26: 123–37. Available online: https://www.jstor.org/stable/24570254 (accessed on 10 April 2022). [CrossRef]
Del Libano, Mario, Susana Llorens, Marisa Salanova, and Wilmar B. Schaufeli. 2012. About the bright and dark sides of self-efficacy: Work engagement and workaholism. *The Spanish Journal of Psychology* 15: 688–701. [CrossRef] [PubMed]
Demerouti, Evangelia, Russell Cropanzano, Arnold B. Bakker, and Michael P. Leiter. 2010. From thought to action: Employee work engagement and job performance. In *Work Engagement: A Handbook of Essential Theory and Research*. East Sussex: Psychology Press, vol. 65, pp. 147–63.
Dezi, Luca, Alberto Ferraris, Armando Papa, and Demetris Vrontis. 2019. The role of external embeddedness and knowledge management as antecedents of ambidexterity and performances in Italian SMEs. *IEEE Transactions on Engineering Management* 68: 360–69. [CrossRef]
Di Vaio, Assunta, Rosa Palladino, Alberto Pezzi, and David E. Kalisz. 2021. The role of digital innovation in knowledge management systems: A systematic literature review. *Journal of Business Research* 123: 220–31. [CrossRef]
Dweck, Carol S. 2006. *Mindset: The New Psychology of Success*. New York: Random House.
Fielding, Nigel G., and Jane L. Fielding. 1986. *Linking Qualitative Data*. Linking Data: The Articulation of Qualitative and Quantitative Methods in Social Research. Beverly Hills: Sage, pp. 41–53. [CrossRef]
Fornell, Claes, and David F. Larcker. 1981. Structural equation models with unobservable variables and measurement error: Algebra and Statistics. *Journal of Marketing Research* 18: 382–88. [CrossRef]
Fredrickson, Barbara L., and Marcial F. Losada. 2005. Positive affect and the complex dynamics of human flourishing. *American Psychologist* 60: 678–86. [CrossRef]
Frese, M. 2008. The changing nature of work. In *An Introduction to Work and Organizational Psychology*. Malden: Blackwell Publishing, pp. 397–413.
Hair, Joseph F., William C. Black, Bill Black, Barry J. Babin, and Rolph E. Anderson. 2010. *Multivariate Data Analysis*, 7th ed. New Jersey: Pearson.
Hakanen, Jari J., and Gert Roodt. 2010. Using the job demands-resources model to predict engagement: Analysing a conceptual model. In *Work Engagement: A Handbook of Essential Theory and Research*. East Sussex: Psychology Press, vol. 2.
Halbesleben, Jonathon R. B. 2010. A meta-analysis of work engagement: Relationships with burnout, demands, resources, and consequences. In *Work Engagement: A Handbook of Essential Theory and Research*. East Sussex: Psychology Press, vol. 8, pp. 102–17.
Han, Soo Jeoung, and Vicki Stieha. 2020. Growth mindset for human resource development: A scoping review of the literature with recommended interventions. *Human Resource Development Review* 19: 309–31. [CrossRef]
Hobfoll, Stevan E., Jonathon Halbesleben, Jean-Pierre Neveu, and Mina Westman. 2018. Conservation of resources in the organizational context: The reality of resources and their consequences. *Annual Review of Organizational Psychology and Organizational Behavior* 5: 103–28. [CrossRef]
Keating, Lauren A., and Peter A. Heslin. 2015. The potential role of mindsets in unleashing employee engagement. *Human Resource Management Review* 25: 329–41. [CrossRef]
Keith, Nina, and Christian Wolff. 2014. Encouraging active learning. In *The Wiley Blackwell Handbook of the Psychology of Training, Development, and Performance Improvement*. Hoboken: John Wiley & Sons, Ltd., pp. 92–116. [CrossRef]
Knight, Caroline, Maria Tims, Jason Gawke, and Sharon K. Parker. 2021. When do job crafting interventions work? The moderating roles of workload, intervention intensity, and participation. *Journal of Vocational Behavior* 124: 103522. [CrossRef]
Kohli, Rajiv, and Nigel P. Melville. 2019. Digital innovation: A review and synthesis. *Information Systems Journal* 29: 200–23. [CrossRef]
Koyuncu, Mustafa, Ronald J. Burke, and Lisa Fiksenbaum. 2006. Work engagement among women managers and professionals in a Turkish bank: Potential antecedents and consequences. *Equal Opportunities International* 25: 299–310. [CrossRef]
Lupșa, Daria, Delia Vîrga, Laurentiu P. Maricuțoiu, and Andrei Rusu. 2020. Increasing psychological capital: A pre-registered meta-analysis of controlled interventions. *Applied Psychology* 69: 1506–56. [CrossRef]
Melão, Nuno, and Joao Reis. 2020. Selecting talent using social networks: A mixed-methods study. *Heliyon* 6: e03723. [CrossRef] [PubMed]
Nunfam, Victor Fannam. 2021. Mixed methods study into social impacts of work-related heat stress on Ghanaian mining workers: A pragmatic research approach. *Heliyon* 7: e06918. [CrossRef] [PubMed]
Oevermann, Ulrich. 1979. Sozialisationstheorie. In *Deutsche Soziologie Seit 1945*. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 143–68.
Oreg, Shaul, Maria Vakola, and Achilles Armenakis. 2011. Change recipients' reactions to organizational change: A 60-year review of quantitative studies. *The Journal of Applied Behavioral Science* 47: 461–524. [CrossRef]
Park, Yoonhee, Doo Hun Lim, Woocheol Kim, and Hana Kang. 2020. Organizational support and adaptive performance: The revolving structural relationships between job crafting, work engagement, and adaptive performance. *Sustainability* 12: 4872. [CrossRef]
Richels, Kelsey A., Eric Aanthony Day, Ashley G. Jorgensen, and Jonathan T. Huck. 2020. Keeping calm and carrying on: Relating affect spin and pulse to complex skill acquisition and adaptive performance. *Frontiers in Psychology* 11: 377. [CrossRef]

Ringle, Christian, Dirceau da Silva, and Diogenes Bido. 2015. Structural equation modeling with the SmartPLS. Available online: https://ssrn.com/abstract=2676422 (accessed on 19 April 2022).
Schaufeli, Wilmar B., and Arnold B. Bakker. 2004. Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior* 25: 293–315. [CrossRef]
Schaufeli, Wilmar B., Arnold B. Bakker, and Marisa Salanova. 2006. The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement* 66: 701–16. [CrossRef]
Simmering, Marcia J., Jason A. Colquitt, Raymond A. Noe, and Christopher O. L. H. Porter. 2003. Conscientiousness, autonomy fit, and development: A longitudinal study. *Journal of Applied Psychology* 88: 954–63. [CrossRef]
Taris, Toon W., and Wilmar B. Schaufeli. 2015. The job demands-resources model. In *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health*. West Sussex: John Wiley & Sons, Ltd., pp. 155–80.
Taris, Toon W., Michiel A. J. Kompier, Annet H. De Lange, Wilmar B. Schaufeli, and Paul J. G. Schreurs. 2003. Learning new behaviour patterns: A longitudinal test of Karasek's active learning hypothesis among Dutch teachers. *Work & Stress* 17: 1–20. [CrossRef]
Tortora, Debora, Roberto Chierici, Massimiliano Farina Briamonte, and Riccardo Tiscini. 2021. 'I digitize so I exist'. Searching for critical capabilities affecting firms' digital innovation. *Journal of Business Research* 129: 193–204. [CrossRef]
Vakola, Maria. 2013. Multilevel readiness to organizational change: A conceptual approach. *Journal of Change Management* 13: 96–109. [CrossRef]
van den Heuvel, Matchteld, Evangelia Demerouti, Arnold B. Bakker, Jorn Hetland, and Wilmar B. Schaufeli. 2020. How do employees adapt to organizational change? The role of meaning-making and work engagement. *The Spanish Journal of Psychology* 23: e56. [CrossRef] [PubMed]
Van Wingerden, Jessica, Arnold B. Bakker, and Daantje Derks. 2017. Fostering employee well-being via a job crafting intervention. *Journal of Vocational Behavior* 100: 164–74. [CrossRef]
Van Woerkom, Marianne, Arnold B. Bakker, and Lisa H. Nishii. 2016. Accumulative job demands and support for strength use: Fine-tuning the job demands-resources model using conservation of resources theory. *Journal of Applied Psychology* 101: 141. [CrossRef]
Yvonne Feilzer, Martina. 2010. Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research* 4: 6–16. [CrossRef]
Zheng, Suli, Wei Zhang, and Jian Du. 2011. Knowledge-based dynamic capabilities and innovation in networked environments. *Journal of Knowledge Management* 15: 1035–51. [CrossRef]

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Review

Digital Entrepreneurship and Creative Industries in Tourism: A Research Agenda

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Abstract: Recently, digital entrepreneurship and creative industries in tourism have been emerging strongly, possibly as a result of the global pandemic of the last two years. Their growth in the last decade has been due to the penetration of technology into the daily life of the tourist and the desire for tours that combine intangible value and a differentiated experience. This paper presents the findings of a research agenda that aims to identify key factors and research dimensions in the adoption of digital entrepreneurship and the creative industries in tourism. The study includes a critical analysis based on a literature review through a filtered search method of statistical information from 20 relevant scientific publications listed in the Scopus and Google Scholar databases. Additionally, this research addresses research gaps and recommends directions for future research. Finally, the conclusions are presented.

Keywords: digital entrepreneurship; creative industries; tourism; creative entrepreneurship; research agenda

Citation: Varotsis, Nikolaos. 2022. Digital Entrepreneurship and Creative Industries in Tourism: A Research Agenda. *Economies* 10: 167. https://doi.org/10.3390/economies10070167

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 10 June 2022
Accepted: 2 July 2022
Published: 13 July 2022

1. Introduction

The creative industry and digital entrepreneurship are part of the tourism industry and have been growing in momentum over the last decade (Jelincic 2021). Climate change (Pang et al. 2013), the growing awareness of environmental issues (Kilipiris and Zardava 2012), the need for more sustainable tourism development (Torres-Delgado and Saarinen 2014), the growing demands for high-quality tourism services (Butnaru and Miller 2012; Garrigos-Simon et al. 2019; Varotsis 2019), and increased competition in the tourism market have contributed to the strengthening of new forms of digital entrepreneurship and creative industries in tourism.

The recent, rapid development of digital technologies—in part as a result of the COVID-19 pandemic—such as big data and analytics, the internet of things, mobile devices, social media, artificial intelligence, blockchain, and cloud computing (Rusch et al. 2022), have caused new entrepreneurs with a focus on new business opportunities to innovate in digital entrepreneurship. Moreover, the creative and cultural industries (Cooke and De Propris 2011) include activities related to architecture, cultural heritage, artistic crafts, audiovisual media, archives, libraries, visual arts, publishing festivals, music creation, and radio (Boix-Domenech and Rausell-Köster 2018), and are now considered a key driver of economic growth, recently attracting innovative entrepreneurs.

As a result, the rapid spread of digital technologies has accelerated the growth of cultural and creative industries (CCIs) in technology-dominated sectors, attracting entrepreneurs who are innovating by investing in digital entrepreneurship. The development of digital entrepreneurship in creative industries is an attractive sector of innovation, as it achieves high digital accessibility and required low investment costs and focuses on empowering value creation (Tomczak and Stachowiak 2015). After all, both managerial and business skills are now predictors of entrepreneurial innovation (Tsolakidis et al. 2020).

This aim of this paper is to review the literature on digital entrepreneurship and the creative industries in tourism as well as to provide a guide to key topics, contexts, methods,

findings, and dimensions in related research. Furthermore, this paper aims to highlight the latest research findings on the effects of digital entrepreneurship and the CCIs in tourism. Finally, opportunities for further research by tourism researchers are presented. This paper presents a critical review of current research and key factors in digital entrepreneurship and the creative industries in tourism (Ngoasong 2018; Meyer et al. 2022).

Understanding the importance of digital entrepreneurship and the creative industries in tourism is the subject of this research. This is achieved by three different methods: first, by recording the findings and conclusions from research on digital entrepreneurship and the creative industries in tourism; second, by identifying and discussing the three dimensions (economic, socio-psychological, and other dimensions) of tourism; and third, by identifying six key factors that outline the research agenda of the present study.

The conceptual and theoretical backgrounds of digital entrepreneurship, the creative industries, and creative entrepreneurship are first presented. Then, the research dimensions are analyzed by creating a distinction between economic, socio-psychological, and other (technological, sustainable, etc.) dimensions. The next section describes the methodology used for the literature analysis, followed by the results, which describe in detail the findings and dimensions of the main research work in digital entrepreneurship and the creative industries in tourism. The Discussion section outlines the research agenda with six factors based on the conclusions from the analyzed research work and describes research gaps and suggestions for future research. The paper concludes by making final remarks on the research agenda.

2. Theoretical Background

This section presents the conceptual framework for digital entrepreneurship, the creative industries, and creative entrepreneurship used in the research agenda development methodology. The concepts listed below describe the keyword search criteria underlying this research and highlight the intersections of digital entrepreneurship, the cultural industries (Leung and Feldman 2021), and the creative industries in the field of tourism.

2.1. Digital Entrepreneurship

Entrepreneurship is the dynamic process of creating value (Gartner 1990; Huarng and Yu 2011) by taking risks aimed at financial and self-fulfilling gratification. Entrepreneurship is a broad term that includes elements of innovation, management, risk-taking, enterprise decision-making, perseverance, and perspicacity in the face of new economic prospects (Weiermair et al. 2006). In addition, the personality of the entrepreneur exhibits special characteristics, such as the need for achievement, autonomy, creation, vision, foresight, and positive thinking (García-Tabuenca et al. 2011).

In the network economy, entrepreneurship characterizes both the neo-active and established companies of the sector. The highly competitive environment of the online economy is forcing both start-ups and established organizations to innovate to succeed in efficiency. Digital entrepreneurship includes all the activities involved in developing a venture that generates revenue from digital and technological means through electronic networks. The digital entrepreneur is involved in any kind of business that uses digital technologies for either commercial or social and governmental purposes (Williamson et al. 2019).

Digital entrepreneurship is often identified by technological innovation flexibility (Kanovska and Bumberova 2021), which involves the transformation of new ideas, inventions, and business processes into market value. It involves transforming a good idea into an innovative idea that creates value in the digital market. Innovative digital entrepreneurs are forced to venture into a highly competitive digital business environment where their inventions—the products they offer to the market—are exposed via the internet to countless other ambitious digital entrepreneurs (Endres et al. 2022). The success of a digital entrepreneur is related to their ability to continuously and successfully update their digital product.

2.2. Creative Industries

Creative industries combine high-value-added services with the supply of industrial products to the market. They incorporate all the activities that stand out in a creative process (Cunningham 2002). A common factor in the activities of the creative industries is creativity, in the sense of providing an innovative solution or an innovation based on a concept of its creator. In the creative industries, creativity brings forth new ideas while innovation transforms them and implements them into creative ideas (Amabile 1988).

According to the definition of the term, as developed for the British economy, the creative industries bring together a number of areas that may not be related to each other, including advertising and marketing, architecture, design, designer fashion, art and antiques, performing and visual arts, publishing, crafts, software, leisure software, museums, galleries, libraries, education, film, video, photography, music, television, and radio (Foord 2009). It is the economy of experience where the consumption of creative goods and services is combined with the intangible added value that accompanies it.

The creative activities related to the creative industries focus on human individual creativity that aims to create knowledge and innovation. The institutional framework of the creative industries includes all the managerial skills and individual creations that achieve value and job creation through the exploitation of intellectual property and individual creativity (Bilton and Leary 2002). In addition, the creative industries integrate individual creativity into the cultural industry, the creative industry, and the orange economy. The orange economy includes all the necessary activities for an idea to be transformed into a product for the market.

The creative industries are often identified with the cultural industries, which are one of the creative subsectors. The cultural industries focus on cultural tourism, cultural heritage, and the activity sectors of museums and libraries, cultural and sporting activities, and activities that emit a way of life, promoting mainly cultural and social value. Human creativity is the common source of the creation of goods and services in the so-called cultural and creative industry (CCI) (Chuluunbaatar et al. 2014).

2.3. Creative Tourism

The modern, highly competitive tourism market requires the provision of services characterized by creativity and innovation to meet the growing demands of tourists. The COVID-19 pandemic has highlighted the need for innovations that maintain or increase tourist satisfaction with tourism services (Bavik and Kuo 2022). Tourism is based on the interactivity of the provider (producer of tourism services) and receiver (tourist); therefore, the satisfaction of the latter depends on the human relationships that develop during the provision of the tourism services. A creative provider of unique and innovative tourism services has a competitive advantage in the intensely competitive tourism industry (Prima Lita et al. 2020).

Tourism is related to the tourist experience that is reflected in the knowledge and stimuli gained during a tour. A unique, unforgettable experience by the tourist is related to the series of goods and services that a tourist receives at a specific place and time, and under their personal conditions of perception. In cultural tourism, the experience is gained from the sense of interaction with another culture (Smith 2015). The uniqueness of an experience requires more than the sum of standardized tourist goods and services. It can be achieved both by the uniqueness of the human relationships that govern the tourism service and by a co-creation of the tourist experience that leads to a cognitive transformation (Jiang et al. 2021). The latter excels when compared to a declining, simple remembrance.

Creative tourism, as opposed to mass tourism provided through a standard tourist product, is a result of co-creation by the host and the tourist that aims to customize authentic unique experiences. In tourism, creativity appears in all four key areas (4Ps) of a creative person, creative process, creative product, and creative press (environment) (Horng et al. 2015). Tourism creativity is achieved with the participation of the creative person and the utilization of the creative process in the design of creative activities (masterclasses) through

the use of creative environments (creative clusters) that form a creative tourist product (tourist attraction) for the creative class (Florida 2012). The tourist attraction can take the form of a visit to an archeological site, a gallery, a concert, a ceremonial event, a theatrical performance, etc.

2.4. Creative Entrepreneurship

In recent decades, a trend has developed towards the creative knowledge economy, which is based on the information society and goes beyond the traditional model of standard product reproduction. If the creative industries combine the creation, production, and supply of creative products for the market, creative entrepreneurship is the process of commercializing creative products through their launch by an enterprise operating in the creative industry (Muller et al. 2009). The creative entrepreneur combines entrepreneurial ability and creative talent to exploit business opportunities in the creative industry.

Moreover, entrepreneurs in the creative economy have emerged who, using individual creativity and personal instinct, have transformed creative ideas into profitable products in the market (Gouvea et al. 2021). They are entrepreneurs with special skills in understanding intellectual capital, in effective management of human resources and financial capital, and in the development of the creative process.

Compared to traditional entrepreneurs who focus on industry and construction to take initiatives, take risks, and manage resources, the creative entrepreneur, in addition to all this, uses their creative and intellectual skills to turn an idea into a profitable product for the creative industry (Duening 2010). Thus creativity can be transformed into an industrial product. From the perspective of traditional entrepreneurship, an industrial product is not necessarily a product of creativity. Human creativity is an essential component of a product developed in the creative industry by a creative entrepreneur (Maryunani and Mirzanti 2015).

Creation and co-creation are at the heart of the creative entrepreneur, who transforms from an inventor of profitable ideas into a co-creator of entrepreneurial opportunities (Karami and Read 2021). In tourism services, the interaction and exchange of resources, with the ultimate goal of co-creating value beyond the financial results and positive externalities, results in social and wider benefits in the creative tourism industry. Creative tourism entrepreneurs (CTEs) are the source of tourism innovation from the perspective of the supply of tourism services (Lindroth et al. 2007), while the co-creation of a tourist product contributes, from the perspective of demand, to the creation of a unique touring experience. Creative tourism is a unique experience based on co-creation by the tourist and CTEs, which aims to expand the tourist's knowledge of the special character and cultural heritage of the tourist destination (Long 2017).

3. Research Dimensions

Digital entrepreneurship and the creative industry in tourism exert a series of effects at economic, social, psychological, environmental, cultural, and technological levels. The ability of the socio-economic system of a tourist destination to develop and adopt creations and digital innovations is a key condition for maintaining a competitive advantage in the tourism market (Pencarelli 2020). The present research classifies, based on the existing literature, the effects of digital entrepreneurship and the creative industry on tourism in three research dimensions, as follows: the economic dimension, socio-psychological dimension, and other dimensions (which comprise the environmental, technological, and cultural dimensions) (Crnogaj et al. 2014; Theuns 2002). Subsequently, an analysis of these dimensions in tourism is conducted.

3.1. Economic Dimensions

The present study focuses on the economic impact of digital entrepreneurship and the creative industry on tourism in both quantitative and qualitative terms. More specifically, the comparative advantage achieved in tourism by digital entrepreneurship and the creative

industry is examined both in terms of the increase in tourist income and in the gross national product—through the increase in tourist income and the increase in employment—as well as by alleviating economic inequalities at both the regional and social levels (Canaleta et al. 2004).

In addition, the effect on self-employment as well as parallel part-time employment is particularly important. Part-time employment may involve either a population whose main occupation is tourism and parallel part-time tourism activities focusing on digital entrepreneurship and the creative tourism industry, or a population whose main occupation is a different field of employment. Furthermore, the economic dimensions of digital entrepreneurship and the creative industry in tourism are explored in the present research in terms of investments that are attracted and promotion of the tourist destination, reducing the operating costs, increasing the economic value of the tourist destination, increasing profitability, enhancing innovation, and analyzing the comparative advantage in the tourism market (Boes et al. 2016; Pearce 2001).

Other economic impacts investigated include stimulating regional development, boosting public revenues, encouraging small and medium businesses, improving tourism infrastructure, economic outreach, and optimizing fixed equipment. For example, enhancing the tourist visibility of an archeological site enhances the attractions of the tourist destination with beneficial effects on the overall visibility of the local tourist services. Using the same example, from the demand side, the customer satisfaction index, due to the tourist's experiences during their stay at the tourist destination, increases (Deng et al. 2013). Similarly, reducing the cost of accommodation by implementing an innovation in browser software that acts as a guide to finding the lowest prices of a tourist destination has beneficial effects on both the supply side (by enhancing the attractiveness of the tourist destination due to competitive advantage) and the demand side (by improving the tourist satisfaction index) (Song et al. 2011).

3.2. Socio-Psychological Dimensions

These dimensions include characteristics that influence both the supply side (in regard to the local community of the tourist destination) and the demand side (in relation to the effects on the tourist client) as well as the human interactions during the tourist tour. The urbanization and professional mobility of the population of a developing tourist destination, the communication between locals and tourists, and the tourist experience of cultural customs, and the local way of life are the social effects of the tourist product (Hosany and Witham 2010).

Participation in a local traditional festival where local wine is offered includes, in addition to the tourist experience from the participation in a traditional custom, the interaction of people with different cultures, perceptions, and social habits (Axelsen and Swan 2010). Furthermore, in terms of the provision of tourism services, there are the effects of digital entrepreneurship and the creative industry on social capital, organizational learning, and group dynamics. From the tourist's point of view, it includes the tourist loyalty index (Cossío-Silva et al. 2019), which measures the total satisfaction, expectations, and experience gained from the human interactions at the tourist destination.

The unique experience gained from co-creation in the provision of the tourist product is also a unique feeling and social transformation for the tourist (Daskalaki et al. 2015). It also includes the attitude toward the host destination (Funk and Bruun 2007), the interaction with the culture of the tourist destination, the attractiveness (the intimacy with the tourism service providers and the mix of emotions toward the destination (Al-Msallam 2020), the human interactions with the hosts, and the general sociability during the tour.

Human interactions have an indirect effect (Lin and Miller 2003) on the culture of both the local community and of the tourist visiting the tourist destination. For example, the intimacy and trust that develop between a host and a guest initially through interaction when creating a tourist product and/or virtual tour of the hosting and visit areas, then during the stay and tour for the tourist both in the host environment and in the wider

environment of the tourist destination, and eventually after the tour are rewarded by the tourist-client with a positive evaluation; this intimacy and trust are both results of the social interaction.

The socio-psychological effects of digital entrepreneurship and the creative industry can have either an individual level of impact on the tourism offer, and in the case of a cultural–creative–historical tourism ecosystem, it helps to change the domestic culture (Haessly 2010), or an organizational level of impact where knowledge capital allows companies to provide a common vision and improve through knowledge management (Cooper 2018).

3.3. Other Dimensions

The environmental dimensions, technological dimensions, and spatial dimensions of tourism fall under this category. The environmental impact of tourism includes the negative externalities from tourism development—the environmental pollution caused mainly by mass and uncontrolled tourism—as well as the positive externalities that come from alternative tourism and sustainable development (Biondo 2012). The spatial expansion caused by tourism development causes conflicts due to the depletion of natural resources to the detriment of other economic sectors, as well as institutional issues of urban planning and spatial planning of tourist infrastructure. Innovation and creativity are factors of sustainability in tourism development, especially where savings are achieved (Brem and Puente-Diaz 2020). Creativity is directly related to sustainability in tourism as its sources lie in sustainable economic, social, cultural, and environmental choices.

Entrepreneurs in tourism based on new technology and creativity play key roles through the innovation they offer to enhance competitiveness. The development of mobile applications has minimized the distance between tourism providers and consumers while enhancing the creativity of tourism and has effectively approached audiences (Psomadaki et al. 2022). In addition, the use of customer relationship management (CRM) software in tourism has enhanced digital interactions and contributed to the co-creation of tourist products and the promotion of tourist destinations (Buhalis and Sinarta 2019).

The use of biometrics has improved security and mobility, while the launch of software based on global positioning systems (GPS) has dramatically increased the choice of travel services at destinations by creating a new digital travel market where every travel provider and tourist meets. Innovations in tourism, as a result of digital entrepreneurship and creativity, have brought new experiences and technological tools, such as big-social data in tourism, data-driven tourism experience, and storytelling engines.

4. Materials and Methods

Using the method of critical review, this research presents an accurate record of findings from previous studies regarding the economic, socio-psychological, and other dimensions of digital entrepreneurship and creative industries in tourism; as well as a research agenda of factors that influence digital entrepreneurship and the creative industry in tourism. Through a critical review of various types of research works (articles, logical databases, approach reports, case studies, surveys, etc.), the context of a knowledge area was studied by calculating and analyzing the aspects of quantity, quality, and scientific progress. A critical review is not identical to a traditional bibliographic review, as it provides mapping of a delimited field, proposes a research agenda, identifies research gaps, and discusses questions for future research (Pickering et al. 2014). Access to the overall scientific work is limited, and therefore reliable sources are selected with strict scientific criteria to ensure the validity, consistency, and completeness of the findings.

The literature research showed that a significant but relatively small number of research projects have been undertaken on digital entrepreneurship and creative industries in tourism, which is a dynamic scientific field and the amount of research has been increasing in recent years. Currently, no prominent journal publishes exclusively on the study objects of the present research. As a result, research papers published in a number of different

journals are fragmented and usually focus on tourism, tourism management, sustainable development, technology, and small and medium enterprises. In addition, they are always in relation to the content of the research work and the selection of authors.

This critical review focused on identifying quantitative and qualitative characteristics (Manzoor et al. 2021) of the objects under investigation and, specifically, article titles, keywords, scientific fields, factors, and dimensions. In addition, a research search classing was defined per factor for the objects under investigation. The search yielded no published research on the research agenda or overview of digital entrepreneurship and the creative industries in tourism.

Key research terms were searched in the fields of title, keywords, content, summary, and full text, and experimental confirmation guides were used to document research works related to digital entrepreneurship and creative industries in tourism. The present study was based on the critical review method in three steps. First, the collection of research papers; second, the selection of related papers through filtering; and third, their extraction and evaluation (Seuring and Muller 2008).

The literature analysis of the dimensions and factors involved in the objects of the present research agenda was conducted on the data of academic publications cited in the Scopus and Google Scholar databases. The Scopus research base provides all the necessary information management tools and research criteria, such as the number of reports, the year of publication and accessibility of the research paper, ensures the availability of high-quality published research papers with reliable and valid research sources, and constitutes the most widely used database in bibliographic research. The Google Scholar research database was used in addition to Scopus due to the large number of research papers it indexes and its access to greater resources than any other relevant search engine, thus, ensuring that the maximum possible amount of academic research relevant to the objects of this research agenda was identified.

The process initially used an extensive keyword search in the title, summary, and keyword domains of the databases. The propelled search motors of Scopus and Google Scholar and the catchphrases used for the research agenda were: "digital entrepreneurship in tourism, digital entrepreneurship in hospitality industry", "e-entrepreneurship in tourism and hospitality industry", "digital entrepreneurship and creative industries in tourism and hospitality industry", "creative industries and tourism", "creative entrepreneurship and tourism", "cultural heritage in tourism and hospitality industry", "creativity and tourism", and "entrepreneurship and creative industries in e-tourism".

Initially, 112 papers were identified in the initial search by using keywords based on the criterion of peer-review publications. The titles, abstracts, and conclusions of the papers were then examined to assess their relevance to the objectives of this critical review, and research that was not relevant was excluded. A total of 20 papers were identified in the final review for inclusion in the present research, followed by their categorization into digital entrepreneurship and the creative industries in tourism. A critical review was conducted with the interpretation of the results and the development of the research dimensions. The research process of the study used is shown in Figure 1.

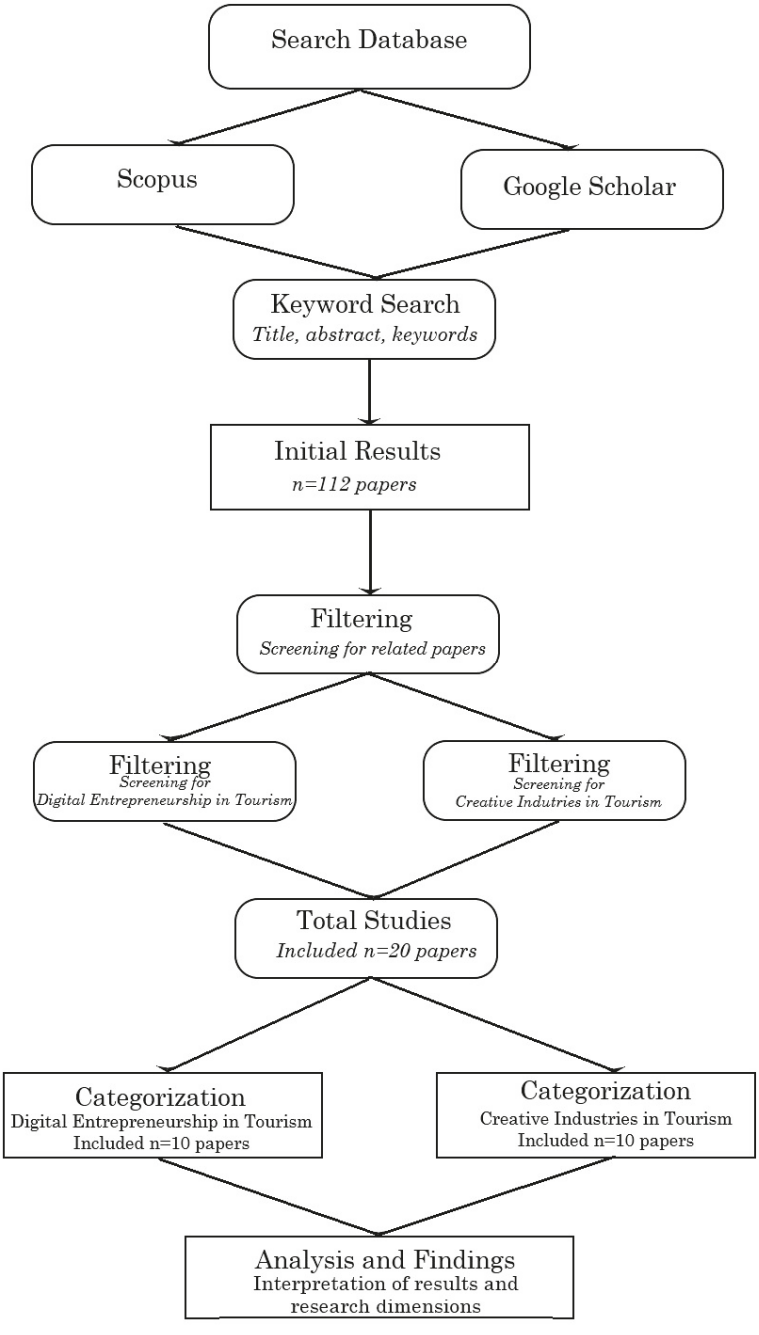

Figure 1. Research process of the study. Source: Compiled by the author, own illustration.

5. Results

This critical review outlines digital entrepreneurship and creative industries by synthesizing 20 studies published from 2005 to 2022. The studies were divided into two groups that constitute the overview of the two research objectives. Specifically, 10 publications outline a bibliographic overview of digital entrepreneurship in tourism, and the remaining 10 publications address the creative industries in tourism. The findings of the critical review, as they emerged from the published research papers, show an exponential increase in publications in the period 2019–2022 demonstrating an increasing interest in both subjects.

It is possible that the consequences of the spread of COVID-19 strengthened the research interest in digital entrepreneurship and the creative industries in tourism, possibly due to the innovative and remote applications and opportunities that have been introduced (Khlystova et al. 2022). It is therefore important to understand the findings of the published work to explore possible research gaps and future research areas while revealing new knowledge, findings, and dimensions relating to the impact of digital entrepreneurship and the creative industries on the tourism industry. Based on the research findings in each research paper, the economic, socio-psychological, and other dimensions of tourism were recorded and are the basis for the possible issues—proposed in the Discussion section—to be explored.

Table 1 presents the academic literature that addresses digital entrepreneurship in tourism, as a research focus. In each publication, a distinction was made in relation to the study context, the study approach, the methodology, the research findings, and the economic, socio-psychological, and other dimensions of tourism, by category. Table 2 presents the academic literature that addresses the creative industries in tourism, as a research focus.

Table 1. Academic literature addressing digital entrepreneurship in tourism as a research focus.

Author(s)	Study Context	Study Approach	Method	Findings	Research Dimensions
Matlay and Westhead (2005)	Western, Central, and Eastern Europe	Organizational	Qualitative (case study, 15 telephone interviews)	Virtual team entrepreneurship in the European tourism and hospitality industries to address attitudinal, resource, operational, and strategic barriers to new firm creation and development.	Economic: investment in ICTs, commitment to e-entrepreneurship, recruitment, and exploitation of disparate human capital, association of knowledge endowment with income distribution and reinvestment, and reaction to risk and uncertainty. Socio-psychological: team dynamics, collective contributions, and collective entrepreneurial. Other: alertness and willingness to respond to new opportunities
Lo et al. (2011)	Hong Kong	User	Quantitative (1466 telephone interviews)	Ignoring Web 2.0 as a marketing communication tool will be detrimental to tourist destinations.	Economic: promotion through effective use of private sites, destination image, and web tourism marketing. Social: customer communication and online media travel photo-sharing community.
Costa and Melotti (2012)	Italy	Organizational	Qualitative (inductive inquiry, benchmarking cases)	Connecting video game technologies, 3D reconstruction, and virtual reality in archeological sites with virtual tourism experience.	Economic: new tourist attractions; economic value of de-territorialized archaeological areas; collaborative partnerships among humanist intellectuals, digital media technologists, and entertainment entrepreneurs; and promotional mix of virtual and experiential archaeology. Socio-psychological: heritage of the senses and satisfied virtual reality users. Other: visual culture of archaeological areas, re-invention of archaeological areas via virtual reality, immaterial knowledge, and online visit of archaeological areas.
Richter et al. (2017)	Germany, Austria, and Switzerland	Organizational	Qualitative (14 semi-structured interviews with entrepreneurs)	Digital entrepreneurs in a sharing economy are more motivated by economic benefits. Customers also act as providers. Urbanization, higher flexibility, and mobility lead to entrepreneurial activity and applications in a sharing economy.	Economic: saving money, positive attitude towards property, and entrepreneurship incentives in a sharing economy. Socio-psychological: personal assistance and personalization, social life components, connectivity with peers, and sharing in the context of social projects.
Oumlil and Juiz (2018)	Spain	User	Quantitative (85 mail surveys, SEM)	Perceived ease of use influences future entrepreneurs' intentions to accept e-entrepreneurship in tourism. Anxiety exerts a significant negative impact on future entrepreneurs to accept e-entrepreneurship in tourism.	Economic: usefulness and profitability. Socio-psychological: Perceived ease of use and anxiety determine investment in tourism information technology. Other: information technology.
Krishnamurthy et al. (2019)	India	User	Quantitative (500 questionnaires)	Travel start-ups and entrepreneurs cater to young travelers who prefer to pay less to enjoy niche tourism. Age and qualifications are the factors that influence the use of niche tourism through information and communication technology-enabled e-tourism promoted by travel start-ups and entrepreneurs.	Economic: lower costs in tourism, niche tourism, and travel start-ups for young tourists.

Table 1. *Cont.*

Author(s)	Study Context	Study Approach	Method	Findings	Research Dimensions
Alford and Jones (2020)	England	User	Qualitative (fieldwork data, 53 entrepreneurs, inductive inquiry)	Measurement objective formulation, strategy proposal, role of peer clusters, and knowledge acquisition through sharing are the most important themes that concern digital marketing entrepreneurs in tourism and could be supported by tourism business agencies and entrepreneurs.	Economic: leverage of resources, collaborative marketing, and government support. Socio-psychological: interaction with peers, learning, cluster group work, peer sharing of knowledge, and peer cluster project.
Casillo et al. (2020)	Italy	Organizational	Qualitative (case study)	Chatbots provide data and services of highly customized and complete tour packages to tourists.	Other: Travel experienceand storytelling engines.
Filieri et al. (2021)	Europe	Organizational	Quantitative (Crunchbase database) and Qualitative.	Learning, communication, and services are artificial intelligence technological domains in the travel and tourism industry that receive more funding from venture capitalists. European artificial intelligence start-ups are concentrated in the capitals of major tourism destinations in France, UK, and Spain. Venture-capital backed AI solutions focus on the pre-trip and post-trip. Artificial intelligence start-ups have been mainly created by male science, technology, engineering, and mathematics specialists with previous study experiences in non-start-up companies.	Economic: marketing automation, customer service, human capital theory, and work experience. Socio-psychological: demographic characteristics and gender gap. Spatial: regional advantage.
Cuomo et al. (2021)	Italy	Organizational	Qualitative (case study)	Passionate tourists are less satisfied with the big social data approach to tourism experience.	Economic: Expanding market share through cultural tourism and customer-oriented service design. Other: Big social data in tourism and data-driven tourism experience approach.

Source: Own elaboration compiled by the author based on the sources mentioned in the table.

Table 2. Academic literature addressing the creative industries in tourism, as a research focus.

Author(s)	Study Context	Study Approach	Method	Findings	Research Dimensions
Andersen (2010)	Australia	User	Quantitative (45 questionnaires)	Life on the periphery is both enabling and disabling for informally qualified professional visual artists of the cultural industries.	Socio-psychological: Successful group, creative making, and lack of cultural stimulation.
Richards (2011)	Global	-	Review	Creative tourism offers a much more effective alternative to new forms of commodification than mass cultural tourism. Authenticity shifts to creative tourism models.	Economic: Linking of creative tourism with production, consumption, and place. Social: Development of creative potential and skills.
Richards (2014)	Global	-	Review	Intangible competitive advantage leads to relational forms of tourism based on creativity and embedded knowledge.	Social: Growing complexity of creative relationships between destinations, tourists, and local residents.
Pappalepore et al. (2014)	United Kingdom	User	Qualitative (142 interviews)	People are a fundamental attraction. Consumers (tourists, visitors, employees, and residents) become prosumers who consume and build the place at the same time, creating value that can be gained from the experience of these destination areas.	Social: Consumption and accumulation of cultural capital.
Liu (2018)	Taiwan	Organizational	Quantitative (432 surveys)	Cognitive capital allows companies to provide a common vision, collective goals, and a mission for the members of the organization. Emerging industries improve knowledge transfer by enhancing the direct and indirect effects between social capital, organizational learning, and absorption capacity.	Social: Social capital, organizational learning, and knowledge management.
Suhartanto et al. (2020)	Indonesia	User	Quantitative (369 questionnaires)	Tourist motivation affects tourist loyalty of creative attraction businesses and experience quality.	Other: Customer loyalty and marketing and tourist motivation.
Henche et al. (2020)	Spain	User	Quantitative (187 questionnaires)	A model for managing cultural and historic districts in world cities produces greater capacity and positive results in urban historic centers. Informal links among different stakeholders of a cultural district and their collaboration lead to the development of cultural–creative–historic tourism ecosystems.	Economic: Urban planning and urban cost development. Other: Creative and cultural neighborhood, and urban regeneration model. Other: Sustainability and historic urban center management.
Dias et al. (2020)	Portugal, Spain	Organizational	Mixed (Qualitative: 4 interviews, Quantitative: 115 questionnaires)	Local knowledge is the source of entrepreneurs' competitive advantages in innovativeness and self-efficacy as it relates to tourist lifestyles.	Economic: Entrepreneurial innovativeness and entrepreneurial communication.
Xiong et al. (2020)	China	User	Quantitative (578 questionnaires)	Offering integrated capacities about creative class entrepreneurship enhances in-migration tourism business innovation and business sustainability.	Economic: Immigrant entrepreneurship, innovative development, and class theory.
Dias et al. (2021a)	Portugal, Spain	Organizational	Mixed (Qualitative: 4 interviews, Quantitative: 115 questionnaires)	The assimilation of local knowledge plays a mediating role between the acquisition of local knowledge, innovation, and self-efficacy of TLEs. A community-focused strategy has a positive effect on innovation and self-efficacy through the indirect impact of business communication.	Economic: Self-efficacy, innovation, and business communication.

Source: Own elaboration compiled by the author based on the sources mentioned in the table.

6. Discussion

The first objective of the critical review was to present the published work in the research field of digital entrepreneurship and creative industries in tourism, identifying the findings of each research work as well as the methodology and research framework. Furthermore, a distinction was made between the economic, socio-psychological, and other dimensions of tourism (Van Acker et al. 2010) described in the publications' findings. Particular attention was paid to the categorization of other dimensions in publications where the findings indicate technological and or spatial dimensions of tourism.

The penetration of digital technologies in daily life reshapes both the lifestyle and economic behavior as well as the operation of enterprises operating in this rapidly growing digital environment. Innovation in the new digital environment can be a competitive advantage for tourism businesses operating in a transformative and highly competitive environment. Achieving competitiveness in tourism is related to the ability of tourism entrepreneurs to innovate, to act entrepreneurially and creatively (Dias et al. 2021b), to effectively manage cultural capital, and to operate flexibly in a digital entrepreneurial environment.

Based on Tables 1 and 2, a research agenda is presented on the proposed factors that influence digital entrepreneurship and the creative industries in tourism. The proposed research agenda provides a basis for further research on the findings and helps to detect research gaps with a view to future research. The basic factors involved are summarized below.

1. The key aspect of digital entrepreneurship and creative industries in tourism is the creation, implementation, or use of innovation by entrepreneurs. Particularly in the creative industries in tourism, the assimilation of the local culture in the applied innovation is required.
2. Creating value from intellectual and practical knowledge implies the application of some characteristics in the creative tourism industry, such as the transfer of local knowledge and cultural elements from the destination area as well as a focus on the cultural community.
3. The widespread use of telecommunication devices by young travelers requires the adoption of new technological innovations, such as 3D virtual tours, chatbots, video game technologies, artificial intelligence for communication and learning, and Web 2.0 as a communication tool.
4. Some research findings highlight the importance of focusing entrepreneurship through perceived ease-of-use technologies aimed at young travelers who prefer special forms of tourism.
5. The key economic dimensions of digital entrepreneurship highlight the economic benefits and implications of investing in ICT in tourism and also focus on the use of innovative digital media to reduce tourism costs.
6. The socio-psychological dimensions highlight the dynamics in digital communication for the promotion of innovative tourist services and the utilization of local authenticity and cultural capital during the tourist experience.

6.1. Research Gaps and Future Research

This critical review, which is based on the research agenda in digital entrepreneurship and the creative industries in tourism, highlights certain research gaps and suggests directions for future research in order to advance academic understanding. The research questions discussed are based on the findings of the existing research presented in this present research agenda as well as the dimensions induced in tourism. The presentation takes place separately for the economic, socio-psychological, and other dimensions of tourism.

6.2. Research Gaps and Future Research Related to the Economic Dimensions

Existing research focuses on saving tourism costs through the digitization of tourism services and incentives to invest in digital entrepreneurship in tourism. Further studies may need to explore how to exploit local cultures and the particular ecosystems of tourist destinations (Philipp et al. 2022).

The contribution of digital entrepreneurship and creative industries is a demonstrated in regional development and in stimulating the prosperity and standard of living of rural societies. The CCIs can stimulate regional development by contributing to the development of rural and regional areas. Particularly in tourism, this can be achieved by exploring a development model of rural tourism based on local values and local cultural creativity (Pourzakarya 2022).

While the findings of the studies presented in this critical review focus on digital applications that promote virtual touring and creativity in tourism, missing elements underscore the ingredients of successful digital entrepreneurship. Further research into creative tourism may provide more insights into the skills, abilities, and characteristics of successful entrepreneurs (Hatthakijphong and Ting 2019) in promoting the digital appeal of tourist destinations.

The findings of the proposed research agenda reveal the rapid development of digital and creative entrepreneurship in tourism, as well as the need for entrepreneurs to implement digital tools in managing and promoting creative tourism. However, the impact on the income of local tourist destination communities has not been sufficiently clarified. Research questions remain as to whether the growth of digital and creative entrepreneurship increases the overall revenue or has a negative impact on the revenue generated from the operation of existing tourism services.

6.3. Research Gaps and Future Research Related to the Social and Psychological Dimensions

The socio-psychological dimension was the second dimension to be explored in studies in digital entrepreneurship and the CCIs in tourism. The emergence of social and cultural capital and the evolution of communication and group dynamics in the digital tourism media are the main socio-psychological dimensions in the existing research. For future research, the attitudes, feelings, and experiences from the interactions of tourists with local communities may be explored to add new socio-psychological dimensions to tourist products (Lin et al. 2019).

In this critical review, the research on socio-psychological findings focused mainly on group interaction, digital communication, and creative learning. Expanded empirical research could focus on the social impact of tourist behavior as well as the attraction that creative entrepreneurship brings to tourist destinations. In addition to the new digital age of smart tourism technologies including virtual browsing, digital travel guides, and the chatbot services (Orden-Mejia and Huertas 2021), what matters most is the satisfaction of the traveler. It is the satisfaction of the traveler that largely determines their own travel behavior (Batra 2009). This satisfied traveler interacts digitally, sharing their tour experience (Tavitiyaman et al. 2022). The tourist experience remains the key factor of tourist satisfaction even when creative entrepreneurship and digital innovation enhance the attractiveness of a tourist destination.

Future research might focus on the tourist's emotions and satisfaction during a cultural tour (Chang 2008). The search for authenticity, reflection, social interaction with the locals, emotional identification with the destination, and even mutual trust are concepts understood differently in different tourist destinations. On the other hand, the empirical exploration of concepts, such as archeology, social anthropology, collective memories, and representations, will enhance the cultural dimension of creative digital entrepreneurship in tourism.

Regarding the quality of life in the destination region, it has not been confirmed whether this is improved by the development of creative and digital entrepreneurship in tourism. In particular, factors relating to the quality of life, such as the destinations'

tourism carrying capacity, the sustainability of tourism development, and improved infrastructure (Mamirkulova et al. 2020), need to be confirmed as being positively related to the development of digital and creative entrepreneurship in tourism.

6.4. Research Gaps and Future Research Related to the Other Dimensions

The emergence of social and cultural capital as well as the development of communication and group dynamics evolving in digital tourism media, are the main socio-psychological dimensions that emerged from the existing research. Possibly exploring the attitudes, feelings, and experiences from the interaction of tourists with local communities will add new socio-psychological dimensions to the product of tourism.

The contribution of digital entrepreneurship and the CCIs to tourism appears to be minimal to date in sustainable tourism development. The research findings do not indicate any particular interest in exploring the impact of creative entrepreneurship in sustainability in tourism. This critical review highlights the need for future research to make a strong contribution to digital and creative entrepreneurship that achieves energy, water, and resource savings (Warren and Becken 2017). Focusing research on developing a business tourism ecosystem through CCIs similar to an archipelago (Barandiaran-Irastorza et al. 2020) or within an urban context can be a key productivity factor in creative tourism entrepreneurship (Loots et al. 2021).

The sustainability of tourist destinations and the quality of life are key factors of successful creative entrepreneurship (Sun and Xu 2019). Although sustainability is one of the other research dimensions of certain studies in the creative industries in tourism, quality of life is a concept that remains without empirical research especially in the emerging digital environment of creative entrepreneurship in tourism. Furthermore, in terms of the spatial and geographical dimension, this will be of particular interest in the future to investigate the impact of digital entrepreneurship and the creative and tourism industries on the completeness of mature tourist destinations in relation to the fullness of emerging unsaturated tourist destinations.

7. Conclusions

This paper aimed to highlight the characteristics, findings, and research dimensions of digital entrepreneurship and CCIs in tourism through an investigation, analysis, and critical review of previous research. The critical review highlighted the relatively limited research in this area and identified the economic, socio-psychological, and other dimensions of tourism, which include spatial, technological, and sustainability issues. The research agenda of six key factors that influence digital entrepreneurship and the creative industries in tourism based on previous research findings emerged. Based on these factors, entrepreneurs in tourism can align themselves with the new digital age of creative entrepreneurship.

This critical review is a guide to entrepreneur decision making and to future research that will further explore digital and creative entrepreneurship in tourism. In addition, it can be used to focus on aspects and applications of CCIs in tourism that researchers have not yet studied. Moreover, based on the findings of the present critical review, future empirical studies may further investigate the interrelationship between memorable experiences and overall satisfaction (Sie et al. 2018). In any case, this work provide useful findings in tourism entrepreneurship that can assist tourism businesses in perspective and viability in a highly competitive business environment.

The main limitations of this research include the focus on digital entrepreneurship and the creative industries in tourism exclusively as well as the reliance on only Scopus and Google Scholar for the keyword searches. However, the restrictions on keywords and scientific search engines ensured that the focus was solely on tourism, in terms of the research findings and the reliability of publications. As this critical review focused on identifying the findings and research dimensions of digital entrepreneurship and CCIs in tourism, the proposed research agenda should be tested in the tourism economy by innovative entrepreneurs.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Conflicts of Interest: The author states that there are no competing interests to declare.

References

Alford, Philip, and Rosalind Jones. 2020. The lone digital tourism entrepreneur: Knowledge acquisition and collaborative transfer. *Tourism Management* 81: 104139. [CrossRef]

Al-Msallam, Samaan. 2020. The impact of tourists' emotions on satisfaction and destination loyalty–An integrative moderated mediation model: Tourists' experience in Switzerland. *Journal of Hospitality and Tourism Insights* 3: 509–28. [CrossRef]

Amabile, Teresa. 1988. A model of creativity and innovation in organizations. *Research in Organizational Behavior* 10: 123–67.

Andersen, Lisa. 2010. Magic Light, Silver City: The business of culture in Broken Hill. *Australian Geographer* 41: 71–85. [CrossRef]

Axelsen, Megan, and Taryn Swan. 2010. Designing Festival Experiences to Influence Visitor Perceptions: The Case of a Wine and Food Festival. *Journal of Travel Research* 49: 436–50. [CrossRef]

Barandiaran-Irastorza, Xabier, Simon Pena-Fernandez, and Alfonso Unceta-Satrustegui. 2020. The Archipelago of Cultural and Creative Industries: A Case Study of the Basque Country. *Economies* 8: 21. [CrossRef]

Batra, Adarsh. 2009. Senior Pleasure Tourists: Examination of Their Demography, Travel Experience, and Travel Behavior Upon Visiting the Bangkok Metropolis. *International Journal of Hospitality & Tourism Administration* 10: 197–212. [CrossRef]

Bavik, Ali, and Chen-Feng Kuo. 2022. A systematic review of creativity in tourism and hospitality. *The Service Industries Journal* 42: 321–59. [CrossRef]

Biondo, Alessio Emanuele. 2012. Tourism and sustainability: The positive externality. *International Journal of Sustainable Economy* 4: 155–66. [CrossRef]

Bilton, Chris, and Ruth Leary. 2002. What can managers do for creativity? Brokering creativity in the creative industries. *International Journal of Cultural Policy* 8: 49–64. [CrossRef]

Boes, Kim, Dimitrios Buhalis, and Alessandro Inversini. 2016. Smart tourism destinations: Ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities* 2: 108–24. [CrossRef]

Boix-Domenech, Rafael, and Pau Rausell-Köster. 2018. The Economic Impact of the Creative Industry in the European Union. In *Drones and the Creative Industry*. Edited by Santamarina-Campos Virginia and Marival Segarra-Oña. Cham: Springer, pp. 19–36. [CrossRef]

Brem, Alexander, and Rogelio Puente-Diaz. 2020. Creativity, Innovation, Sustainability: A Conceptual Model for Future Research Efforts. *Sustainability* 12: 3139. [CrossRef]

Buhalis, Dimitrios, and Yeyen Sinarta. 2019. Real-time co-creation and nowness service: Lessons from tourism and hospitality. *Journal of Travel & Tourism Marketing* 36: 563–82. [CrossRef]

Butnaru, Gina Ionela, and Amanda Miller. 2012. Conceptual Approaches on Quality and Theory of Tourism Services. *Procedia Economics and Finance* 3: 375–80. [CrossRef]

Canaleta, Carlos Gil, Pedro Pascual Arzoz, and Manuel Rapun Rapun Garate. 2004. Regional Economic Disparities and Decentralisation. *Urban Studies* 41: 71–94. [CrossRef]

Casillo, Mario, Fabio Clarizia, Giuseppe DAniello ', Massimo De Santo, Marco Lombardi, and Domenico Santaniello. 2020. CHAT-Bot: A cultural heritage aware teller-bot for supporting touristic experiences. *Pattern Recognition Letters* 131: 234–43. [CrossRef]

Chang, Jui Chi. 2008. Tourists' Satisfaction Judgments: An Investigation of Emotion, Equity, and Attribution. *Journal of Hospitality & Tourism Research* 32: 108–34. [CrossRef]

Chuluunbaatar, Enkhbold, Ottavia Ding-Bang Luh, and Shiann-Far Kung. 2014. The Role of Cluster and Social Capital in Cultural and Creative Industries Development. *Procedia-Social and Behavioral Sciences* 109: 552–57. [CrossRef]

Cooke, Phil, and Lisa De Propris. 2011. A policy agenda for EU smart growth: The role of creative and cultural industries. *Policy Studies* 32: 365–75. [CrossRef]

Cooper, Chris. 2018. Managing tourism knowledge: A review. *Tourism Review* 73: 507–20. [CrossRef]

Cossío-Silva, Francisco-Jose, Maria-Angeles Revilla-Camacho, and Manuela Vega-Vázquez. 2019. The tourist loyalty index: A new indicator for measuring tourist destination loyalty? *Journal of Innovation & Knowledge* 4: 71–77. [CrossRef]

Costa, Niccolo, and Marxiano Melotti. 2012. Digital Media in Archaeological Areas, Virtual Reality, Authenticity and Hyper-Tourist Gaze. *Sociology Mind* 2: 53–60. [CrossRef]

Crnogaj, Katja, Miroslav Rebernik, Barbara Bradac Hojnik, and Doris Omerzel Gomezelj. 2014. Building a model of researching the sustainable entrepreneurship in the tourism sector. *Kybernetes* 43: 377–93. [CrossRef]

Cunningham, Stuart. 2002. From Cultural to Creative Industries: Theory, Industry and Policy Implications. *Media International Australia* 102: 54–65. [CrossRef]

Cuomo, Maria Teresa, Debora Tortora, Pantea Foroudi, Alex Giordano, Giuseppe Festa, and Gerardino Metallo. 2021. Digital transformation and tourist experience co-design: Big social data for planning cultural tourism. *Technological Forecasting and Social Change* 162: 120345. [CrossRef]

Daskalaki, Maria, Daniel Hjorth, and Johanna Mair. 2015. Are Entrepreneurship, Communities, and Social Transformation Related? *Journal of Management Inquiry* 24: 419–23. [CrossRef]
Deng, Weijaw, Minglang Yeh, and M. L. Sung. 2013. A customer satisfaction index model for international tourist hotels: Integrating consumption emotions into the American Customer Satisfaction Index. *International Journal of Hospitality Management* 35: 133–40. [CrossRef]
Dias, Alvaro, Graca Miranda Silva, Mafalda Patuleia, and Maria Rosario Gonzalez-Rodriguez. 2020. Developing sustainable business models: Local knowledge acquisition and tourism lifestyle entrepreneurship. *Journal of Sustainable Tourism*, 1–20. [CrossRef]
Dias, Alvaro, Maria Rosario Gonzalez-Rodriguez, and Mafalda Patuleia. 2021a. Developing poor communities through creative tourism. *Journal of Tourism and Cultural Change* 19: 509–29. [CrossRef]
Dias, Alvaro, Maria Rosario Gonzalez-Rodriguez, and Mafalda Patuleia. 2021b. Creative tourism destination competitiveness: An integrative model and agenda for future research. *Creative Industries Journal* 1–24. [CrossRef]
Duening, Thomas. 2010. Five Minds for the Entrepreneurial Future: Cognitive Skills as the Intellectual Foundation for Next Generation Entrepreneurship Curricula. *The Journal of Entrepreneurship* 19: 1–22. [CrossRef]
Endres, Herbert, Stefan Huesig, and Robin Pesch. 2022. Digital innovation management for entrepreneurial ecosystems: Services and functionalities as drivers of innovation management software adoption. *Review of Managerial Science* 16: 135–56. [CrossRef]
Filieri, Raffaele, Elettra D'Amico, Alessandro Destefanis, Emilio Paolucci, and Elisabetta Raguseo. 2021. Artificial intelligence (AI) for tourism: An European-based study on successful AI tourism start-ups. *International Journal of Contemporary Hospitality Management* 33: 4099–125. [CrossRef]
Florida, Richard. 2012. The Rise of the Creative Class, Revisited. In *The Creative Class*. New York: Basic Books, pp. 35–62.
Foord, Jo. 2009. Strategies for creative industries: An international review. *Creative Industries Journal* 1: 91–113. [CrossRef]
Funk, Daniel, and Tennille Bruun. 2007. The role of socio-psychological and culture-education motives in marketing international sport tourism: A cross-cultural perspective. *Tourism Management* 28: 806–19. [CrossRef]
García-Tabuenca, Antonio, Jose Luis Crespo-Espert, and Juan Cuadrado-Roura. 2011. Entrepreneurship, creative industries and regional dynamics in Spain. *The Annals of Regional Science* 47: 659–87. [CrossRef]
Garrigos-Simon, Fernando, Yeamduan Narangajavana-Kaosiri, and Yeamdao Narangajavana. 2019. Quality in Tourism Literature: A Bibliometric Review. *Sustainability* 11: 3859. [CrossRef]
Gartner, William Bill. 1990. What are we talking about when we talk about entrepreneurship? *Journal of Business Venturing* 5: 15–28. [CrossRef]
Gouvea, Raul, Dimitri Kapelianis, Manuel-Julian Montoya, and Gautam Vora. 2021. The creative economy, innovation and entrepreneurship: An empirical examination. *Creative Industries Journal* 14: 23–62. [CrossRef]
Haessly, Jacqueline. 2010. Tourism and a Culture of Peace. In *Tourism, Progress and Peace*. Edited by Omar Moufakkir and Ian Kelly. Wallingford: MPG Books Group.
Hatthakijphong, Panicha, and Hsiu-I Ting. 2019. Prioritizing successful entrepreneurial skills: An emphasis on the perspectives of entrepreneurs versus aspiring entrepreneurs. *Thinking Skills and Creativity* 34: 1–13. [CrossRef]
Henche, Blanca Garcia, Erica Salvaj, and Pedro Cuesta-Valino. 2020. A Sustainable Management Model for Cultural Creative Tourism Ecosystems. *Sustainability* 12: 9554. [CrossRef]
Horng, Jeou-Shyan, Chang-Yen Tsai, Chih-Hsing Liu, and Dolly Yu-Chun Chung. 2015. Measuring Employee's Creativity: A New Theoretical Model and Empirical Study for Tourism Industry. *Asia Pacific Journal of Tourism Research* 20: 1353–73. [CrossRef]
Hosany, Sameer, and Mark Witham. 2010. Dimensions of Cruisers' Experiences, Satisfaction, and Intention to Recommend. *Journal of Travel Research* 49: 351–64. [CrossRef]
Huarng, Kun-Huang, and Tiffany Hui-Kuang Yu. 2011. Entrepreneurship, process innovation and value creation by a non-profit SME. *Management Decision* 49: 284–96. [CrossRef]
Jelincic, Daniela Angelina. 2021. Indicators for Cultural and Creative Industries' Impact Assessment on Cultural Heritage and Tourism. *Sustainability* 13: 7732. [CrossRef]
Jiang, Xiaowei, Andrew Kim, Kyungyeol (Anthony) Kim, Qian Yang, Jeronimo Garcia-Fernandez, and James Zhang. 2021. Motivational Antecedents, Value Co-Creation Process, and Behavioral Consequences in Participatory Sport Tourism. *Sustainability* 13: 9916. [CrossRef]
Kanovska, Lucie, and Veronika Bumberova. 2021. The Differences in the Propensity of Providing Smart Services by SMEs from the Electrical Engineering Industry with Regard to Their Cooperation and Innovation Flexibility. *Sustainability* 13: 5008. [CrossRef]
Karami, Masoud, and Stuart Read. 2021. Co-creative entrepreneurship. *Journal of Business Venturing* 36: 106125. [CrossRef]
Khlystova, Olena, Yelena Kalyuzhnova, and Maksim Belitski. 2022. The impact of the COVID-19 pandemic on the creative industries: A literature review and future research agenda. *Journal of Business Research* 139: 1192–210. [CrossRef]
Kilipiris, Fotis, and Stella Zardava. 2012. Developing sustainable tourism in a changing environment: Issues for the tourism enterprises (travel agencies and hospitality enterprises. *Procedia-Social and Behavioral Sciences* 44: 44–52. [CrossRef]
Krishnamurthy, Lalitha, Arockia Rajasekar, and Raja Jebasingh. 2019. An Empirical Study on Role of Travel Start-Ups and Entrepreneurship in E-Tourism. *Journal of Service Science and Management* 12: 620–27. [CrossRef]
Leung, Linda, and Daniel Feldman. 2021. Is It Digital Entrepreneurship? Designing a New Sport through Audience Ethnography. *Sustainability* 13: 11690. [CrossRef]

Lin, Hongxia, Meng Zhang, Dogan Gursoy, and Xiaorong Fu. 2019. Impact of tourist-to-tourist interaction on tourism experience: The mediating role of cohesion and intimacy. *Annals of Tourism Research* 76: 153–67. [CrossRef]
Lin, Xiaohua, and Stephen Miller. 2003. Negotiation approaches: Direct and indirect effect of national culture. *International Marketing Review* 20: 286–303. [CrossRef]
Lindroth, Kaija, Jarmo Ritalahti, and Tuovi Soisalon-Soininen. 2007. Creative Tourism in Destination Development. *Tourism Review* 62: 53–58. [CrossRef]
Liu, Chih-Hsing Sam. 2018. Examining social capital, organizational learning and knowledge transfer in cultural and creative industries of practice. *I Tourism Management* 64: 258–70. [CrossRef]
Lo, Iris Sheungting, Bob McKercher, Ada Lo, Catherine Cheung, and Rob Law. 2011. Tourism and online photography. *Tourism Management* 32: 725–31. [CrossRef]
Long, Philip. 2017. The parallel worlds of tourism destination management and the creative industries: Exchanging knowledge, theory and practice. *Journal of Policy Research in Tourism, Leisure and Events* 9: 331–40. [CrossRef]
Loots, Ellen, Miguel Neiva, Luis Carvalho, and Mariangela Lavanga. 2021. The entrepreneurial ecosystem of cultural and creative industries in Porto: A sub-ecosystem approach. *Growth and Change* 52: 641–62. [CrossRef]
Mamirkulova, Gulnara, Jianing Mi, Jaffar Abbas, Shahid Mahmood, Riaqa Mubeen, and Arash Ziapour. 2020. New Silk Road infrastructure opportunities in developing tourism environment for residents better quality of life. *Global Ecology and Conservation* 24: e01194. [CrossRef]
Manzoor, Bilal, Idris Othman, and Juan Carlos Pomares. 2021. Digital Technologies in the Architecture, Engineering and Construction (AEC) Industry—A Bibliometric—Qualitative Literature Review of Research Activities. *International Journal of Environmental Research and Public Health* 18: 6135. [CrossRef] [PubMed]
Maryunani, Salfitrie Roos, and Isti Raafaldini Mirzanti. 2015. The Development of Entrepreneurship in Creative Industries with Reference to Bandung as a Creative City. *Procedia-Social and Behavioral Sciences* 169: 387–94. [CrossRef]
Matlay, Harry, and Paul Westhead. 2005. Virtual Teams and the Rise of e-Entrepreneurship in Europe. *International Small Business Journal* 23: 279–302. [CrossRef]
Meyer, Christopher, Laima Gerlitz, and Monika Klein. 2022. Creativity as a Key Constituent for Smart Specialization Strategies (S3), What Is in It for Peripheral Regions? Co-creating Sustainable and Resilient Tourism with Cultural and Creative Industries. *Sustainability* 14: 3469. [CrossRef]
Muller, Kathrin, Christian Rammer, and Johannes Truby. 2009. The role of creative industries in industrial innovation. *Innovation* 11: 148–68. [CrossRef]
Ngoasong, Michael Zisuh. 2018. Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competencies. *Journal of Small Business and Enterprise Development* 25: 483–500. [CrossRef]
Orden-Mejia, Miguel, and Assumpcio Huertas. 2021. Analysis of the attributes of smart tourism technologies in destination chatbots that influence tourist satisfaction. *Current Issues in Tourism* 1–16. [CrossRef]
Oumlil, Rachid, and Carlos Juiz. 2018. Acceptance of Tourism E-Entrepreneurship: Application to Educational Balearic Islands Context. *Journal of Entrepreneurship Education* 21: 1–16.
Pang, Sharon, Bob McKercher, and Bruce Prideaux. 2013. Climate Change and Tourism: An Overview. *Asia Pacific Journal of Tourism Research* 18: 4–20. [CrossRef]
Pappalepore, Ilaria, Robert Maitland, and Andrew Smith. 2014. Prosuming creative urban areas. Evidence from East London. *Annals of Tourism Research* 44: 227–40. [CrossRef]
Pearce, David. 2001. The Economic Value of Forest Ecosystems. *Ecosystem Health* 7: 284–96. [CrossRef]
Pencarelli, Torino. 2020. The digital revolution in the travel and tourism industry. *Information Technology & Tourism* 22: 455–76. [CrossRef]
Philipp, Julian, Hannes Thees, Natalie Olbrich, and Harald Pechlaner. 2022. Towards an Ecosystem of Hospitality: The Dynamic Future of Destinations. *Sustainability* 14: 821. [CrossRef]
Pickering, Catherine, Julien Grignon, Rochelle Steven, Daniela Guitart, and Jason Bryne. 2014. Publishing not perishing: How research students transition from novice to knowledgeable using systematic quantitative literature reviews. *Studies in Higher Education* 40: 1756–69. [CrossRef]
Pourzakarya, Maryam. 2022. Searching for possible potentials of cultural and creative industries in rural tourism development; a case of Rudkhan Castle rural areas. *Consumer Behavior in Tourism and Hospitality*. [CrossRef]
Prima Lita, Ratni, Ranny Fitriana Faisal, and Meuthia Meuthia. 2020. Enhancing small and medium enterprises performance through innova-tion in Indonesia: A framework for creative industries supporting tourism. *Journal of Hospitality and Tourism Technology* 11: 155–76. [CrossRef]
Psomadaki, Ofilia, Maria Matsiola, Charalampos Dimoulas, and George Kalliris. 2022. The Significance of Digital Network Platforms to Enforce Musicians' Entrepreneurial Role: Assessing Musicians' Satisfaction in Using Mobile Applications. *Sustainability* 14: 5975. [CrossRef]
Richards, Greg. 2011. Creativity and Tourism: The state of the art. *Annals of Tourism Research* 38: 1225–53. [CrossRef]
Richards, Greg. 2014. Creativity and tourism in the city. *Current Issues in Tourism* 17: 119–44. [CrossRef]
Richter, Chris, Sascha Kraus, Alexander Brem, Susanne Durst, and Clemens Giselbrecht. 2017. Digital entrepreneurship: Innovative business models for the sharing economy. *Creat Innov Manag* 26: 300–10. [CrossRef]

Rusch, Magdalena, Josef-Peter Schöggl, and Rupert Baumgartner. 2022. Application of digital technologies for sustainable product management in a circular economy: A review. *Business Strategy and the Environment* 1–16. [CrossRef]
Seuring, Stefan, and Martin Muller. 2008. From a literature. re view to a conceptual framework for sustainable supply chain management. *Business Strategy and the Environment* 16: 1699–710. [CrossRef]
Smith, Stephen. 2015. A sense of place: Place, culture and tourism. *Tourism Recreation Research* 40: 220–33. [CrossRef]
Sie, Lintje, Kelly Virginia Phelan, and Shane Pegg. 2018. The interrelationships between self-determined motivations, memorable experiences and overall satisfaction: A case of older Australian educational tourists. *Journal of Hospitality and Tourism Technology* 9: 354–79. [CrossRef]
Song, Haiyan, Gang Li, Robert van der Veen, and Jason Chen. 2011. Assessing mainland Chinese tourists' satisfaction with Hong Kong using tourist satisfaction index. *International Journal of Tourism Research* 13: 82–96. [CrossRef]
Suhartanto, Dwi, Anthony Brien, Ina Primiana, Nono Wibisono, and Ni Nyoman Triyuni. 2020. Tourist loyalty in creative tourism: The role of experience quality, value, satisfaction, and motivation. *Current Issues in Tourism* 23: 867–79. [CrossRef]
Sun, Xiaoxia, and Honggang Xu. 2019. Role Shifting Between Entrepreneur and Tourist: A Case Study on Dali and Lijiang, China. *Journal of Travel & Tourism Marketing* 37: 547–61. [CrossRef]
Tavitiyaman, Pimtong, Xinyan Zhang, and Wing Yin Tsang. 2022. Tourists Perceive the Usefulness of Technology Adoption in Hotels: Interaction Effect of Past Experience and Education Level. *Journal of China Tourism Research* 18: 64–87. [CrossRef]
Theuns, Leo. 2002. Tourism and Development: Economic Dimensions. *Tourism Recreation Research* 27: 69–81. [CrossRef]
Tomczak, Paulina, and Krzysztof Stachowiak. 2015. Location patterns and location factors in the cultural and creative industries. *Quaestiones Geographicae* 34: 7–27. [CrossRef]
Torres-Delgado, Anna, and Jarkko Saarinen. 2014. Using indicators to assess sustainable tourism development: A review. *Tourism Geographies* 16: 31–47. [CrossRef]
Tsolakidis, Panagiotis, Naoum Mylonas, and Eugenia Petridou. 2020. The Impact of Imitation Strategies, Managerial and Entrepreneurial Skills on Startups' Entrepreneurial Innovation. *Economies* 8: 81. [CrossRef]
Van Acker, Veronique, Bert Van Wee, and Frank Witlox. 2010. When Transport Geography Meets Social Psychology: Toward a Conceptual Model of Travel Behaviour. *Transport Reviews* 30: 219–40. [CrossRef]
Varotsis, Nikolaos. 2019. Quality standards in hospitality industry: Ionian region. *Journal of Tourism and Hospitality* 8: 417. [CrossRef]
Warren, Christopher, and Susanne Becken. 2017. Saving energy and water in tourist accommodation: A systematic literature review (1987–2015). *International Journal of Tourism Research* 19: 289–303. [CrossRef]
Weiermair, Klaus, Hubert Siller, and Claudia Mossenlechner. 2006. Entrepreneurs and Entrepreneurship in Alpine Tourism: Past, Present, and Future. *Journal of Teaching in Travel & Tourism* 6: 23–40. [CrossRef]
Williamson, Ben, Annika Bergviken Rensfeldt, Catarina Player-Koro, and Neil Selwyn. 2019. Education recoded: Policy mobilities in the international 'learning to code' agenda. *Journal of Education Policy* 34: 705–25. [CrossRef]
Xiong, Yu, Yang Zhang, and Timothy Lee. 2020. The rural creative class: An analysis of in-migration tourism entrepreneurship. *International Journal of Tourism Research* 22: 42–53. [CrossRef]

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Review

E-Management as a Game Changer in Local Public Administration

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Abstract: The rapid development of digital technologies provides an efficient way to overcome the drawbacks of traditional management. E-management, a new form of management, is attracting much attention worldwide. The current research is aimed at examining the development of e-management in public sector organizations and anticipating possible alternatives for solving e-management problems. We use a qualitative strategy to explain the concept, specifics, benefits, drivers, situation, and progress of e-management in the public sector. Based on interviews with managers at local public administration institutions in Lithuania, we conclude that e-management in municipalities until the COVID-19 pandemic was applied only in exceptional cases due to legislation and workplace stationarity. However, at the moment, e-management in municipality administrations is treated not as an alternative but as the only possible choice.

Keywords: e-government; digital management; e-leadership; technologies; municipalities

Citation: Vilkaite-Vaitone, Neringa, and Karolina Povilaitiene. 2022. E-Management as a Game Changer in Local Public Administration. *Economies* 10: 180. https://doi.org/10.3390/economies10080180

Academic Editor: Ralf Fendel

Received: 11 June 2022
Accepted: 21 July 2022
Published: 25 July 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

With the introduction of information and communication technologies (ICT) in public administration organizations, digital solutions have been implemented to reduce the time and financial costs of providing services. In many cases, e-government is underestimated because it is poorly visible to the public. Nevertheless, e-government is a crucial aspect of any government seeking efficiency. Without e-government, the provision of services, public involvement, and high-quality operations at minimal cost, which is the prerogative of e-government, cannot be realized (Cook et al. 2002). These circumstances call for an examination of the phenomenon of e-management.

The spread of computer technology in the 20th century can be considered the beginning of the formation of e-management. In the sixties and seventies, the use of computer technology became convenient, saving time, effort, and resources. One of the consequences of the development of ICT is the emergence of the electronic exchange of information and messages between colleagues and departments. The emergence of electronic data sharing systems and networks has led to the use of the functions and roles of e-management through modern networks (especially intranets and extranets), digital spaces, the Internet, and technological infrastructure (Ellatif and Ahmed 2013). According to Demir (2019), the concept of e-management has actively developed in recent decades. Following the evolution of the Internet, the concept of e-management has also evolved. In the beginning, the dominant associations for e-management were the transmission of information through electronic channels, while at the moment, the functionality of e-management seems much broader (Demir 2019). Wart et al. (2019) describe e-management as a process employing advanced ICT to ensure internal and external management functionality. E-management includes using advanced ICT for information management, dissemination, service delivery, marketing, decision making, etc. Thus, e-management is mainly related to using ICT.

Adding the letter "e" to the term management does not mean management in a virtual environment. E-management should complement advanced management models applied in virtual and physical environments so that participants improve their skills and social interactions (Freitas and Routledge 2013). In reference to Yao et al. (2011), e-management is a strategic approach. It begins with formulating a vision and mission, emphasizing the benefits an organization gains through the potential of ICT. It focuses on the key benefits of applying e-management. Hopefully, e-management will create preconditions for achieving the highest quality result and organizational efficiency. It is possible to achieve efficiency only when the organization treats e-management as a strategic issue (Yao et al. 2011). Iulian (2008) notes that using essential tools such as Microsoft Excel or Microsoft Access does not mean that the organization applies the concept of e-management. It is only an intermediate step in transitioning from traditional management to true e-management. E-management systems connect the organization's suppliers, partners, and consumers. Almutairi (2014) identifies even a broader list of tools needed to implement the e-management concept: data disks, technological equipment (e.g., computers), communication networks, and knowledge creators.

Pursuing the high quality of public services, it becomes necessary to pay attention to the fact that public service users (citizens, business entities, etc.) value the quality of services provided under e-government. E-management orientation towards citizens serves as a new way to use ICT in policy discussions. This way of management has an impact on economic, social, and political development. The positive effect occurs because e-management acts in an electronic environment and complies with remote teams. The new e-management paradigm enables direct and immediate communication with employees, consumers, and suppliers, harnesses the potential of talent, improves organizational performance through multifunctional teams, increases customer satisfaction, reduces operating costs, and strengthens knowledge management (DasGupta 2011; Yao et al. 2011; Almutairi 2014). Despite the well-known benefits of e-management, very little is known about how public administration institutions should apply the concept to achieve efficiency simultaneously. This paper contributes to tackling this issue by exploring e-management through qualitative research in local public administration institutions in Lithuania. In the context of the COVID-19 pandemic and possible monkeypox outbreak, such research gains exceptional importance. The spread of viruses inevitably affects most public sector organizations, including local government, and moves many employees to work from home. The topic of e-management has become even more relevant in anticipation of the new industrial revolution (Industry 5.0) (Fazal et al. 2022).

Previously the phenomenon of e-management has received considerable attention from researchers all over the world (Cook et al. 2002; Cecchetti et al. 2009; Garjoaba 2011; Lee et al. 2011; Pries-Heje and Pries-Heje 2012; Chang and Lee 2013; Avolio et al. 2014; Voce 2015; Ji et al. 2016; Wart et al. 2017, 2019; Demir 2019; Waswas and Jwaifell 2019). Recent scholarship has paid attention to e-management in business entities (He and Chen 2007; Iulian 2008; Garjoaba 2011; Lee et al. 2011; Askarzai et al. 2013; Ellatif and Ahmed 2013; Freitas and Routledge 2013; Alrahahle 2014; Fan et al. 2014; Li et al. 2016; Fazal et al. 2022). The public sector as a context of e-management has received the attention of a few researchers so far (Cook et al. 2002; Auffret et al. 2010; Almutairi 2014; Demir 2019). Studies of e-management in educational institutions are quite common (Hashim et al. 2006, 2010; Kulkarni and Pougatchev 2011; Chang and Lee 2013; Garcia 2015; Voce 2015; Radonov and Videkov 2017; Shobaki et al. 2018; Waswas and Jwaifell 2019; Timoteo et al. 2021), but other public sector organizations have not been systematically analyzed in this regard. It means that we still need in-depth studies and specific research outputs to draw a comprehensive picture of e-management in local public administration. Therefore, this research aims to examine the development of e-management in local public administration and anticipate possible alternatives to solve e-management problems.

The study takes a further step to explain the concept, specifics, benefits, procedures, and progress of e-management in local public administration. Given the arguments of

previous research, the current study focuses on managers' perceptions as the basis of analysis. Such a choice provides a broad examination of e-management as a game changer in local public administration. From a scientific point of view, the analysis of the concept and structure of e-management is vital for understanding the phenomenon of e-management. We expect that the results of the empirical study of the attitudes of leading staff of public sector institutions to e-management will create preconditions for identifying problems arising in Lithuanian municipalities, applying e-management practices, and preparing possible alternatives for solving e-management problems.

The remainder of this paper is structured as follows: Section 2 presents the theoretical background for the phenomenon of e-management; Section 3 provides the methodology of the research; Section 4 analyses the results of qualitative research conducted in local public administration institutions; the paper ends with Sections 5 and 6, which provide limitations, managerial implications, possible avenues for future research, and conclusions.

2. Literature Review

The concept of e-management has developed intensively over the last few decades. Aiming to clarify its content, we have collected a variety of e-management definitions. An analysis of the scientific literature (He and Chen 2007; Iulian 2008; Seresht et al. 2008; Yao et al. 2011; Almutairi 2014; Wart et al. 2016, 2019; Radonov and Videkov 2017; Demir 2019) has shown that the concept of e-management can be interpreted emphasizing different components of e-management. Usually, scholars have emphasized human resources, material resources, organizational dynamics, organizational goals, internal and external processes, technological resources, information exchange, interactive communication, workflows, and their automation, documentation of administrative processes, social impact, organizational processes, information provision, service delivery, manual, employee referral, and motivation.

According to Wart et al. (2016), external and internal factors determine the decision to apply e-management. External factors include competition and public comparisons, technological diffusion in similar organizations (network effect), and user perceptions (adoption of technologies and concerns about technologies). Internal factors include the task needs, awareness, and leaders' facilitation (in-depth knowledge of technologies and their adoption, preferences for utilization of technology, and concerns about various technologies). Seresht et al. (2008) have classified e-management factors into the following categories: managerial (1), humanistic (2), cultural-social (3), organizational-structural (4), technical-technological (5), and environmental (6). Managerial factors typically encourage organizational activities, but they can also accidentally become the context of many failures at the organizational level. The application of e-management is hampered by management practices such as insufficient motivation, inadequate knowledge, short management lifecycle, etc. Humanistic factors, such as resistance to change, insufficient number of specialists, lack of interest, and motivation, may prevent the organization from transitioning to e-management. Cultural-social factors involve knowledge, beliefs, arts, morals, laws, customs, and other habits of people as members of society that can affect the acceptability of ICT. Organizational-structural factors include knowledge management, employees, and internal communication. They are relevant for the success and survival of an organization (Seresht et al. 2008). According to Lilian (2014), managers have to organize their work somewhat differently as organizational structures change from traditional hierarchies to more flexible ones. Environmental factors include the necessary rules and regulations in ICT policy. El-Seoud and Taj-Eddin (2018) provided a similar typology of e-management factors. The researchers mentioned managerial, humanistic, organizational culture, organizational, environmental, and technological factors. Any of these factors can have both positive and negative effects on e-management.

Seresht et al. (2008), who studied the situation of e-management in Iran, found that cultural, environmental, and organizational factors hamper the implementation of e-management. El-Seoud and Taj-Eddin (2018) concluded that in Egypt, lack of appropriate

in-service training, limited knowledge and knowledge sharing, lack of IT professionals in organizations, access to the Internet, and ICT, and limited budgets prevent organizations from the application of e-management.

Almutairi (2014) emphasized the organizational culture as an essential factor in e-management. After conducting a questionnaire survey at the Kuwaiti Public Sector Institution for Applied Education and Training, the author found a significant direct correlation between elements of organizational culture and the application of e-management.

Applying e-management in public sector institutions is a difficult task requiring significant financial resources and precise planning (Iulian 2008). First of all, the institution needs to assess whether e-management is necessary because its implementation is susceptible to time, financial, and human resources.

The implementation of e-management in an organizational context should have a specific consistency. Iulian (2008) has suggested the following procedure: (1) documentation of all processes, (2) the definition of requirements, (3) provider selection, (4) purchasing/development, (5) testing, (6) future improvements, and (7) maintenance.

He and Chen (2007) emphasized the necessity to incorporate all elements of e-management (e-technology, e-source, e-service, e-speed, and e-organization) into e-management. The process of e-management application should consist of three main stages: input, change, and outcome. The implementation of each stage requires electronic technologies, information technologies, and network technologies. E-technologies are introduced at the input stage; these technologies are the driving force behind the whole model. The phase of change includes e-resources, e-speed, and e-services. By leveraging e-technologies, all e-resources should be integrated as much as possible. Then the organization moves to e-services and e-speed in every business process to meet users' needs. In the outcome phase, the organization becomes an e-organization (He and Chen 2007).

Auffret et al. (2010) treated the application of e-management as a combination of seven actions. These actions include assessment of preparedness, regulation, organizational development, capacity building, international cooperation, inter-institutional coordination, cooperation, and commitment. Their implementation can be done in a spiral model. The spiral model is considered best suited to the specifics of the public sector, and, unlike some other models, it is not focused exclusively on the technological implementation of e-management.

The application of e-management solutions in the public sector makes research into progress in this area worthwhile. We assume that the decision to apply e-management is determined by six different groups of factors: managerial, humanistic, cultural-social, organizational-structural, technological-technical, and environmental factors. Such a set of factors is based on insights of Iulian (2008); Seresht et al. (2008); Almutairi (2014); Fan et al. (2014); Lilian (2014); Wart et al. (2016); El-Seoud and Taj-Eddin (2018). If the interaction of these factors determines the decision of the public sector organization to choose e-management, then the application of the e-management concept should follow seven steps according to the course proposed by Auffret et al. (2010). First, the organization's readiness is assessed, then the legal framework regulating e-management solutions is examined, organizational development is carried out, opportunities are increased, and international cooperation, inter-institutional coordination, cooperation, and commitment are initiated and implemented. With the implementation of the e-management concept in a public sector organization, regular and timely evaluations of the benefits, situation, and progress of e-management become necessary, creating preconditions for identifying problematic aspects and areas for improvement. Based on the theoretical background, we address the following research questions:

- What is the concept and what are the specifics of e-management in the public sector?
- What are the benefits of e-management in the public sector?
- What factors determine the application of e-management practices in the public sector?
- What is the current state of e-management and its progress in the public sector?

3. Methodology

A qualitative methodology was chosen to evaluate e-management in local public administration as the most appropriate to achieve the research goal and increase the knowledge of the e-management phenomenon in a natural organizational environment. Figure 1 presents the research flowchart.

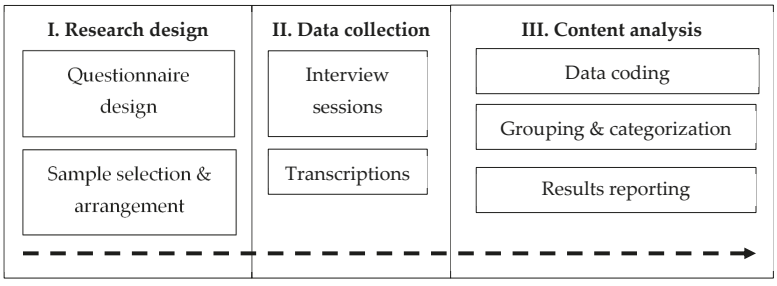

Figure 1. Research flowchart.

In order to find answers to the research questions, the expert interview method was chosen for data collection. This method explores and collects data about a specific field of interest (Doringer 2021). The expert interview method was chosen as appropriate for the study because the phenomenon of e-management is abstract and has been relatively poorly studied empirically (Savolainen 2014). Given the complexity and depth of the e-management phenomenon, the interview method was considered appropriate as the research organizers could lead a flexible discussion.

The data was collected using a structured interview guideline consisting of 14 questions. Based on recent scholarship, we built a questionnaire consisting of four main blocks: the concept and features of e-management (1), benefits of e-management (2), e-management factors (3), and e-management situation and progress (4) (Table 1).

Table 1. Questionnaire design.

Block	Questions	Theoretical Background
The concept and features of e-management	1. How would you explain the concept of e-management? Can you provide examples from your practice? 2. What specifics do you see in e-management in public sector organizations? What specifics of e-management do you see in the organization you work in? What is specific about it at your management level?	He and Chen (2007); Iulian (2008); Yao et al. (2011); Seresht et al. (2008); Ellatif and Ahmed (2013); Almutairi (2014); Wart et al. (2016); Radonov and Videkov (2017); Demir (2019); Wart et al. (2019)
Benefits of e-management	3. Why, in your opinion, is the application of e-management important in local public administration? What benefits do you see for the organization, managers, employees, and citizens? 4. During the COVID-19 pandemic, the need for e-management has dramatically increased, and in some organizations it has become the only possible management method. How has the lockdown changed the importance and need for e-management in local public administration?	Hashim et al. (2006); Iulian (2008); Hashim et al. (2010); Yao et al. (2011); Askarzai et al. (2013); Ellatif and Ahmed (2013); Almutairi (2014); El-Seoud and Taj-Eddin (2018); Demir (2019)

Table 1. *Cont.*

Block	Questions	Theoretical Background
Factors of e-management	5. How has the COVID-19 pandemic affected management in local public administration? What else (besides the pandemic) determines the need for e-management in local public administration? Furthermore, what limitations exist for e-management? 6. In your opinion, what are the success factors of e-management in the public sector?	Iulian (2008); Seresht et al. (2008); Almutairi (2014); Fan et al. (2014); Lilian (2014); Wart et al. (2016); El-Seoud and Taj-Eddin (2018)
Situation and progress of e-management	7. How was e-management implemented in the organization you work in? When did you notice it? 8. How do you assess the progress of e-management in the organization you work? How would you describe the current situation? 9. How has this situation changed during the last five years? If, in your opinion, the application of e-management has intensified, what caused it? 10. Which areas of the organization's activities have e-management benefited the most? Moreover, where would you consider it ineffective? 11. What tools and technologies are essential for e-management in your organization? Which of them are the most vital? 12. What problems do you face in the field of e-management? 13. What challenges related to e-management have you faced after the lockdown was announced? How did you overcome those challenges? 14. In your opinion, what should be done on a national level in order to strengthen e-management in public sector organizations? What could be done at the organizational level? At the executive level? At the level of individual employees?	He and Chen (2007); Iulian (2008); Auffret et al. (2010); Almutairi (2014); Savolainen (2014); Shobaki et al. (2018); Demir (2019)

Savolainen (2014) suggests interviewing managers about the e-management phenomenon. Managers of local public administration institutions have specific knowledge in e-management. At first, the study participants were selected through the purposive sampling technique. The participants were chosen based on their managerial experience in local public administration and willingness to share their experiences. Later the experts were recruited by a snowball sampling technique. Experts provided information about those whose involvement may provide additional insights about e-management. Thus, the sample comprised informants with different professional backgrounds in local public administration. Data saturation was reached after seven interviews. The empirical study involved managers whose managerial experience ranged from 4 to 26 years during the study (Table 2).

The data collection started in November 2020 and ended in January 2021. All informants were interviewed via telephone, Microsoft Teams, and Zoom. The interviews were conducted by one researcher, while the second was responsible for taking field notes and invigilating the behavior of the experts. Every interviewee was asked for permission to record the conversation; the interviewee's anonymity was ensured, and transcripts would not be available to a third party. The semi-structured interviews with experts lasted between 35 and 60 min.

The current study adopted content analysis to investigate the development of e-management in public sector organizations and anticipate possible alternatives for solving e-management problems. The analysis followed an inductive approach, moving from details to general classifications and concepts.

Table 2. Profile of the research participants.

Code	Gender	Position	Number of Subordinates	Years in a Management Position at All Levels
I1	Male	Department manager	5	17
I2	Female	Department manager	26	18
I3	Female	Director of the administration	200	4
I4	Female	Department manager	37	8
I5	Female	Department manager	18	16
I6	Female	Department manager	9	26
I7	Female	Department manager	14	12

The authors transcribed the interviews. The collected texts went through the coding procedures. Following Elo and Kyngas (2007), the coded data were categorized and grouped. The last phase of the content analysis was reporting. To ensure the validity and reliability of the qualitative study, the authors carefully read the text several times, shared the study with some participants for their approval, and involved one more researcher to act as a critic.

4. Results

4.1. The Concept and Features of E-Management

The first block of the research tool was designed to elucidate the concept and features of e-management in a public sector organization. Analyzing the interviewees' positions on the issue of collision and acquaintance with the concept of e-management, it became clear that the concept of e-management is not yet sufficiently familiar and known. Such research results confirm the theoretical assumption that the concept of e-management is still very new. Due to the novelty, some informants lack knowledge about e-management. Although there is a lack of knowledge about e-management, the concept has inevitably become familiar with the COVID-19 pandemic (" ... *e-management has emerged through the COVID-19*", I2; *At a time when the work of an organization due to a global pandemic is being organized remotely, we are working on the principle of e-management*", I7). The COVID-19 pandemic has strengthened the need for employees to adapt quickly to the lockdown and transition to teleworking. It means that some employees had to learn to use teleworking, communication equipment, and software because there were no possibilities to come to work. For some research participants, e-management practices were new; for others, they were reasonably common.

Describing practical examples of e-management, the informants mentioned a relatively wide variety of e-management components. The research results have shown that e-management consists of organizing conferences, meetings, and providing services using ICT. In some cases, the organization of seminars and communication sessions were also mentioned. Such a structure of e-management allows us to state that practitioners demonstrate a relatively narrow position towards the contents of e-management. One informant put forth exceptional knowledge and experience in e-management. She could not only name specific examples of e-management but also share the successful experience of e-management initiatives at other institutions (previous employers). The informant described the e-management initiatives implemented in these institutions as advanced and productive.

The study also sought to highlight the characteristics of e-management in the public sector. Some informants did not notice significant differences between e-management in the

public and private sectors. Interviewees explained the lack of specification ("*e-management in public administration is the assignment of tasks, remote problem-solving, decision-making, and the solution of problems*" (I2). We assume that such a statement is disputable. Specifics of ICT can be seen as one of the peculiarities of e-management practices in the public sector. ICT can vary between public and private sector organizations, different public sector organizations, and different levels of management in one public sector organization. Likewise, the variety of communication tools and channels also differs. In some cases, other features of e-management in the public sector were mentioned: use of specific databases, regulatory gaps, strict subordination, and general purpose.

4.2. The Benefits of E-Management

Another block of interview questions was aimed at revealing the benefits of e-management. After analyzing the informants' attitudes toward the benefits of e-management, the following subcategories were identified: economy in time, financial resources, possibility to perform functions without direct participation, increase in communication efficiency, provision of services to citizens, and increase of convenience. Almost all interviewees emphasized the opportunities to save time created by e-management. Time is saved because e-management eliminates the need for employees to travel to other locations across the country. The meetings themselves are organized faster. Employees' time is saved, and less time is needed to prepare for daily work. Not only time but also financial resources are saved. Reduced costs for correspondence, job maintenance, document printing, repairs, utilities, and business trips determine the decrease in demand for financial resources. The managers also evaluate the opportunities provided to perform the functions without direct participation. It means that management is possible without being physically present in the workplace. An increase in communication efficiency was also mentioned. The efficiency increases in communication with subordinates, colleagues, and citizens. Informants also treat e-management as improving work efficiency and increasing convenience. The study results showed that e-management benefits not only the organization that applies it but also the citizens - it speeds up the delivery of services to them. In some cases, the following advantages of e-management were also mentioned: providing information to customers, saving employees' financial resources, saving transport, saving human resources, increasing transparency, improving the needs of society, improving the material base, developing communication, improving the efficiency of working time, increasing citizens' trust, increasing citizens' satisfaction with services, increasing the efficiency of management, improving control, and increasing the efficiency of decision-making.

The study results showed that e-management has a vast range of benefits, bringing local public administration institutions closer to the goals of private sector organizations. One informant noted that "*. . . by using e-management in a public sector organization, we can achieve the same goals as in the private sector*", I7). The benefits of e-management became particularly evident during the COVID-19 pandemic. In general, e-management has become more widespread ("*We did not have had any experience in e-management until COVID-19 began*", I2). For most organizations, this has become the only way to stay afloat ("*. . . it was the only way to stay afloat, stabilize all the processes and work together stably*", I3).

The COVID-19 pandemic reinforced the need for e-management. In some organizations, such management has become the only option to ensure continuity of operations. The research participants were asked how the importance and need for e-management had changed due to COVID-19. The main changes identified by the interviewees were as follows: work with the help of ICT, creating opportunities to work remotely, the need for rapid adaptation, adjustments to the legal framework, and working from home.

The study results show that the application and need for e-management in the local public administration institutions have increased due to the COVID-19 pandemic. The pandemic has led to more comprehensive practices of e-management. According to one informant, "*. . . until the COVID-19 pandemic in 2020, in the spring, the principles of e-management were only partially applied in our organization. This lockdown has enabled the complete application of e-management, and it has become perhaps the only way to ensure the security of employees and*

the continuity of the processes" (I7). The changes mentioned above have led to the broader use of ICT in enabling remote work, meeting the need to quickly adapt to the situation, adjusting the legal framework, and working from home.

4.3. The Factors Determining the Choice of E-Management

The research results highlighted the role of COVID-19 in strengthening the need for e-management applications. The theoretical analysis suggested that a comprehensive range of factors drives the need for e-management, so informants were asked to indicate what factors, apart from the pandemic, led local public administration institutions towards e-management.

The analysis of the study results shows that the application of e-management is driven by technological progress and changing needs of citizens. According to the classification of the factors discussed in the theoretical background, the mentioned factors can be attributed to the groups of technical-technological and cultural-social factors. In some cases, informants also mentioned the need to avoid contact and the desire to speed up processes in the institution.

According to interviewees, the application of e-management is limited by technical-technological factors: lack of computers and computer literacy. Participants of the study also mentioned other restricting factors: human resources, financial resources, resistance to change, lack of competence, and lack of legal regulation.

Participants in the study were asked to identify success factors for e-management in the local public administration. The dominant success factors for e-management in the local public administration appeared to be work efficiency, technology, faith in work, human capital, time, financial resources, honesty, trust in the manager, and the transition to a flexible environment.

The analysis of e-management factors has shown that the application of e-management in public administration is usually driven by technological progress and changing needs of citizens and is limited by the lack of computer equipment and skills. The success of e-management is frequently determined by work efficiency, technology, faith in work, and human capital.

4.4. Situation and Progress of E-Management

Aiming to assess the e-management situation and progress in local public administration, we asked survey participants how e-management was implemented in the organization, when they noticed the first procedures and how those procedures took place. It is probable that due to the differences in attitudes towards the phenomenon of e-management, the informants named the beginning of the implementation of e-management very differently. The informants indicated various periods from 2015 to 2020. According to one informant, the introduction of e-management in the municipal administration started five years ago ("*We noticed it five years ago*", I4). A slightly larger share of survey participants indicated the start of e-management implementation processes in 2018. It is also believed that the introduction of e-management only started with the onset of the COVID-19 pandemic. The informants mentioned various steps in the implementation of e-management. The study participants were united only on the introduction of the document management system as an action towards e-management. In reference to the attitudes of interviewees, we have crystallized a specific process of e-management implementation in municipal administrations (Figure 2).

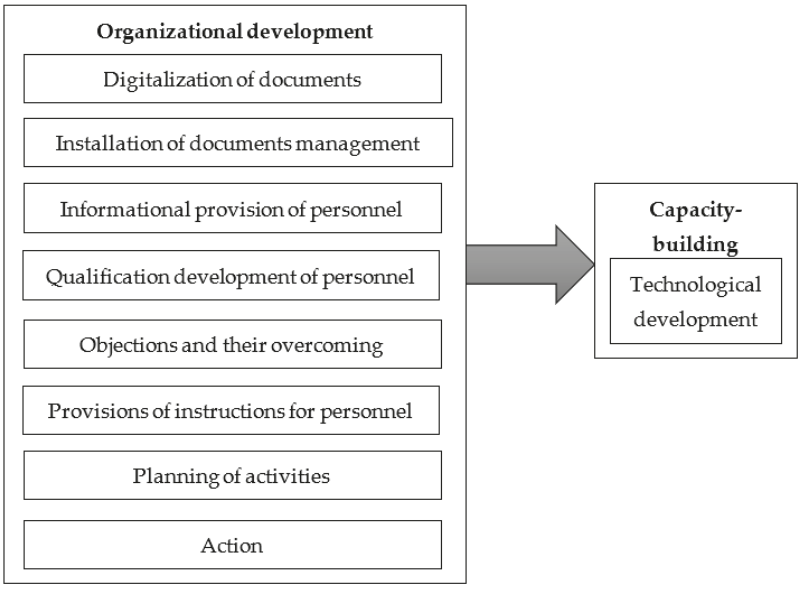

Figure 2. The process of e-management implementation in municipalities.

The research results suggested two main stages: organizational development and capacity building. The organizational development phase started with transferring documents to the digital space (" ... *the creation of electronic files by sending documents electronically*", I4). Later, the document management system was introduced, the staff was informed about it, and training was provided for the staff (" ... *taught us all*", I2). The phenomenon of employee resistance is often encountered in the implementation of change. The introduction of e-management in municipal administrations was not an exception; therefore, measures had to be taken to reduce resistance ("*There were many objections at the beginning, everyone wanted paper work*," I2; "*Of course, there was much resistance from people who wanted to see the original document*", I2). After solving or minimizing the problem of employee resistance, the staff was given instructions (" ... *we just got instructions*", I2), work planning was started (" ... *we started planning our work*", I4), and the work itself was done (" ... *we worked*", I2). Only technological development was carried out during the capacity-building phase ("*After the system was updated ...* ", I2). In the capacity-building phase, the implementation of e-management has stopped. Interviews with management staff did not provide any insight into the continuation of this process.

The study sought to determine how management staff assess the progress of e-management. Some informants indicated that progress was significant in this area. It meant that most of the management staff were in favor of e-management. However, opportunities for improvement were also identified ("*There are clearly no limits to improvement* < ... > ... *we will certainly have a less administrative burden and more time to work in the future*", I3). Attention was also drawn to the possible temporary nature of progress. It has been suggested that the progress of e-management may slow down after the end of the COVID-19 pandemic.

Participants in the study saw an intensification of e-management compared to the situation five years ago. According to informants, these changes were caused by the COVID-19 pandemic and the installation of a document management system. In addition to the factors mentioned above, in some cases, the informants named the following factors that led to the progress in the implementation of e-management: usage of mobile signatures, policies, social networks, websites, smart devices, and changes in the needs of the younger generations.

The study sought to identify the areas of the organization where e-management was efficient and where the efficiency was insufficient. The analysis of the research data showed that the successful application of e-management appeared in self-management and education. From the informants' point of view, in addition to self-management and education, tax administration, and document and financial management are also prime areas. According to the study participants, there is a lack of effectiveness in social support as well.

Technologies are inseparable from e-management. Research participants were asked to indicate tools and technologies essential for e-management in local public administration. The most necessary tools and technologies to ensure e-management are the document management system, video conferencing platforms, a computer, and an electronic signature. In addition to the elements mentioned above, the informants highlighted the importance of smartphones, electronic banking, video and audio equipment, e-mail, the Internet, and social networks.

Many issues were identified when informants were asked what problems they faced in e-management. Informants mentioned the following problems: the lack of direct communication, concentration at work, different schedules, fear, old technologies, need for updates, lack of interactivity, lack of financial resources, low computer literacy, difficulties in coordinating work, and high workload.

Research participants mentioned the following challenges they faced during the pandemic: absence of an employee nearby, intensive telephone communication, tedious use of headphones, complicated organization of urgent meetings, lack of IT specialists, lack of employee competencies, and lack of training.

The challenges were overcome with habituation, changes in work organization, prompt response, excellent communication, diligence, and flexibility of IT staff. There were also cases where the situation caused by COVID-19 was not identified as a challenge. According to one informant, "*it has become easier to manage because all actions are recorded with the help of technological programs*" (I7). The advantage of direct communication was also seen ("*. . . I rested from communication because there were no more coffee drinks, only a plain working environment. I am the head of the department, and I do not call unnecessarily*", I2).

Research results showed significant progress in e-management since the beginning of the COVID-19 pandemic, particularly successful solutions in self-management and education. However, there were also challenges that needed to be addressed.

4.5. Development of E-Management in Local Public Administration

Participants in the study were asked to identify what should be done to strengthen e-management in local public administration. The views of the informants on this issue differed significantly. Some of the executives in the study saw a need to improve staff competencies. Employees focused on the lack of technological and legal competencies. The variety of proposals for developing e-management in local public administration institutions is presented in Table 3.

Table 3. Solutions for the development of e-management.

Levels	Suggestions
State level	Regulatory adjustment Organization of distant meetings Strengthening the integrity of systems Ensuring the recognition of electronic documents
Organizational level	Improvement of technological competencies Improvement of legal competencies Adjustment of internal regulation Intranet installation
Individual (employee) level	Improvement of communication competence

At the state level, informants saw a need for regulatory adjustment. It was essential to establish teleworking, especially in some cases (for example, during explanatory seminars). The need to organize remote meetings in the future was seen. It was also vital to ensure the integrity of systems and more robust recognition of electronic signatures in public sector institutions. At the organizational level, there exists a need to adjust internal regulations and to install an intranet. At the level of individual employees, recommendations were received to improve employees' communication competence.

The empirical study found that only two (organizational development and capacity building) of the seven stages of e-management implementation were observed in the e-management implementation process. The municipal administration is recommended to continue the processes of international cooperation, inter-institutional coordination, cooperation, and commitment. Summarizing, it can be stated that the development should be carried out at three levels: state, organizational and individual employees. The implementation of the recommendations at every level is expected to significantly contribute to the improvement of e-management.

5. Discussion

The outbreak of COVID-19 has caused unprecedented changes for local administration institutions and their management. The previous short-sighted vision focused on traditional management techniques had to change. Therefore, it is crucial to investigate the development of e-management in local public administration and anticipate possible alternatives for solving e-management problems.

The study aimed to explore the concept and specifics of e-management in the public sector. Based on a literature review (He and Chen 2007; Iulian 2008; Seresht et al. 2008; Yao et al. 2011; Almutairi 2014; Wart et al. 2016; Radonov and Videkov 2017; Demir 2019; Wart et al. 2019) we found that it is appropriate to define e-management as a process of social influence embedded in both proximal and remote contexts, based on advanced information technology that corrects attitudes, thinking, behaviors and activities. It is a process of using advanced information technology to achieve internal and external management functionality. The representatives of local public administration were not able to identify such a broad content of e-management. Conceptualization of e-management as a structure that involves the organization of conferences, meetings, the provision of services, and the use of ICT is considered insufficient, especially in the current context of the COVID-19 pandemic, where teleworking has become the only option. The specifics of e-management in the study were refined mainly through ICT and its diversity, which does not adequately reflect the content of e-management in the public sector.

In order to answer the second research question, which is to identify the benefits of e-management in local public administration, we first draw on literature. The review shows that e-management can substantially strengthen organizational communication and knowledge management, harness the potential of talent, improve organizational performance through multifunctional teams, increase customer satisfaction, and reduce operating costs (DasGupta 2011; Yao et al. 2011; Almutairi 2014). We have observed that in local public administration institutions in Lithuania, the most visible benefits are saving time and financial resources, performing functions without direct participation, increasing communication efficiency, ensuring higher quality of services to citizens, and increasing convenience. Time is saved because e-management eliminates the need for employees to travel to other locations across the country. Moreover, the meetings rarely protract, and employees need less time to prepare for daily work. Financial resources are saved due to reduced costs for correspondence, job maintenance, document printing, repairs, utilities, and business trips. Literature confirms that costs are declining due to the wide range of capabilities of smart systems, reducing the need for human resources at the operational level (Yao et al. 2011). The management staff of municipal administrations also benefit from the opportunities to perform functions without direct participation. It means that management is possible without being physically present in the workplace. The experts

who participated in the research also mentioned the increasing communication efficiency. The benefits of increasing communication efficiency have also been identified in previous research (Yao et al. 2011; Almutairi 2014). To summarize, local public administration institutions will need e-management regardless of the pandemic situation. There is clear evidence of the benefits of this digital form of management.

Theoretical analysis of the e-management phenomenon urged us to formulate the third research question related to the factors determining the application of e-management practices in local public administration. The insights from the literature show the dominant role of managerial, humanistic, cultural-social, organizational-structural, technical-technological, and environmental factors (Iulian 2008; Seresht et al. 2008; Almutairi 2014; Fan et al. 2014; Lilian 2014; Wart et al. 2016; El-Seoud and Taj-Eddin 2018). Our study confirmed the relevance of technological progress and changing needs of citizens as the main drivers for local public administration institutions to move towards e-management. The lack of technological equipment and skills (technical-technological factors) was the main limitation for successful e-management.

The fourth research question aimed to provide insights into the current state of e-management in local public administration. Theoretical analysis of the e-management phenomenon created preconditions for refining the stages of e-management implementation in a public sector organization. As mentioned, these stages are preparedness assessment, regulation, organizational development, capacity building, international cooperation, inter-institutional coordination, cooperation, and commitment (Auffret et al. 2010). The results of interviews with the staff of municipal administrations led to the observation of only two of the stages mentioned above: organizational development and capacity building. It means that the spiral model suggested by Auffret et al. (2010) is not practically applied in local public administration in Lithuania.

The findings obtained in this study reveal remarkable insights both for managers of public administration institutions and policymakers. First, it is expedient to develop e-management at three levels: state, organizational and individual. Implementation of the recommendations at all these levels is expected to contribute significantly.

As the empirical study identified the significant benefits of e-management, exacerbated by the COVID-19 pandemic and lockdown, we encourage researchers to explore further the potential of e-management in the country's public sector organizations. Public sector organizations in Lithuania are also offered to organize remote meetings between managers and their subordinates in the future. Such meetings allow saving time traveling to meeting places.

Having established that the implementation of e-management in municipal administrations took place in only two stages (organizational development and capacity building), a proposal at the organizational level was formulated. Thanks to the study, it is recommended to continue the processes by moving into international cooperation, inter-institutional coordination, cooperation, and commitment.

The research results revealed gaps in the coordination of work; therefore, we suggest the installation of intranets in municipal administrations, which is likely to improve the coordination function performed by managers. An intranet would also become a medium for remote communication between employees.

Moreover, the research results highlighted the need to improve the application of e-management at the level of individual employees. It would be expedient for employees to improve their communication competence.

This study is not free from limitations that pave the way for further studies. During the research, there was a lockdown in Lithuania. COVID-19 pandemics limited direct contact with the research participants. For this reason, interviews were conducted via telephone, Microsoft Teams, and Zoom. It is likely that such a choice somewhat limited the study's results. Telephone communication did not provide opportunities to observe the non-verbal expressions of informants. Therefore, the research has the potential to be extended and expanded, aiming to base data collection on direct communication. Such an extension of

the study could provide researchers possibilities for a thorough examination of changes after a few years.

6. Conclusions

This research was conducted to fill the gap in e-management in the context of local public administration. Many approaches to the concept of e-management have been analyzed. Each of them contains advantages and disadvantages. In this study, the authors utilize the advantages of the explanation of e-management as a process of social influence embedded in both proximal and remote contexts, based on advanced ICT that corrects attitudes, thinking, behaviors and activities. It is a process of using advanced ICT to achieve internal and external management functionality. Furthermore, the authors propose that managerial, humanistic, cultural-social, organizational-structural, technical-technological, and environmental factors may positively or negatively affect the choice of e-management in local public administration.

Although e-management is not a new concept in the field of social sciences, its research in public administration is still limited. Therefore, our research contributes to the literature on e-management in public administration and the reality of the public sector. In this research, based on a qualitative strategy, the authors built a coherent list of factors determining e-management in local public administration. Interviewing experts with sufficient managerial experience and knowledge provided numerous insights and opportunities for improving e-management at state, organizational and individual levels. The research presents specific recommendations that may be added to local public administration's toolbox of strategies for achieving more efficient management.

Author Contributions: Conceptualization, N.V.-V.; methodology, N.V.-V.; software, K.P.; validation, N.V.-V. and K.P.; formal analysis, K.P.; investigation, K.P.; resources, N.V.-V.; data curation, K.P.; writing—original draft preparation, N.V.-V.; writing—review and editing, N.V.-V.; visualization, N.V.-V.; supervision, N.V.-V.; project administration, N.V.-V.; funding acquisition, N.V.-V. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data supporting results is securely kept in the PC of one of the researchers (K.P.).

Conflicts of Interest: The authors declare no conflict of interest.

References

Almutairi, Naser. 2014. The impact of organizational culture on the adoption of e-management "Evidence from public authority for applied education and training (PAAET) in Kuwait". *International Journal of Business and Management* 9: 57–74. [CrossRef]

Alrahahle, Abdelrazaq Salem. 2014. The impact of e-management and the role of human resource development in improving the performance of the organization. *International Journal of Business and Social Science* 5: 264–71.

Askarzai, Walied, Yi-Chen Lan, and Bhuvan Unhelkar. 2013. Study of employee attitudes towards virtual management in small and medium sized enterprises: An exploratory data analysis. Paper presented at 23rd International Business Research Conference, Melbourne, Australia, November 18–20; pp. 1–13.

Auffret, Jean-Pierre, Elsa Estevez, Ignacio Marcovecchio, and Tomasz Janowski. 2010. Developing a GCIO system: Enabling good government through e-leadership. Paper presented at 11th Annual International Digital Government Research Conference on Public Administration Online: Challenges and Opportunities, Puebla, Mexico, May 17–20; pp. 82–88.

Avolio, Bruce, John Sosik, Surinder Kahai, and Bradford Baker. 2014. E-leadership: Re-examining transformations in leadership source and transmission. *The Leadership Quarterly* 25: 105–31. [CrossRef]

Cecchetti, Alfred, Bambang Parmanto, Marcella Vecchio, Sjarif Ahmad, Shama Buch, Nathalie K. Zgheib, and Roberrt Branch. 2009. Team building: Electronic management-clinical translational research (eM-CTR) systems. *CTS: Clinical & Translational Science* 2: 449–55.

Chang, Wen-Long, and Chun-Yi Lee. 2013. Virtual team e-leadership: The effects of leadership style and conflict management mode on the online learning performance of students in a business-planning course. *British Journal of Educational Technology* 44: 986–99. [CrossRef]

Cook, Meghan, Mark LaVigne, Christina Pagano, Sharon Dawes, and Theresa Pardo. 2002. Making a Case for Local e-Government. Available online: http://dan-wyers.tripod.com/sitebuildercontent/sitebuilderfiles/EGovmakingacase.pdf (accessed on 5 July 2022).

DasGupta, Probal. 2011. Literature review: E-leadership. *Emerging Leadership Journeys* 4: 1–36.

Demir, Ismeta Mameledzija. 2019. Digital management in larger municipalities in Bosnia and Herzegovina. *Acta Economica* 17: 83–95.

Doringer, Stefanie. 2021. 'The problem-centred expert interview'. Combining qualitative interviewing approaches for investigating implicit expert knowledge. *International Journal of Social Research Methodology* 24: 265–78. [CrossRef]

Ellatif, Huthaifa Abdelkarim Ali, and Sammani Abdulmutalib Ahmed. 2013. E-management: Configuration, functions and role in improving performance of Arab institutions and organizations. *International Journal of Computer Applications* 80: 33–40.

Elo, Satu, and Helvi Kyngas. 2007. The qualitative content analysis process. *Journal of Advanced Nursing* 62: 107–15. [CrossRef]

El-Seoud, Samir Abou, and Islam Taj-Eddin. 2018. E-management: Obstacles and challenges in Egypt. Paper presented at 2018 International Conference on Computer and Applications, Beirut, Lebanon, August 25–26; pp. 450–56.

Fan, Kai-Tang, Yuan-Ho Chen, Ching-Wen Wang, and Minder Chen. 2014. E-leadership effectiveness in virtual teams: Motivating language perspective. *Industrial Management & Data* 114: 421–37.

Fazal, Nadia, Abid Haleem, Shashi Bahl, Mohd Javaid, and Devaki Nandan. 2022. Digital management systems in manufacturing using industry 5.0 technologies. In *Advancement in Materials, Manufacturing and Energy Engineering*. Edited by Puneet Verma, Olusegun Samuel, Tikendra Nath Verma and Gaurav Dwivedi. Lecture Notes in Mechanical Engineering. Singapore: Springer, vol. II.

Freitas, Sara, and Helen Routledge. 2013. Designing leadership and soft skills in educational games: The e-leadership and soft skills educational games design model (ELESS). *British Journal of Educational Technology* 44: 951–68. [CrossRef]

Garcia, Ingrid. 2015. Emergent leadership: Is e-leadership importance in the quality of virtual education? *RIED* 18: 25–44. [CrossRef]

Garjoaba, Corneliu. 2011. Advantages brought on by implementing the e-management within SMEs in Romania by creating a durable development on the troubled background within the business environment. *Annals of the University of Petrosani Economics* 11: 129–38.

Hashim, Fatimah, Gazi Mahabubul Alam, and Saedah Siraj. 2006. Ensuring participatory based decision-making practice in higher education through e-management: A faculty initiative. In *Recent Advances in E-Activities, Information Security and Privacy*. Puerto de la Cruz: WSEAS Press.

Hashim, Fatimah, Gazi Mahabubul Alam, and Saedah Siraj. 2010. Information and communication technology for participatory based decision-making-E-management for administrative efficiency in higher education. *International Journal of Physical Sciences* 5: 383–92.

He, GuoZheng, and RongQiu Chen. 2007. E-Enterprise and e-Management concept and process model research. Paper presented at International Conference on Wireless Communications, Networking and Mobile Computing, Shanghai, China, September 21–23; pp. 3557–60.

Iulian, Maiorescu. 2008. Implementing e-management in small and medium enterprises. *Annals of the University of Oradea, Economic Science Series* 17: 1409–13.

Ji, Xiaoyuan, Hu Ye, Jian-Xin Zhou, and Wei-Lin Deng. 2016. Digital management technology and its application to investment casting enterprises. *China Foundry* 13: 301–9. [CrossRef]

Kulkarni, Ashok, and Valeri Pougatchev. 2011. Macroscopic view on the structure of the e-management control and evaluation system for the university of technology, Jamaica. *International Journal of Information Technology and Knowledge Management* 4: 243–52.

Lee, Nick, David Gilliland, Daniel Bello, and Talai Osmonbekov. 2011. When electronic management tools work—And don't work—In social-based distribution channels: A study of IT manufacturers and resellers. *Journal of Business Research* 64: 1017–24. [CrossRef]

Li, Weizi, Kecheng Liu, Maksim Belitski, Abby Ghobadian, and Nicholas O'Regan. 2016. E-leadership through strategic alignment: An empirical study of small- and medium- sized enterprises in the digital age. *Journal of Information Technology* 31: 185–206. [CrossRef]

Lilian, Snellman Carita. 2014. Virtual teams: Opportunities and challenges for e-leaders. *Procedia—Social and Behavioral Sciences* 110: 1251–61. [CrossRef]

Pries-Heje, Jan, and Lene Pries-Heje. 2012. Designing a framework for virtual management and team building. In *Designing Science Research in Information Systems. Advances in Theory and Practice, Paper presented at 7th International Conference, Las Vegas, NV, USA, May 14–15*. Berlin: Springer, pp. 256–70.

Radonov, Rossen Ivanov, and Valentin Hristov Videkov. 2017. Further development of the "E-management" platform for electronic management and control of the education. Paper presented at XXVI International Scientific Conference Electronics, Sozopol, Bulgaria, September 13–15; pp. 1–4.

Savolainen, Taina. 2014. Trust-building in e-leadership: A case study of leaders' challenges and skills in technology-mediated interaction. *Journal of Global Business Issues* 8: 45–56.

Seresht, Hossein Rahman, Marjan Fayyazi, and Nastaran Simar Asl. 2008. E-Management: Barriers and Challenges in Iran. Available online: https://www.iczhiku.com/resourceDetail/WnGq7VBNHb3ip9Jcujj0tA== (accessed on 2 July 2022).

Shobaki, Mazen Al, Samy Abu-Naser, Youssef Abu Amuna, and Suliman El Talla. 2018. Support extent provided by universities senior management in assisting the transition to e-management. *International Journal of Academic Management Science Research* 2: 1–26.

Timoteo, Margareth, Emanuelle Lourenço, Ana Carolina Brochado, Luciana Domenico, Joice da Silva, Bruna Oliveira, Renata Barbosa, Pietro Montemezzi, Carlos Fernando De Almeida Barros Mourao, Beni Olej, and et al. 2021. Digital management systems in academic health sciences laboratories: A scoping review. *Healthcare* 9: 739. [CrossRef]

Voce, Julie. 2015. Reviewing institutional policies for electronic management of assessment. *Higher Education* 69: 915–29. [CrossRef]

Wart, Montgomery Van, Alexandru Roman, and Sharon Pierce. 2016. The rise and effect of virtual modalities and functions on organizational leadership: Tracing conceptual boundaries along the e-management and e-leadership continuum. *Transylvanian Review of Administrative Sciences* 12: 102–22.

Wart, Montgomery Van, Alexandru Roman, and XiaoHu Wang. 2019. Operationalizing the definition of e-leadership: Identifying the elements of e-leadership. *International Review of Administrative Sciences* 85: 80–97. [CrossRef]

Wart, Montgomery Van, Alexandru Roman, XiaoHu Wang, and Cheol Liu. 2017. Integrating ICT adoption issues into (e-)leadership theory. *Telematics and Informatics* 34: 527–37. [CrossRef]

Waswas, Dima, and Mustafa Jwaifell. 2019. The role of universities' electronic management in achieving organizational excellence: Example of Al Hussein Bin Talal University. *World Journal of Education* 9: 53–66. [CrossRef]

Yao, Liu, Ahmad Bin Othman, Ahmed Aballa, and Omar Mahdi. 2011. E-management development and deployment strategy for future organization. *African Journal of Business Management* 5: 6657–67.

economies

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Stablecoin-Based Digital Trading and Investment Platforms and Their Potential in Overcoming Sanctions Restrictions

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Abstract: The current article summarizes the main properties of stablecoins and explores their potential use in digital platforms to solve problems of supporting foreign trade and investment processes in countries subjected to restrictions on a wide range of its interactions with foreign countries, companies and international markets. Empirical results show that gold-backed stablecoins, being effective at hedging assets in certain situations, provide countries with the opportunity to distance themselves from traditional financial institutions and reserve currencies in the context of external operations. Digital trading and investment platforms created on its basis do not exclude the risks inherent to the instrument. Moreover, they are exacerbated by continuing and increasing sanctions pressure on the economy integrated with such platforms. However, at the same time, these assets remain one of the most effective ways to support foreign trade and investment processes in these countries. The thesis is proven using an informalized method based on expert evaluations regarding the possibility of digital platforms overcoming trade and investment sanctions, the effects of which on the Russian economy cannot yet be accurately predicted. The study proposes two scenarios for the development of these platforms, potentially expanding the boundaries of foreign trade and investment interaction of the country subjected to sanctions with international markets.

Keywords: stablecoins; risks in business economics and finance; digital trading and investment platforms; economic sanctions; digital currencies

Citation: Travkina, Elena Vladimirovna, Alim Borisovich Fiapshev, and Marianna Tolevna Belova. 2022. Stablecoin-Based Digital Trading and Investment Platforms and Their Potential in Overcoming Sanctions Restrictions. *Economies* 10: 246. https://doi.org/10.3390/economies10100246

Academic Editor: Renata Korsakienė

Received: 12 September 2022
Accepted: 29 September 2022
Published: 9 October 2022

1. Introduction

The conditions associated with the introduction of foreign trade and financial restrictions in the relations of individual countries forces them to create digital trade and investment platforms to overcome restrictions. This allows nations to support domestic production and demand and minimize the consequences of breaking foreign trade chains. Until recently, the creation of such platforms was based solely on economic and local considerations, not provoked by political factors. At the same time, the possibilities of such platforms solving general economic problems constitute a legitimate research gap, primarily because of the relative short history of large-scale sanction policies implemented in the context of the new financial alternative, born in the depths of cryptoeconomics.

The formation of digital trading and investment platforms implies the issuance of stablecoins, pegged to either fiat currency or precious metals, for the purpose of settling foreign trade obligations. The second option of provision seems more appropriate for the purpose of reviving foreign trade and creating a parallel settlement system functioning in the decentralized financial sphere, considering that foreign trade restrictions are most often accompanied by financial sanctions.

The purpose of this paper is to analyze precious metal-backed stablecoins as a tool to overcome a wide range of sanctions restrictions. Research in this area is relevant both theoretically and practically, as it can expand the understanding of stablecoins' functionality, as well as provide new opportunities for international settlements of countries both subjected

to financial and trade sanctions and states with limited sovereignty of their national monetary systems. For companies under restrictive conditions, the inclusion of digital trading platforms created on the basis of stablecoin in operations solves the problem of, if not preservation, then maintenance at a minimum level of foreign trade contacts. Obviously, the solution to this problem can make a certain contribution to the stabilization of the macroeconomic situation, as well as, be subject to the mitigation and removal of sanctions from the strategic perspective to help bring the economy to the trajectory of sustainable development. The problem of ensuring this sustainability not only does not disappear under the conditions of sanctions, but it only becomes more acute. The provisions related to the substantiation of possible solutions to minimize the consequences of the restrictions imposed on the national economy through the creation of trade and investment platforms functioning on the basis of stablecoins, the efficiency of measures to include stablecoins in the contours of the traditional financial system in order to ensure the sustainability of the system's operations and the entire economy is the main content of the research undertaken in the framework of this work.

2. Literature Review

The ideas of justice and fairness in settlements in the interests of all their participants are associated with the search for stable instruments for their conduct. It can be said that they constitute one of the most important directions in the development of monetary theory, especially during the period of intensified interstate trade cooperation. The practical embodiment of these ideas goes back to the era of initial capital accumulation. Already at this stage, the similarity of the operations of early European deposit banks with today's supply of stablecoins is noted (Frost et al. 2020; Knot 2019). The technological and financial innovations in the latter half of the 20th century related to the expansion of the use of bank cards in settlements not least relied on the idea of value preservation (Arner et al. 2020). This and subsequent historical periods provide proof of the active response of the financial system to the interests of business development and the needs of citizens. These periods also coincide with growing dissatisfaction with the financial hegemony of developed countries, which often depend on national monetary systems to conduct cross-border payments and attack the safety of their reserves. The emergence and development of distributed ledger technology has created digital money, thereby broadening the understanding of monetary reality. This reality is now only a symbol of the challenge to systems based on fiat money, but it is already strengthening its role as an alternative to these systems. The phenomenon of stablecoin created on its foundation serves today as a means of settling foreign trade obligations and automated financial products, catalyzing and strengthening the cryptoindustry. This function provides prerequisites for the expansion of the boundaries of the analyzed phenomenon and the emergence and development of competition between different types of money, different in terms of the subjectivity of their emergence. The benefits of such competition, appearing on the basis of denationalization of money, were convincingly presented in his time by F. Hayek (1976). He argued the possibility of productive circulation of different currencies, refuting the thesis still expressed by W. Jevons that "there is nothing less suitable for competition than money" (Jevons 1875). By doing this, the author also contrasted his position with the "dogmas" of quantitative theory, a universalism whose inviolability is still questioned by many today (Friedman and Schwartz 1970).

Addressing the phenomenon of private money, many confirmations of the issue and circulation of non-public means of payment can be found in economic history. The culminating phase of a process of development of the phenomenon of private money broken in time is the denationalization of money, now accelerated by the technological factor. In this phase, as well as at the time of the pioneering concept of F. Hayek, the question of means of payment of private origin if often bought led to the denial of their monetary status. Such a discourse seems unproductive because it actually excludes an important aspect of modern monetary reality from the analysis.

This study examines the phenomenon of the decentralized issuance of stablecoins under the circumstances of government support in order to overcome trade and financial constraints external to the country. This event has hardly been studied in this perspective. As a result, this section will be limited to considering the main positions on the essence of stablecoins, as well as the peculiarities of its use and regulation.

The essence of stablecoin is quite clearly expressed in the definitions contained in the modern analysis of this phenomenon (Bullmann et al. 2019; Lipton et al. 2020; Sameeh 2018; Samman and Masanto 2019). Their advantages from other interpretations are that they emphasize the basic, conceptual elements of stablecoins, rather than the details of its implementation. This view is technologically neutral. Excluding existing forms of currency, it focuses on the ability of this instrument to mitigate the high volatility inherent to cryptocurrencies and, as a result, the potential for use in international transactions. The increase in the number and volume of the latter is associated with three circumstances: their relative speed and low-cost, the possibility of reaching the target audience with no or limited access to banking services, and the benefits for businesses and citizens of countries with unstable currencies (Bolliger 2019). These characteristics essentially describe the functional components of the instrument, highlighting the contours of the basic conditions, area of origin and nature of factors for its use for settlements and investment purposes. In terms of the ability to implement the latter in relation to stablecoins, it is important to keep in mind that they have been proven to be an elegant solution for developing the entire ecosystem of cryptocurrency trading while minimizing dependence on traditional banking services (Bolliger 2019).

Based on the wide array of stablecoins, the classification of which is mostly based on the type of collateral, the possibility of centralization, etc., it is necessary to emphasize the features of those which are tied to gold (Bolliger 2019; Dell'Erba 2019). These peculiarities have a definite influence on the investment qualities of stablecoins tied to metal. Among these characteristics of positive properties are stability, ease of understanding and perception and trust, including that provided by the low probability of cyberattacks. The flipside of these obvious advantages are no less obvious flaws: centralization and the associated dependence on the issuer, the need for frequent and independent auditing, dependence on the price dynamics of gold, the possibility of fictitious or incomplete security and potential problems with liquidity. Moreover, stablecoins, secured by sufficiently reliable and liquid collateral, can potentially serve as a digital currency-shelter in periods of cryptocurrency market crises. The phenomenon of stablecoins has been investigated in detail in this regard, which is adjacent to the aspects that the current study aims to examine (Liao and Caramichael 2022; Malloy and Lowe 2021; Wang et al. 2020). Yet with different methods of posting collateral, stablecoins are not deprived of volatility, which has been highlighted by researchers (Chohan 2019). Authors note a reduction in the probability of excess volatility if the supply of stablecoins is fully covered by fiat currency and guarantees of a third party acting as a pledge trustee (Jarno and Kołodziejczyk 2021). Collateralization of stablecoins with gold also does not guarantee the desired stability. It is dependent on fluctuations in the price of this metal. Moreover, geopolitical risks have been shown to increase the vulnerability of gold-backed stablecoins (Aloui et al. 2021).

Considering all these risks, digital platforms based on the issuance of stablecoins can be created for the purposes of settlements by business structures of countries affected by foreign trade and financial restrictions. These motives of regulatory arbitrage have been embodied in solutions for a number of years and have been investigated in sufficient detail. Simultaneously, the possibilities of combining the settlement and investment functionality of these platforms constitutes the content of the new challenge, especially in relation to the conditions and development tasks of countries under trade and financial sanctions.

The investment appeal of the proposed projects depends on the scale and potential sources of income of the issuer of stablecoins. The composition of revenue varies significantly depending on the specific token issuance scheme. Five revenue streams are usually distinguished:

- interest income, which, depending on the size of the reserve funds, can vary. Generally, issuers have an incentive to issue stablecoins for currencies that offer positive interest rates. For example, TrustToken maintains stablecoins for USD, GBP, AUD, CAD and HKD, not all of which have provided positive interest rates in the past (TrustToken 2020);
- transaction fees, which can be seen as a "last resort" (Tether) when the interest income outweighs the benefits of their introduction (Etherscan 2020);
- issuance and redemption fees. Stablecoin issuers can charge fees for their issuance (mining) and redemption (Tether 2020);
- cross-selling. Token issuers can cross-sell additional services that are based on their stablecoins. For example, some cryptocurrency exchanges are closely related to stablecoin issuers (e.g., Bitfinex and Tether). Stablecoins can serve as a means to attract and facilitate trading on their platforms;
- secondary tokens designed to increase in value as the stablecoin is used. System initiators regularly allocate a portion of these tokens to themselves to benefit from their increased value. For example, DAI has a special management token (MKR), which is also needed to close the Collateral Debt Position.

These revenue streams are generalized regardless of the type of stablecoin binding and the scale of its centralization. However, in one way or another, they can be extended to gold-backed tokens, and their utilization should be seen as an additional incentive factor in addition to the benefits provided by the DeFi sphere. In addition, it is inevitable that established stablecoin projects must take into account regulatory requirements and recommendations. This is an important aspect of the studied problem, which is covered in detail in the current analysis. Therefore, the study is limited to a review of the framework regulatory conditions accompanying the creation and functioning of stablecoin projects.

The document developed by the relevant ministers and governors of the G7 countries is the most important legal paper regarding the focus and content of national regulatory practices with respect to stablecoins (G7 Working Group on Stablecoins 2019). The document is focused on existing platforms with a significant customer base, initiating projects to create a digital currency with collateral. The content of the recommendations presented in this document is related to the possible risks of transactions with stablecoins, regardless of the scale of these operations. It is about the need to monitor threats associated with illegal actions, cyberattacks, data leakage, legal uncertainty, etc. In connection with the latter, the document contains recommendations related to the requirement for a clear legal description of the created project and the regulation of initiatives implemented in the interjurisdictional field. In addition, the G7 recommendations call not to discriminate against the created projects, so that adopted regulations remain technology-neutral and do not hinder innovation, whilst also guaranteeing the safety and reliability of the platforms created, full information to potential investors and protection of their rights. Regardless of the purpose of establishing platforms that issue and operate stablecoins, national regulators will inevitably be concerned with meeting these recommendations. This necessity is conditioned by circumstances that determine both the specifics of the DeFi sphere within which stablecoins circulate and the essence of this instrument itself, which is not dwelled on in detail due to their detailed coverage in the framework of contemporary analysis of the phenomenon of cryptoeconomics.

The justification of the possibilities of creating digital platforms, involving the issue of stablecoins in settlement and investment is advisable to be preceded by the analysis of the consolidated positions of this entire market.

3. Methodology

The analysis is based on the following methodological assumptions. Digital currencies, by facilitating the transfer of value between counterparties, are now the basis for the creation of digital platforms that transcend national borders. The scale and network effects of their activities are difficult to predict, since they depend on the motivations of the potential participants of these platforms, which can change under the influence of both

regulatory and political practices. Due to the difficulty of formalizing these factors, the study focuses on exploring the nature and causes of this motivation, providing a rationale for the possibilities of creating digital platforms based on stablecoins themselves, their functionality and the main limitations in their activities aimed at overcoming regulatory and other barriers imposed on certain jurisdictions.

The goal of the research implies the need to analyze aggregate indicators of the cryptocurrency market in terms of the functioning of the stablecoins market segment, as well as indicators characterizing the scale of ICOs, because the current study initially proceeded from the need to combine the settlement and investment functions of the created digital platforms. This analysis requires reference to sites providing extensive financial information on a country's macroeconomic and political parameters and the trends of the stablecoin market, as well as those specializing on listing existing ICOs and providing information about them. The final stage of the analysis is to highlight the case of opportunities to restore and reinvigorate international trade in commodities and financial assets with the participation of business entities that are now artificially cut off from these processes.

4. Results

As illustrated by conducted analysis, Tether continues to dominate the stablecoin market. In general, stablecoins tied to fiat reserve currencies occupy the vast majority of this market. When Tether tokens first began trading on Bitfinex in 2015, their turnover was quite small. However, as the cryptoeconomy evolved, so did Tether's stablecoin. The latter allowed bypassing traditional wire transfers by providing an alternative payment mechanism, including one between exchanges, without being exposed to the volatility of cryptocurrency prices. After the 2018 cryptocurrency crash, it was suggested that Tether was used to inflate and manipulate Bitcoin prices (Upson 2020). Moreover, it was assumed that cryptocurrency exchanges actively encouraged the use of stablecoins to increase trading volumes, as they provided an opportunity for trading venues to be less dependent on unstable banking relationships (Griffin and Shams 2019). The latter circumstance, in conjunction with the transactional potential, essentially caused the growth of this segment of the crypto market, expressed in the indicators of the supply of stablecoins, which exceeded $165 billion by the end of 2021.

At the same time, the probability of deviations of stablecoin from the USD parity can be traced in overall trends, which somewhat undermines the confidence in the already established view of their stability. The volatility of such deviations can be different and depend on many factors, including market manipulations, as the Terra USD situation has shown. Some researchers also point to the possibility of the loss of stability of this instrument, regardless of its design (Chohan 2019; Jarno and Kołodziejczyk 2021).

At the end of 2021 and the beginning of 2022, there was a revival of this segment as a whole and its part, with the emergence of gold-linked stablecoins. This is largely due to the unprecedented depreciation of the world's main reserve currency—the U.S. Dollar, which, as speculated, could be overcome in the foreseeable future. This circumstance provoked the growth of use of tokens tied to gold, which outstripped the dynamics of the entire cryptomarket. Gold outperformed bitcoin in its growth, but the market value of all gold tokens is still three orders of magnitude lower than the total market value of bitcoins. At the same time, experts note the continued weak appeal of gold tokens for investors due to the rather sluggish dynamics of the metal price and its frequent downward correction. This is the main difference between the analyzed instrument and other ones, rotating in the sphere of centralized issuance management and circulation of stablecoins—tokens pegged to fiat currencies. The universal nature of the latter, inherent to money, provides an opportunity to invest in conservative instruments offered by DeFi. Gold, despite preserving the property of "former money" and its worthy place among authoritative assets, still excludes such an opportunity.

The factor restraining investments in gold tokens is the opinion of potential users that the correction is not always quick, often taking days or even weeks. In addition, a

gold-backed stablecoin is far from always confirming its position as a stable asset. Gold, at least according to its price dynamics in the last two decades, is not a stable asset in itself. It is also volatile, and its liquidity is not high. Keeping large stocks of gold is costly. In the circumstances of stability, not to mention negative momentum of indices, this fact plays against investors.

A large portion of gold-linked tokens seek to become analogous to gold exchange-traded funds. The latter buy the physical metal, sharing ownership of it through shares. However, gold or metal stackable tokens are inferior to the mentioned instrument in terms of regulation and reliability. In addition, they encapsulate the risks of private key loss, cyberattacks, regulatory uncertainty and insufficient liquidity. Obviously, these circumstances will be deterrents in building the investment potential of the respective projects.

Reducing the potential for these disincentives is achieved by diversifying the instruments, leveraging other crypto-assets that can be raised to pay investment fees. This provides an opportunity to expand the issuer's instruments, in particular to provide loans in cryptocurrency and other reputable stablecoins, as was done in 2019 by Paxos, which launched the gold-linked stablecoin Pax Gold. This further enabled emerging startups to offer PAXG-backed loans in both fiat currencies and PAX, TrueUSD and USDC stablecoins (Stablecoins 2020).

The results of the analysis allows for identifying two main conditions contributing to the potential of investing in stablecoin:

- the ability to conduct transactions in the presence and increasing constraints on a seamless, technologically and price-optimal basis;
- support for the entire ecosystem of cryptocurrency trading, assuming and actually accompanying the circumvention of the contours of the traditional banking system (TradFi).

The second circumstance, in addition to the first one, reflecting the main functionality of the created stablecoin projects, is important for evaluating the potential of increasing the supply of this instrument in the crypto market. The factors of such growth can be the properties immanent to stablecoin, describing its functionality of servicing the turnover of other crypto-assets.

It is these features that constitute the main factor for the creation of trading and investment platforms primarily for the purposes of regulatory arbitrage. At the same time, the practice of creating such platforms to circumvent foreign trade and financial restrictions is insignificant both in terms of time and scale. Some countries whose economies and financial systems have been under restrictions for some time—North Korea, Venezuela, Iran, Belarus—have resorted to it. Yet even with this short history, it is already possible to note the fragmented filling of the deficit of goods and technologies in connection with the use of the possibilities of the DeFi sphere.

Experts say that the main constraints to the implementation of these trade and investment platforms, which operate with crypto assets, are the fear of potential participants of secondary sanctions against them, the scale of the economies of these countries and, accordingly, the extent of their involvement in the system of global economic relations. How will this potential manifest itself in an economy that is sufficiently large and diversified, with a significant number and scale of technological links with the outside world? Will the factor of scale play a decisive role here, if not in full, then in partial and significant for the implementation of the goal of sustainable economic development, to compensate the deficit of financial resources, imported goods and technologies? Obviously, formalized methods of forecasting the effects of the functioning of digital trading and investment platforms that involve the crypto economy's capabilities are limited in their capabilities, due to the weakness and insufficiency of the statistical base to clarify the aforementioned possibility. Therefore, to clarify this possibility in the new reality for the Russian economy, an expert approach will be further used based on estimates of limitations in the implementation of platform solutions and the probability of changes in the sanctions regime, which depends mainly on factors non-economic in nature.

5. Discussion

Digital trade and investment platforms based on cryptocurrencies and stablecoins partly contribute to the goal of mitigating individual foreign trade and financial restrictions imposed by sanctions on individual countries. This possibility is recognized by financial authorities of the Russian Federation. Following the adoption of the law on digital financial assets and digital currencies, which imposed rather strict restrictions on the operation of cryptocurrencies, introducing an easing of regulations in the national legislation in order to create opportunities to support foreign trade and overcome other restrictions associated with sanctions has been planned.

However, it is necessary to mention the difficulties of launching and the subsequent functioning of digital projects of trade and investment profiles in the current environment. Foreign trade and financial restrictions inevitably restrain the expansion of created projects. Overcoming them at the first stages of their development will not be facilitated by the rather narrow location of the concentration of production chains supported by the interested parties of the projects. These shortcomings may be later minimized by extending the trading functionality of the created platforms to the investment one (Lisin et al. 2021). In this case, the composition of participants is expanded by those who are interested in obtaining investment income, as well as by those entities that have a need to refinance their activities. This expansion involves the procedures of initial placement of ICO tokens secondary to stablecoins. The study identifies two scenarios for the development of digital platforms for the issuance of stablecoins.

The first one is limited to the placement of exclusively issuable stablecoins. It envisages the distribution of stablecoins among interested participants, who, in turn, will be limited only by the transactional functionality of these tokens to conduct foreign trade transactions. Acquisition of stable gold-linked coins by potential participants can be envisaged in fiat currencies and cryptocurrencies. In both cases, the value of the provided medium of payment is fixed in stablecoins, and the collateral plays its stabilizing role. This is important not only when paying for tokens with volatile, decentralized issued digital payment instruments, but also when presenting fiat money subject to inflationary pressures.

Storage of raised funds can be organized in different ways. Firstly, it can be done by the investor himself in the so-called "cold" wallet, when the private key is possessed by the investor himself. Secondly, the storage of "cold" wallets with third parties is the services of companies of the corresponding profile, providing secure storage services (custodial service). In essence, both options boil down to the phenomenon of escrow. In the first case, decentralized, and in the second, centralized (Bortnik et al. 2022). As a result, smart contracts can effectively serve as a certain form of escrow manager, since they will only execute predetermined instructions that cannot be subsequently changed. In general, regardless of the method of escrow service used, the success of a project is related to the presence or absence of that service. A similar mechanism may well be involved in commodity exchanges. Funds in escrow will be deposited in full or in part at the moment of fulfillment of obligations in terms of deliveries stipulated by foreign trade contracts. The functionality of escrow accounts in this case is limited to the service of facilitating the fulfillment of obligations of project participants. Regardless, it is reasonable to use this option for reasons of expanding the range of services provided by the digital platform.

The second scenario involves the implementation of an alternative ICO scheme. According to it, additional ICO tokens are issued by the companies involved in the implementation of the relevant project. These tokens are placed to interested investors in exchange for stablecoins. The companies-customers of the ICO, in turn, get the opportunity to refinance their activities in stablecoins. Thus, this scenario involves an additional number of investors interested in the project in terms of fixing the value of volatile crypto-assets and fiat currency and receiving more significant revenue streams distributed in favor of ICO customer companies, which can use not only stablecoins for the implementation of the transactional component of their business, but also fiat money.

This scenario does not exclude, but rather complements the platform's foreign trade functionality. It is associated with more intensive, large-scale and diverse financial flows, as well as with increased risks, the minimization or prevention of which can be ensured by hedging procedures. The second scenario, called the investment scenario with a certain degree of conditionality, provides an opportunity to attract external financing of companies—ICO customers. It also expands the regulatory framework applied to the platform's activity, not only in terms of expanding the set of instruments, but also in terms of regulation of crowdfunding operations (Kazakova et al. 2021). The diversity of income streams of the platform—commissions from ICO applicant companies, placement of stablecoins, settlements with them and other assets under trust management, ICO tokens, etc. gives a certain reserve for it in terms of establishing preferences for companies—project participants. This increases the possibility of refinancing their activities and may constitute a significant incentive for potential participants of the project. For investors entering the project, the subjects of the potential demand for ICO tokens, it is advisable to establish a commission-free regime, as it has been practiced by many similar projects. This aspect should be considered as important, given that the funds of these investors are, in fact, the main source of increasing the refinancing potential of the companies—participants of the stablecoin project.

Most of the existing digital platforms created to circumvent foreign trade and financial restrictions have trading functionality. The article proposes to supplement it with investment opportunities, which, taking into account both the features of stable provision of investment products issued on the platform and their potential profitability, should help to attract participants, both for purely investment purposes and trading. In addition, given the measure of involvement of the companies covered by the project in addressing the issues of the modern ESG agenda, this policy can act as an additional motivating factor to join the platform. A pronounced ESG orientation of the project participants' activities is important already because many experts consider the current trade and financial restrictions to be temporary. Obviously, they will be gradually mitigated and eliminated as the problems that provoked their introduction are solved. On the whole, DeFi platform solutions can encourage companies to become more actively involved in solving modern social and environmental problems and in achieving their sustainable development goals. Such targeting of DeFi solutions could guide and define the content of future research into the capabilities of emerging cryptocurrency and stablecoin-based trading and investment platforms.

When assessing the possibilities of digital platform solutions with trading and investment purposes in relation to the conditions and tasks of development of the Russian economy in the context of sanctions, the limitations of their potential results are noted. Of course, the results of these solutions will be more significant than in the countries against which sanctions were adopted earlier. This will be influenced by the scale of the economy and the geographical orientation of Russian exports. This will also be facilitated by the export specialization of the Russian economy, which is not limited exclusively to energy products, but also consists of other raw materials that are in demand from countries that have not joined the large-scale sanctions against the Russian Federation. This is the main feature that distinguishes Russian decisions in the analyzed sphere from the decisions of other countries under financial and economic restrictions. The common thing will be fragmentation in solving the problems of replenishment of the formed commodity and technological deficit. Furthermore, this limitation, which at times can be expanded by considering the competitive prices of Russian export positions and investment opportunities of platform products, will most often be supported by a set of non-economic factors and the increasing probability of sanctions for potential participants of created platforms.

6. Conclusions

The scientific novelty of the study consists in the substantiation of the possibilities of digital trading and investment platforms created on the basis of stablecoin to bypass the sanctions restrictions imposed on trade and financial transactions of certain countries.

Binding stablecoins to precious metals and avoiding the operation of reserve fiat currencies provide the necessary stability for the settlement of trade transactions and minimize the dependence on the regulatory and supervisory authorities of the countries that initiated the restrictions. This creates a trading platform for the resumption and expansion of export–import transactions. Whereas previously digital platform decisions were made primarily for the purpose of regulatory arbitrage, maximizing financial results, and these goals were essentially the only driver of the entire crypto economy, today these decisions are initiated to circumvent deliberately imposed large-scale sanctions of a trade and financial nature. These decisions, being provoked by a political factor that complements the economic grounds for the development of the cryptoindustry, are associated with a certain positive effect for the economies of the countries that have been subjected to sanctions. This is evidenced by the experience of creation and operation of platforms in a number of countries, which have been in actual economic isolation until now.

The possibility of expanding the activities of trade and investment platforms directly insignificantly correlates with the scale of the economy and the measure of its involvement in the system of international economic relations. The most significant factors that will influence the measure of participation of companies from different jurisdictions in the functioning of the digital trade and investment platform created for "anti-sanctions" purposes will be, firstly, their high interest in the commodity export positions of the country that has fallen under sanctions restrictions. Second, the functionality of the created platforms, and, thirdly, the probability of secondary sanctions to the participants of the platform interaction. Moreover, we consider the last factor to be more significant, determining the local nature and corresponding effect of the entire policy of circumventing trade and financial restrictions. The limited nature of the effect achieved does not cancel the expediency of the implementation of platform solutions based on stablecoin.

The fact that the participants of the relevant projects are given the opportunity not only to make payments in stable account units with guaranteed collateral, with no barriers to reverse conversion into national currencies and precious metal, but also to invest in derivative tokens with the use of their primary placement instrument, are considered to be the most important conditions for scaling these projects. The combination of trading and investment functions in the created digital platforms is especially crucial. This potentially expands the range of project participants, which will probably include not only subjects of international trade relations, but also investors interested in generating income from the issue of derivative tokens within the ICO, as well as participants who are short of resources to refinance their activities.

A look at the trends and scope of the expansion of the crypto economy and the sphere of decentralized finance shows a pronounced bias in sentiment and a desire to challenge the financial hegemony of individual states. Both economic and political reasons give rise to this challenge. At the same time, their current prevailing opportunistic bases are eventually transformed into strategic attitudes related to the need to achieve sustainable development goals, to strengthen the responsibility of business and to turn to the numerous social and environmental problems of modern reality on a large scale.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

References

Aloui, Chaker, Hela ben Hamida, and Larisa Yarovaya. 2021. Are Islamic gold-backed cryptocurrencies different? *Finance Research Letters* 39: 1–9. [CrossRef]

Arner, Douglas, Raphael Auer, and Jon Frost. 2020. Stablecoins: Risks, potential and regulation. Banco de España. *Financial Stability Review* 39: 95–123.

Bolliger, C. 2019. Stablecoins—Classification of Stablecoins and Their Impact on the Financial Sector. Available online: https://www.researchgate.net/publication/344279937 (accessed on 4 June 2022).
Bortnik, A., U. Baig, M. G. Abbas, Z. A. Shaikh, L. M. Baitenova, L. M. Mutaliyeva, K. Shvandar, R. H. Karlibaeva, D. I. Stepanova, and A. Lisin. 2022. Factors of demand for central bank digital currency: Evidence from Sweden and Switzerland. *Journal of Tianjin University Science and Technology* 55: 474.
Bullmann, D., J. Klemm, and A. Pinna. 2019. *In Search for Stability in Crypto-Assets: Are Stablecoins the Solution?* ECB Occasional Paper Series № 230; Frankfurt: European Central Bank.
Chohan, Usman W. 2019. Are Stable Coins Stable? Notes on the 21st Century (CBRi). Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3326823 (accessed on 4 June 2022).
Dell'Erba, M. 2019. Stablecoins in cryptoeconomics: From initial coin offerings to Central Bank Digital Currencies. *New York University Journal of Legislation & Public Policy* 22: 44.
Etherscan. 2020. Tether USD (USDT)-Contract Source Code. Available online: https://etherscan.io/address/0xdac17f958d2ee523a2206206994597c13d831ec7/$\backslash$#code/ (accessed on 4 June 2022).
Friedman, M., and A. Schwartz. 1970. *Monetary Statistics of the United States*. New York: Columbia University Press. 629p.
Frost, J., H. S. Shin, and P. Wierts. 2020. *An Early Stablecoin? The Bank of Amsterdam and the Governance of Money*. BIS Working Papers, No. 902. México: BIS.
G7 Working Group on Stablecoins. 2019. Investigating the Impact of Global Stablecoins. Available online: https://www.bis.org/cpmi/publ/d187.htm (accessed on 4 June 2022).
Griffin, John M., and Amin Shams. 2019. Is Bitcoin Really Un-Tethered? *The Journal of Finance* 75: 1913–64. [CrossRef]
Hayek, F. 1976. *The Denationalization of Money*. London: Institute of Economic Affairs.
Jarno, K., and H. Kołodziejczyk. 2021. Does the Design of Stablecoins Impact Their Volatility. *Journal of Risk and Financial Management* 14: 42. Available online: https://www.mdpi.com/journal/jrfm/ (accessed on 4 June 2022). [CrossRef]
Jevons, W. S. 1875. *Money and the Mechanism of Exchange*. London: Cosimo, Inc. 349p.
Kazakova, N. A., A. Lavrov Denis, S. V. Karpova, V. I. Avdiyskiy, S. E. Dubova, S. V. Makar, N. A. Barmenkova, and N. P. Kushchev. 2021. Greenelectricity and heat generation in Canada: Implications for Russia. *International Journal of Energy Economics and Policy* 3: 280–89.
Knot, K. 2019. Risks and benefits of modern financial technology. Presented at the RiskMinds International Seminar—Day I: The Risk Regulation Summit, Amsterdam, The Netherlands, December 2.
Liao, G. Y., and J. Caramichael. 2022. *Stablecoins: Growth Potential and Impact on Banking*. International Finance Discussion Papers (IFDP). Washington, DC: Board of Governors of the Federal Reserve System.
Lipton, A., A. Sardon, F. Schär, and C. Schüpbach. 2020. Stablecoins, Digital Currency, and the Future of Money. Works in Progress. Building the New Economy. Available online: https://wip.mitpress.mit.edu/pub/17h9tjq7/release/1 (accessed on 4 June 2022).
Lisin, A., K. Shvandar, A. Meynkhard, M. Uandykova, S. Yuksel, K. Kalmikov, O. Litvishko, and X. Tabachkova. 2021. Digital trading applications and bank performance: Evidence from Russia. *Journal of Open Innovation: Technology, Market, and Complexity* 7: 194. [CrossRef]
Malloy, M., and D. Lowe. 2021. *Global Stablecoins: Monetary Policy Implementation Considerations from the US Perspective*; FEDS Working Papers. Washington, DC: Board of Governors of the Federal Reserve System.
Sameeh, T. 2018. Your Most Comprehensive Guide to Stablecoins. Available online: https://www.cointelligence.com/content/stablecoins-guide/ (accessed on 4 June 2022).
Samman, G., and A. Masanto. 2019. The State of Stablecoins 2019: Hype vs. Reality in the Race for Stable, Global, Digital Money. Available online: ttps://static1.squarespace.com/static/564100e0e4b08c9445a5fc5d/t/5c71e43ef9619ae6c83c30af/1550967911994/The+State+of+Stablecoins+2019_Report+2_20_19.pdf (accessed on 4 June 2022).
Stablecoins. 2020. An Overview of the Current State of Stablecoins. Available online: https://download.blockdata.tech/blockdata-stablecoin-report-blockchain-technology.pdf/ (accessed on 4 June 2022).
Tether. 2020. Fees. Available online: https://tether.to/fees/ (accessed on 4 June 2022).
TrustToken. 2020. Explore All of Our Currencies. Available online: https://www.trusttoken.com/currencies (accessed on 4 June 2022).
Upson, S. 2020. Why Tether's Collapse Would Be Bad for Cryptocurrencies. Available online: https://www.wired.com/story/why-tethers-collapse-would-be-bad-forcryptocurrencies (accessed on 4 June 2022).
Wang, Gang-Jin, Xin-yu Ma, and Hao-yu Wu. 2020. Are stablecoins truly diversifiers, hedges, or safe havens against traditional cryptocurrencies as their name suggests? Preprint submitted to Research in International Business and Finance.

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Effects of Relational Benefits in the Model of Customers' Benefits and Relationship Quality in Vietnam

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Abstract: With the aim of comparing the influence of economic benefits with social benefits in the model of integrating customer benefits and relationship quality in the context of university–enterprise relationship research in Ho Chi Minh City (HCMC), Vietnam. From the perspective of enterprises, a study combining qualitative and quantitative research was carried out. Data for the main study were collected from 486 enterprises using an online survey. The research model and hypotheses are tested by analyzing the structural equation model. The results of examining the influence of economic benefits and social benefits in the research model indicate that the influence of economic benefits is more significant than the influence of social benefits. This is a new finding of this study in comparison with previous studies on relational benefits. In addition, the study also pointed out that economic benefits and social benefits have a direct impact on perceived service quality.

Keywords: customer loyalty; perceived service quality; relational benefits; relationship quality

Citation: Nguyen, Phuong T., Hieu V. Cao, Hiep M. Phuoc, and Phong T. Tran. 2022. Effects of Relational Benefits in the Model of Customers' Benefits and Relationship Quality in Vietnam. *Economies* 10: 283. https://doi.org/10.3390/economies10110283

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 13 September 2022
Accepted: 18 October 2022
Published: 11 November 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

Regarding the motivation for enterprises to enter into the relationship, Peterson (1995) and Sheth and Parvatiyar (1995) argue that economic benefits are the main driving force for developing business-to-business (B2B) relationships. More specifically, Peterson (1995) argues that saving money is the main motivation to engage in relational exchanges. However, the results of many recent studies do not seem to support these scholars' views.

Since the study of Gwinner et al. (1998), the issue of customer benefits when participating in a relationship in the service sector received particular attention from many scholars. In particular, the relational benefit approach and relationship quality by Hennig-Thurau et al. (2002) have been applied by many studies (for example, Palaima and Auruškevičienė 2007; Gremler et al. 2020). While Palaima and Auruškevičienė (2007) studied the B2B relationship in parcel delivery, Gremler et al. (2020) conducted a meta-analysis of 224 research papers on relational benefits in the last 20 years, including 42 studies on the relationship between businesses and enterprises (B2B). The results of these authors show that special treatment benefits (including economic benefits and customization benefits) have only a very small influence on the research model compared to social benefits and confidence benefits. This result contradicts the views of Peterson (1995) and Sheth and Parvatiyar (1995). This contradiction has prompted the writer to re-examine the effect of economic interests in a similar research model.

Discussing customer benefits, Gwinner et al. (1998) argue that besides the relationship benefits, "the customer's benefits when entering into the relationship can focus on services"; because customers want to receive benefits from services, they have a relationship with suppliers (Gwinner et al. 1998), the level of meeting this type of benefits is reflected in

perceived service quality (PSQ). Thus, when researching the benefits of customers, it is necessary to pay attention to both types of benefits mentioned above. Therefore, this study inherits and extends the approach of relational benefits and relationship quality of Hennig-Thurau et al. (2002) into an integrated model of customer benefits and B2B relationship quality in the context of research on service relationship between universities and enterprises in Ho Chi Minh City (HCMC), Vietnam.

HCMC is the economic, cultural, service, and educational center of Vietnam. According to the White Paper on Vietnamese enterprises 2021, HCMC has 254,699 operating enterprises, accounting for about 37% of the number of enterprises in the country. Business relationships in Ho Chi Minh City are full of characteristics of a transition economy in the context of Asian culture. Besides, this city currently has 63 higher education institutions, accounting for about 26% of the number of higher education institutions in the country. Particularly, excluding 15 public institutions in the fields of defense, security, staff training, and fine arts, the remaining 48 higher education institutions in Ho Chi Minh City have relationships with enterprises. Therefore, HCMC is a suitable choice to study the benefits of enterprises in their relationship with universities. This selection may help uncover some differences from previous relational benefits studies that were largely based on Western industrial culture, as Gwinner et al. (1998, p. 111) have shown that "It is also quite possible that the benefits received, or their importance, in the customer—service provider relationship may be very different when considered in other cultural contexts".

The relationship between higher education institutions and enterprises not only increases the ability to transfer technology, knowledge, and meet human resource demands but also helps to form and develop innovative start-ups (Carayol 2003; Gibb and Hannon 2006). There have been many studies on the university–enterprise relationship according to the educational research approach (e.g., Etzkowitz and Leydesdorff 2000; Carayol 2003; Gibb and Hannon 2006). According to the marketing approach, there has been a number of researchers mentioning the relationship between universities and students (Holdford and White 1997; Athiyaman 1997; McCollough and Gremler 1999; Hennig-Thurau et al. 2001) or research on service relationships between universities and cultural institutions (e.g., Segarra-Moliner et al. 2013). However, the level of interaction between educational research and marketing research on this topic is rather low. Many authors have supported the view that universities can be viewed as service providers (Dolinsky 1994; Kotler and Fox 1995; Licata and Frankwick 1996; Zammuto et al. 1996; Joseph and Joseph 1997; Athiyaman 1997; Hennig-Thurau et al. 2001; Segarra-Moliner et al. 2013). Services that universities provide to businesses include training courses, internships, research projects, licensing, patents, product and service development, innovation, and more (Dan 2013).

This study considers the perspective of enterprises on the university–enterprise relationship according to the benefit and relationship quality approach in relationship marketing theory to study the effects of relational benefits in the model of customers' benefits and relationship quality in Vietnam. From there, the study compares the level of influence between economic benefits and other main relational benefits in the research model to expand understanding of customer benefit dynamics in the B2B relationship in the service sector in a transition economy in Vietnam.

2. Theoretical Overview and Research Hypotheses

2.1. Relationship Marketing (RM)

The concept of relationship marketing (RM) was first introduced by Berry. Berry et al. (1983, p. 25) stated that "relationship marketing is a strategy to attract, maintain, and enhance relationships with customers of service organizations". The basic philosophy of RM is based on the assumption that supplier-buyer interaction strategies can build and preserve buyer loyalty (Berry 1995). For a relationship to exist, it must be perceived as mutually beneficial by the partners (Barnes 1994). Berry (1995) also argued that a marketing relationship benefits the customer as well as the company. Associated with the theme of RM is relationship quality (RQ).

The university–business relationship meets the conditions for effective practice of RM: (1) the enterprise has a continuous or periodic demand for the service provided by the university; (2) Enterprises can control the choice of universities (3) There are many universities providing alternative services and it is common for enterprises to switch from one university to another. In addition, Berry et al.'s (1983) definition of RM corresponds to the university's goal of successfully building relationships with businesses. Accordingly, attracting businesses is just an intermediary step, strengthening relationships, and turning indifferent businesses into loyal customers of the university is also RM. The concepts that the study is interested in such as perceived service quality (PSQ), relational benefits (RB), relationship quality (RQ) and customer loyalty (LOY) are all core concepts of the RM theory.

2.2. The Quality of the University–Enterprise Relationship

Many scholars have attempted to define RQ in order to define its dimensions and determine its premises and consequences in different contexts, resulting in several different definitions of CLMQH. Among them, Smith (1998) suggested that RQ is a higher-order structure consisting of satisfaction, trust, and commitment components. This view is supported by many researchers (e.g., Vieira et al. 2008, Walsh et al. 2010; Chu and Wang 2012; Susanta et al. 2013; Purnasari and Yuliando 2015; Gremler et al. 2020; Tajvidi et al. 2021; Nguyen et al. 2021). The author conducted qualitative research to determine the components of the quality of the university–enterprise relationship, and the results supported the view of Smith (1998). The quality of the university–enterprise relationship is also a higher-order construct including satisfaction, trust, and commitment components. In this study, the quality of the university–enterprise relationship is the intermediate variable of the research model.

2.2.1. Satisfaction (SAT)

Many researchers identify satisfaction as an important component to build RQ (e.g., Dwyer et al. 1987; Crosby et al. 1990; Morgan and Hunt 1994; Skarmeas et al. 2008). According to Oliver (1999), "satisfaction is the customer's perception of the difference between previous expectations and outcomes when receiving goods or experiencing services". Doyle (2002) suggested that "a very satisfied customer will exhibit the following characteristics: (1) loyalty, stay in the relationship longer, (2) buy more, (3) positive word of mouth, (4) pay less attention to other competing brands and other advertising and (5) the company will reduce costs compared to serving new customers". Satisfaction is an important component to build the quality of the university–enterprise relationship. Accordingly, satisfaction is the positive emotional state of enterprises when evaluating the interaction aspects are well done. Enterprise satisfaction is very important because satisfied customers will often orient long-term cooperation (Jesús and Polo-Redondo 2011), hence, customers are less likely to switch to other partners (Kotler and Gertner 2002), hope to have a long-term relationship with a supplier (Storbacka et al. 1994).

2.2.2. Trust (TRU)

In the integrated model of RB and RQ of Hennig-Thurau et al. (2002), RQ has only two components, satisfaction and commitment—in which, the trust factor is studied as confidence benefits are one of three types of RB. However, the author's qualitative research shows that trust is one of the three components of the quality of the university–enterprise relationship. Therefore, this study will not include confidence benefits in the research model.

Ganesan (1994) considered "trust to be one of the most widely tested and accepted concepts in relationship marketing". Similarly, Muafi (2015, 2016) confirmed trust as an important indicator of RQ. There are a number of different interpretations of this concept, such as Dwyer et al. (1987) suggested that "trust is when one party expects the other to fulfill their obligations and responsibilities in the relationship". Similarly, Crosby et al. (1990) argued that trust is when customers are confident that they can rely on someone they believe will serve their long-term interests. More specifically, Morgan and Hunt (1994)

suggested that trust is formed when one partner in a relationship believes that their partner is trustworthy and upright. In the university–enterprise relationship, trust expresses the confidence of enterprises when they believe that this university will meet their requirements (Anderson and Weitz 1989), enterprises will try to reduce risk by how to choose a university that is considered to have credibility and benevolence.

2.2.3. Commitment (COM)

Berry and Parasuraman (1991) argued that the commitment of two partners to the relationship is the foundation on which the relationship is built. Defining commitment, Morgan and Hunt (1994) argued that "relationship commitment as an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the commitment party believes the relationship is worth working on to ensure that it endures indefinitely". Assessing the importance of commitment in business relationships, Dwyer et al. (1987) argued that "commitment is the highest level of relationship linkage in the relationship development process model through five stages: (1) awareness; (2) discovery; (3) expansion; (4) commitment; and (5) dissolution". In the university–enterprise relationship, commitment is the long-term orientation of the enterprise toward the relationship with the university, a desire to maintain a long-term and valuable relationship. A commitment is formed when both the enterprise and the universities are willing to sacrifice short-term benefits for long-term benefits. Once committed, businesses in the relationship will not be willing to switch even if another university has superior incentives compared to the university that the enterprise has committed.

2.3. Customer Loyalty (LOY)

In the service sector, clients who have interconnection with a supplier can derive two types of benefits including benefits from the core service and benefits from the relationship itself (Gwinner et al. 1998; Hennig-Thurau et al. 2000). Indeed, considering the nature of the service transaction, because customers (enterprises) want to receive benefits from services, they connect to suppliers (universities) (Gwinner et al. 1998), the level of response of these benefits is reflected in service quality perceived (PSQ) by customers (enterprise). Besides this, close customers can also get benefits from the relationship itself, this second type of benefit is named relational benefits (RB). This study extends Hennig-Thurau et al. (2002)'s integrated model of relationship benefits and relationship quality (2002) by adding the PSQ factor to the research model.

2.4. Customers' Benefits

In the service sector, clients who have interconnection with a supplier can derive two types of benefits including benefits from the core service and benefits from the relationship itself (Hennig-Thurau et al. 2000). Indeed, considering the nature of the service transaction, because customers want to receive benefits from services, they connect to suppliers (Gwinner et al. 1998), the level of response of these benefits is reflected in the customer's perception of the service quality. Besides this, close customers can also get benefits from the relationship itself, this second type of benefit is named relational benefits (RB). Initial qualitative research by Gwinner et al. (1998) determined that "there are four types of relational benefits namely social benefits, psychological benefits, economic benefits, and customization benefits". Similar to the study of Nguyen et al. (2021), this study will focus on considering economic benefits and social benefits for businesses in the service relationship with universities.

2.5. Relational Benefits (RB)

Initial qualitative research by Gwinner et al. (1998) determined that "there are four types of relational benefits namely social benefits (SOB), psychological benefits, economic benefits (ECB), and customization benefits". Over time, more types of relationship benefits have been added such as Identity-Related Benefits (Fournier 1998), Functional Benefits

(Reynolds and Beatty 1999; Tsimonis et al. 2020), Quality Improvement Benefits (Sweeney and Webb 2002), Respect Benefits (Chang and Chen 2007), Value-Added Benefits (Li 2011; Li et al. 2012), Collaborative Benefits (Li 2011; Li et al. 2012); Hedonic Benefits (Meyer-Waarden et al. 2013), Enjoyment Benefits (Li 2011; Tsimonis et al. 2020), Self-Enhancement Benefits (Hennig-Thurau et al. 2004; Tsimonis et al. 2020), Advice Benefits (Hennig-Thurau et al. 2004; Tsimonis et al. 2020), Status Benefits (Li 2011; Tsimonis et al. 2020), Safety Benefits (Yang et al. 2017; Lee et al. 2021), Epistemic Benefits (Lee et al. 2021). However, these additional benefits do not appear frequently, so this study only focuses on analyzing the relational benefits introduced by Gwinner et al. (1998).

Although initially Gwinner et al. (1998) introduced four types of RBs, however, in the study of the relationship between businesses and individual customers (B2C), Gwinner et al. (1998) classified the four types of RBs initially into new three types including (1) Social benefits (SOB), (2) Confidence benefits, and (3) Special treatment benefits (STB), with STB including discounts, faster service, . . . (economic benefit) or special additional service. Accordingly, economic benefits are only a component of STB in the study of B2C relationships. However, Gwinner et al. (1998) noted that "future studies should explore whether similar benefits are present in the context of B2B relationships". Thus, when studying B2B relationships, it is necessary to re-examine the classification of RB because Gwinner et al. (1998) also argued that "economic benefits that customers can receive when participating in a relationship exchange is the main driver for developing relationships between businesses" (B2B relationship), as Peterson (1995) and Sheth and Parvatiyar (1995) pointed out earlier. Therefore, instead of repeatedly applying STB to B2B relationship research (e.g., Palaima and Auruškevičienė 2007; Gremler et al. 2020), the study will focus on analyzing ECB and its effects.

2.5.1. Economic Benefits (ECB)

Gwinner et al. (1998) argued that "economic benefits (ECB) include both monetary and non-monetary benefits". From the review of studies that mentioned ECB, the author has conducted qualitative research, and the results have confirmed that the components of ECB in the relationship are consistent with the theory, including cost reduction (Williamson 1988; Heide and John 1992; Kalwani and Narayandas 1995; Sheth and Parvatiyar 1995; Gwinner et al. 1998; Li et al. 2012), time savings (Gwinner et al. 1998), recover R&D costs faster (Sheth and Parvatiyar 1995), share in technology, information and market access opportunities (Wilson 1995), gain knowledge from partners (Badaracco 1991; Wilson 1995) and receive special additional services (Gwinner et al. 1998; Gremler et al. 2020). Businesses participating in qualitative research believe that ECB is very important to them, it affects their perceptions of service quality, relationship quality, and loyalty. Therefore, ECB is selected to include in the research model.

For the interrelation of ECB and perceived service quality (PSQ), Palaima and Auruškevičienė (2007) and Chen and Hu (2013) confirmed that service quality directly affects RB. However, Isen and Baron (1991) state that "feelings shape thought and thought shapes feelings". Besides this, several organizational behavior studies have demonstrated that feelings and emotions influence several important organizational behaviors (e.g., George and Brief 1996; Podsakoff and MacKenzie 1997). This suggests that benefits may have an influence on perception and raises the question of whether customers have a more positive perception of service quality when receiving relational benefits. The author's qualitative research shows that in HCMC when receiving relational benefits, businesses feel more positively about the university's service quality. Therefore, the author expects economic benefits will have a direct influence on the perception of enterprises about the university's service quality. Besides, Nguyen et al. (2021) confirmed that economic benefits have a direct influence on relationship quality (RQ) and customer loyalty (LOY). Based on the results of previous studies and the above arguments, the author proposes the following hypotheses:

Hypothesis 1 (H1). *Economic benefits have a direct positive impact on PSQ.*

Hypothesis 2 (H2). *Economic benefits have a direct positive impact on RQ.*

Hypothesis 3 (H3). *Economic benefits have a direct positive impact on LOY.*

2.5.2. Social Benefits

Gwinner et al. (1998) argued that social benefits (SOBs) are related to emotions such as personal recognition, becoming a loyal customer, and friendship between customer and service supplier. In service relationships, Liljander and Strandvik (1995) stated that "SOBs exist when the customer and the service employee know each other well, communicate easily and have mutual trust". In addition, customers can also benefit from social interactions through shopping (Darden and Dorsch 1990), since "service encounters are also social encounters, repeated contact naturally occurring between individuals" (Czepiel 1990), which helps "address the basic human need to feel important" (Jackson 1993) and the SOBs that arise from social relationships go beyond ECB (Hennig-Thurau et al. 2002). Enterprises participating in qualitative research believe that a relationship with the university can bring them some SOB such as personal recognition, being treated with respect, developing friendships, to continue to access other opportunities through the relationship and many enterprises expressed their interest in social aspects of this relationship. Enterprises think that receiving SOB is important to them, it affects their perception of service quality, relationship quality, and loyalty. Therefore, SOB was selected to be included in the research model.

With regard to the influence of SOB on perceived service quality (PSQ), many researchers believe that the social relationship between service providers and customers can be a powerful tool to enhance customers' perception of the benefits of core services (e.g., Crosby 1989; Kempeners 1995; Price and Arnould 1999). From the confirmation of these authors and the argument about the influence of economic benefits on PSQ in the above section, the author believes that SOBs have a significant effect on the perception of enterprises about the university's service quality. Besides this, Nguyen et al. (2021) confirmed that SOBs have a direct influence on relationship quality (RQ) and customer loyalty (LOY). Based on the results of previous studies and the above arguments, the author proposes the following hypotheses:

Hypothesis 4 (H4). *Social benefits have a direct positive impact on PSQ.*

Hypothesis 5 (H5). *Social benefits have a direct positive impact on RQ.*

Hypothesis 6 (H6). *Social benefits have a direct positive impact on LOY.*

2.6. Perceived Service Quality (PSQ)

Grönroos (1982) argued that the quality of a particular service is viewed as the result of the service users' perceived evaluation process when comparing their expectations with the actual service they experience, the result of that process is perceived service quality (PSQ). Similarly, Parasuraman et al. (1988) argued that PSQ is the perception of customers as a result of the comparison between their expectations and the service they actually receive. On the basis of the synthesis of definitions, it can be expressed that the service quality of the university as perceived by enterprises is the result of the evaluation process according to the perception of enterprises when comparing the actual service experience provided by the university with their expectation of benefits. The author's qualitative research shows that university service quality as perceived by businesses includes three components: technical quality (what the service is provided), functional quality (how the service is provided), and the image of the university as perceived by enterprises. This result is consistent with the PSQ model of Grönroos (1993) with three components: "technical quality", "functional quality", and "image".

Discussing the influence of perceived service quality on relationship quality, Crosby et al. (1990) argued that service quality is a condition for RQ; Rauyruen and Miller (2007) even suggested that service quality is one of the components of RQ. Similarly, many studies confirm service quality as one of the factors affecting RQ (e.g., Crosby et al. 1990; Lagace et al. 1991; Wray et al. 1994; Bejou et al. 1996; Parsons 2002; Palaima and Aruškevičienė 2007). In addition, Hennig-Thurau et al. (2001, pp. 335, 337) identified that "educational service quality, according to student perception (PSQ), has a significant positive impact on student loyalty". Similarly, Palaima and Aruškevičienė (2007) also determined that "service quality has a direct influence on customer loyalty". From the results of previous studies, the author believes that the quality of university service as perceived by enterprises affects the quality of university–enterprise relationship and the loyalty of enterprises and proposes the following hypotheses:

Hypothesis 7 (H7). *Perceived service quality has a direct positive impact on RQ.*

Hypothesis 8 (H8). *Perceived service quality has a direct positive impact on LOY.*

2.7. The Effect of University–Enterprise Relationship Quality

As mentioned, the quality of the university–enterprise relationship includes three components: satisfaction, trust, and commitment, these three components play different roles in developing the relationship (Aurier and N'Goala 2010); in which, commitment requires prior trust, and both are motivated by satisfaction (Segarra-Moliner et al. 2013). Prince et al. (2016) argue that relationship quality is an important variable to achieve customer loyalty (LOY). Similarly, many studies have identified LOY as one of the outcomes of RQ (e.g., Liu et al. 2011; McDonnell et al. 2011; Aurier and Lanauze 2011; Li et al. 2012; Yang et al. 2017; Gremler et al. 2020). Based on the results of previous studies, the author believes that the quality of the university–enterprise relationship has a direct positive influence on the loyalty of enterprises and proposes the hypothesis:

Hypothesis 9 (H9). *Relationship quality has a direct positive impact on LOY.*

3. Research Models

The following model presents hypothetical relationships (see Figure 1).

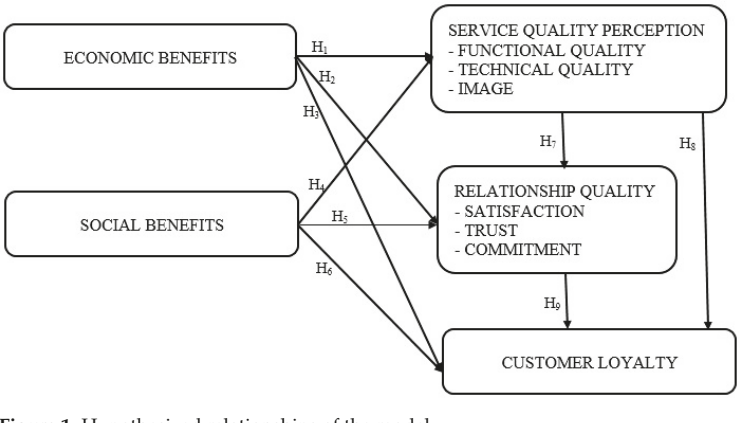

Figure 1. Hypothesized relationships of the model.

4. Research Methodology

The study uses mixed research methods, combining qualitative research methods and quantitative research methods. The study needs to synthesize and generalize relevant

theories to identify research concepts in the context of researching the university–business relationship in HCMC, forming a research model, and building a scale measure. Therefore, it is necessary to carry out some qualitative research to adjust and identify the variables of the model in order to build a theoretical framework for the problem to be studied and to build and calibrate the scales of research concepts. Quantitative research methods are used to confirm and re-check the research results of the qualitative research, identify variables and correlations between variables, and quantify the impact of variables in the research models. Quantitative research is employed on data from survey questionnaires and surveys. Main research steps:

- Preliminary research includes two studies: (1) qualitative research including in-depth interviews (n = 6) and two focus group (n = 16 and n = 15) for the purpose of model formation and building, and calibrating scales for concepts, (2) preliminary quantitative research is done through direct interview technique with sample size n = 114. Thereby, the scale is preliminarily assessed for reliability with Cronbach's Alpha.
- The main study was carried out using a quantitative method. The study has a total of 46 initial estimated parameters, the research program aims to collect over 460 questionnaires. Through the questionnaire survey, 486 valid answers were collected. The data are processed and analyzed using the software SPSS 20 and AMOS 24. The main research is used to confirm the reliability and validity of the scales and to test the research model. The scale is officially evaluated through reliability assessment Cronbach's Alpha and exploratory factor analysis (EFA) to evaluate the scale's value. The scale model is tested for validity and reliability through confirmatory factor analysis (CFA), and the theoretical model is tested through SEM linear structural modeling analysis method, tested with Bootstrap. In addition, the study also conducted a multi-group analysis

4.1. Selection of Respondents

The sample was selected according to the convenience sampling method with two control attributes: (1) Having a service relationship with at least one higher education institution, (2) The place of business is HCMC. The interviewees are leaders or managers of enterprises operating in Ho Chi Minh City who have a service relationship with the university; Each enterprise only interviewed one person.

As mentioned, by the end of 2020, Ho Chi Minh City had 254,699 operating enterprises. Data at the end of 2019 of the White Paper on the size of Vietnamese enterprises showed that only 2.6% are large enterprises and 3.4% are medium enterprises, the remaining 94% are small and micro enterprises. However, currently, there are no data on the percentage or list of enterprises in HCMC that have a relationship with the university. Due to the lack of data, the study had to collect samples in a convenient method based on the author's accessibility.

4.2. Collection of Responses and Sample Size

In the preliminary research, the author combined face-to-face interviews and mailing: The author participated in enterprise meetings at the university and asked for direct interviews. In addition, the author asked for information about businesses at these events to send letters. This method was done before the lockdown time due to COVID-19, 2020. The result was 114 valid answer sheets.

In the main survey, the author collected samples by convenience method. The author received support from organizations such as the Vietnam Chamber of Commerce and Industry—HCMC Branch (VCCI), HCMC Business Association (HUBA), and other Associations and Business Clubs in HCMC and the help of universities help send the survey in Google Form via email and social media groups of the above Organizations. The total number of subjects who are members of these groups was about 10,000 enterprises. Survey period: From April 2020 to July 2020. As a result, 486 valid answer sheets were obtained.

The sample size needs to be large enough to guarantee the necessary confidence estimation of the linear structural model (SEM) (Raykov and Widaman 1995) and needs to be considered in relation to the number of estimated parameters. (Hair et al. 2010). Bollen (1989) suggested that there should be a minimum of five observations per estimator (ratio 5:1). However, Kline (2005) suggests that this ratio should be 10:1. This study had 46 estimated parameters; so the ratio is 486: 46 > 10, reaching the threshold required by Kline (2005).

4.3. Sample Characteristic

The total number of survey questionnaires with complete responses were 486, of which 40.10% were in a relationship of 5 years or less and 59.90% had a relationship for more than 5 years. Divided by the equity of enterprises, 71% was private enterprises and 28% was state enterprises. Sorted from low to high by business's annual sales, 48% are under $1 million, 25% are between $1 and $4 million, and 27% are over $4 million.

4.4. Scale for Measuring Research Concepts

Referring to the scales of previous studies, the author carried out qualitative research to adjust the scales to suit the research context. There are five main concepts considered in the model, including (1) Perceived service quality (PSQ) (including three components: technical quality, functional quality, and image), (2) Economic benefits (ECB), (3) Social benefits (SOB), (4) Relationship quality (RQ) (including three components are satisfaction, trust, and commitment), and (5) Customer loyalty (LOY). All constructs were measured on a five-point scale, ranging from strongly disagree with statement (1) to strongly agree with statement (5). The scale is presented in Appendix A (Table A1).

5. Results

Through testing reliability by Cronbach's alpha, two observed variables SAT4 and TRU4 were excluded due to variable-total correlation coefficient < 0.30. EFA analysis results showed: With three independent variables perceived service quality (PSQ), economic benefits (ECB), and social benefits (SOB), the results show that the coefficient KMO = 0.916 > 0.5, KMO and Barlett's test in factor analysis results sig = 0.000, at eigenvalue = 1.674, the extracted variance was 62.449% (>50%) and five components are extracted. However, IMQ4 was rejected because it did not reach the discriminant value. After removing IMQ4 and re-analyzing, the results showed that KMO coefficient = 0.915 > 0.5, sig = 0.00, at eigenvalue = 1.656, extracted variance was 63.484% (>50%) extracted five components, in where the 3 components of the variable PSQ are segregated into three different groups. For the intermediate variable RQ, the results of EFA analysis showed that the coefficient KMO = 0.873 > 0.5, sig = 0.00, at eigenvalue = 1783, the extracted variance is 60.924% > 50%, and two components are extracted, in which the observed variables belonging to two groups SAT and TRU grouped into one were named SATTRU. For the dependent variable LOY, the results of EFA analysis showed that the coefficient KMO = 0.875 > 0.5, sig = 0.00, at eigenvalue = 3300 variance extracted 66.005% (>50%) extracted 1 component. Thus, the results of the EFA analysis showed that all indicators met the requirements. In the CFA analysis, after hooking e3 (SAT3)—e7 (TRU5) and removing SOB6, the critical model CFA results with 42 observed variables showed that the model was satisfactory with Chi squared = 1,106,558 with 790 degrees of freedom, p = 0.000, CMIN/df = 1.401 < 2, RMSEA = 0.029 < 0.05 and GFI = 0.903; CFI = 0.970; TLI = 0.967 > 0.9. The results of the convergence test show that all the weights of the variables were > 0.5 and were statistically significant at the 99.9% level (Anderson and Gerbing 1988). Check discriminant value, the results of correlation analysis showed that the correlation of the variables was < 1 and the difference was statistically significant.

The results of the analysis of the combined reliability coefficient and the extracted total variance showed that the combined confidence coefficient (CR) of the latent variables were

both higher than 50%, and the AVE indices were all larger than MSV. Thus, the fit indexes of the model were satisfactory.

5.1. Testing the Theoretical Model

Through testing the scales of this research model, the results were appropriate. The test results by the structural equation model showed that Chi-squared = 1,158,004 with 803 degrees of freedom; $p = 0.000$; CMIN/df = 1.442 < 2; RMSEA = 0.030 < 0.05; GFI = 0.899 was close to 0.9; the indexes CFI = 0.966 and TLI = 0.963 were both > 0.9. Therefore, it can be concluded that the model fits the market data. Figure 2 presents the abbreviated SEM results.

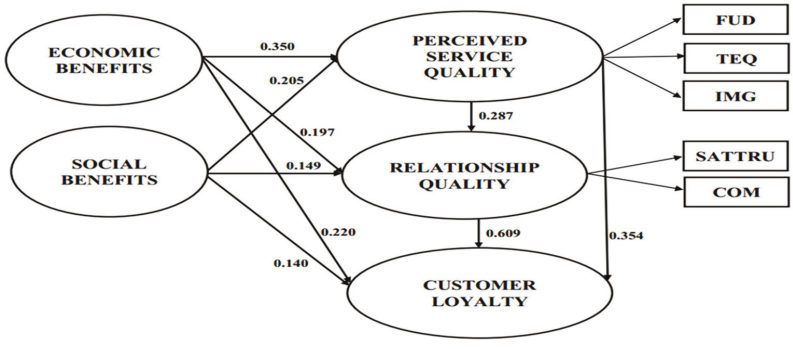

Figure 2. SEM results. Source: Official quantitative research results.

The results in Table 1 showed that the hypothetical relationships were statistically significant at the 5% level of significance.

Table 1. SEM test results.

			Estimate	S.E.	C.R.	*p*	Label
PSQ	<—	ECB	0.350	0.061	5.718	***	
PSQ	<—	SOB	0.205	0.051	4.056	***	
RQ	<—	PSQ	0.287	0.082	3.485	***	
RQ	<—	ECB	0.197	0.050	3.984	***	
RQ	<—	SOB	0.149	0.039	3.842	***	
LOY	<—	PSQ	0.354	0.131	2.706	0.007	
LOY	<—	ECB	0.220	0.073	3.006	0.003	
LOY	<—	SOB	0.140	0.058	2.425	0.015	
LOY	<—	RQ	0.609	0.219	2.778	0.005	

Source: Official quantitative research results. Notes: *** $p < 0.001$.

Thus, the estimation results in Figure 2 and Table 1 showed that the hypothesized relationships in the theoretical model had a p-level of significance varying from 0.000 to 0.05, reaching the necessary level of significance (confidence interval 95%), all 9 hypotheses were accepted

5.2. Bootstrap Estimation

Estimation results by Bootstrap in Table 2 show that most of the deviations were very small and not statistically significant. Therefore, it can be concluded that the estimates in the model can be trusted.

Table 2. Estimation results by Bootstrap with $N = 1000$.

Parameter			Estimate	SE	SE-SE	Mean	Bias	SE-Bias	CR	*p*	Conclusion
PSQ	<—	ECB	0.457	0.071	0.002	0.453	−0.004	0.003	−1.333	0.1830	STABLE
PSQ	<—	SOB	0.307	0.089	0.003	0.309	0.002	0.004	0.500	0.6173	STABLE
RQ	<—	PSQ	0.365	0.126	0.004	0.373	0.007	0.006	1.167	0.2439	STABLE
RQ	<—	ECB	0.328	0.091	0.003	0.324	−0.004	0.004	−1.000	0.3178	STABLE
RQ	<—	SOB	0.284	0.086	0.003	0.282	−0.002	0.004	−0.500	0.6173	STABLE
LOY	<—	PSQ	0.256	0.157	0.005	0.243	−0.013	0.007	−1.857	0.0639	STABLE
LOY	<—	ECB	0.209	0.087	0.003	0.202	−0.007	0.004	−1.750	0.0808	STABLE
LOY	<—	SOB	0.152	0.084	0.003	0.145	−0.007	0.004	−1.750	0.0808	STABLE
LOY	<—	RQ	0.346	0.221	0.007	0.365	0.019	0.010	1.900	0.0580	STABLE

Source: Official quantitative research results.

5.3. Multigroup Analysis

As mentioned, 94% of enterprises in Vietnam are small and micro enterprises, so the study did not select multi-group analysis by enterprise size. In addition, at present, enterprises in Vietnam operate under the market economy with business relationships that do not distinguish between state-owned and private enterprises, so the study does not choose multi-group analysis by corporate equity. Meanwhile, in Asian culture, the treatment of long-term partners is often different from the treatment of new partners. However, in the context of economic transformation in Vietnam, there may be changes to explore. In this study, the multi-group analysis method was used to compare the research model over time relationship. Relationship time is divided into two groups: (1) relationship time from 1–5 years and (2) long relationship time > 5 years. The multi-group analysis method in this study included the variable model and the partial invariant model. In the variable method, the estimated parameters in each model were not constrained, the relationship between the concepts in the model had different values between groups. In the partially invariant model, the measure component was not constrained, but the relationships between the concepts in the model were equally valid for the groups (see Table 3).

Table 3. Estimation of the variable model.

			Regression Weights: (1–5 Years)				Regression Weights: (>5 Years)			
			Estimate	S.E.	C.R.	*p*	Estimate	S.E.	C.R.	*p*
PSQ	<—	ECB	0.341	0.06	5.679	***	0.341	0.060	5.679	***
PSQ	<—	SOB	0.202	0.05	4.164	***	0.202	0.049	4.164	***
RQ	<—	PSQ	0.324	0.08	4.088	***	0.324	0.079	4.088	***
RQ	<—	ECB	0.136	0.04	3.285	0.001	0.136	0.041	3.285	0.001
RQ	<—	SOB	0.141	0.03	4.231	***	0.141	0.033	4.231	***
LOY	<—	PSQ	0.538	0.12	4.414	***	0.538	0.122	4.414	***
LOY	<—	ECB	0.254	0.06	3.985	***	0.254	0.064	3.985	***
LOY	<—	SOB	0.200	0.05	3.963	***	0.200	0.051	3.963	***
LOY	<—	RQ	0.281	0.13	2.217	0.027	0.281	0.127	2.217	0.027

Source: Official quantitative research results. Notes: *** $p < 0.001$.

Comparing the difference in model compatibility index, the Chi-square test was used to compare the two models. The results of Table 4 show that $p = 0.0860 > 0.05$, so we chose the invariant model, the model with higher degrees of freedom. The study chose the

invariant model to read the results because it has higher degrees of freedom. Conclusion: there is no difference in the impact of variables in the model between respondents with different relationship lengths.

Table 4. Different invariant model compatibility criteria.

Model	Chi-Square	df
Invariant	2118.099	1615
Mutable	2102.914	1606
Different	15.185	9.000
Conclude	0.085978086	Choose an invariant model

Source: Official quantitative research results.

Besides the direct relationships shown in Figure 2 and Table 1, the research results also showed indirect relationships as shown in Table 5.

Table 5. Direct, indirect, and total impacts.

	Impact	ECB	SOB	PSQ	RQ
PSQ	Direct	0.350	0.205		
RQ	Direct	0.197	0.149	0.287	
	Indirect	0.100	0.059		
	Total	0.297	0.208	0.287	
LOY	Direct	0.220	0.140	0.354	0.609
	Indirect	0.195	0.127	0.175	
	Total	0.415	0.267	0.529	0.609

Source: Official quantitative research results.

6. Discussing Research Results

Research results showed that the research model fits the market data, all nine proposed hypotheses are accepted. In which, economic benefits (ECB) and social benefits (SOB) have a significant direct influence on perceived service quality (PSQ), and have both direct and indirect effects on the quality of university–enterprise relationship (RQ) and loyalty of enterprises (LOY). PSQ has a significant direct influence on the RQ, and at the same time has a direct and indirect influence on LOY, and RQ has the greatest direct influence on LOY.

Regarding the degree of influence of the relational benefits on the remaining factors of the model, although previous studies on the benefits of B2B relationships have confirmed that social benefits always have a high degree of influence and significantly stronger effects than economic benefits (with economic benefits being included in benefits receiving special treatment according to the classification applied in Gwinner et al. (1998) B2C relationship studies) (e.g., Palaima and Auruškevičienė 2007; Gremler et al. 2020); this study confirms that the opposite has happened in the university–enterprise relationship in HCMC, Vietnam.

- The degree of the direct influence of the ECB on the PSQ of 0.350 is larger than the effect of the social benefits on the PSQ of 0.205.
- The degree of the direct influence of the ECB on the RQ of 0.197 is larger than the direct influence of the SOB on the RQ of 0.149.
- The degree of ECB's Indirect Effect on RQ of 0.100 is larger than SOB's Indirect Effect on RQ of 0.059.
- The degree of the total influence of the ECB on RQ of 0.297 is greater than the sum of the influence of the SOB on the RQ of 0.208.
- The degree of the direct influence of the ECB on the LOY of 0.220 is larger than the direct influence of the SOB on the LOY of 0.140.

- The degree of ECB's Indirect Effect on LOY of 0.195 is larger than that of SOB's Indirect Effect on LOY of 0.127.
- The degree of the ECB's total influence on LOY of 0.415 is significantly larger than the total effect of SOB on LOY of 0.267.

Thus, the quantitative research results have confirmed the qualitative research results that for businesses that have a "relationship" with universities in Ho Chi Minh City, Vietnam, compared to social benefits, economic benefits have a significantly stronger influence on relationship quality and customer loyalty. This result supports Peterson (1995); Sheth and Parvatiyar (1995) and Gwinner et al. (1998), these scholars both argue that "the economic benefits that customers can derive from the relationship are the main drivers for developing B2B relationships". This is a new finding in empirical research on the benefits of B2B relationships in the service sector.

Besides, the acceptance of hypotheses H1 and H4 "economic benefits and social benefits have a significant direct impact on perceived service quality" has supported the qualitative research results of the author, confirming that when enterprises receive economic and social benefits, they have a more positive perception of the university's service quality. This is also a new finding of the study. This result is consistent with the "feelings shape thought and thought shapes feelings" views of Isen and Baron (1991), as well as supporting the views of George and Brief (1996) and Podsakoff and MacKenzie (1997), who argue that feelings and emotions influence several important organizational behaviors.

In addition, the research results also showed that, besides directly affecting the quality of university–enterprise relationship (RQ) and business loyalty (LOY), perceived service quality (PSQ) is also an intermediate variable that increases the influence of economic benefits (ECB) and social benefits (SOB) on RQ and LOY. Similarly, besides having a direct effect on LOY, RQ also acts as an intermediate variable that significantly increases the influence of ECB, SOB, and PSQ on LOY.

There are two unexpected results of the study. Firstly, in theory, the components of the university–enterprise relationship quality concept include three components: satisfaction, trust, and commitment. However, in this study, the two components satisfaction (SAT) and trust (TRU) have high intrinsic unity and converge into one component SATTRU. This convergence may be due to the way it is represented in the research context. In fact, trust is very important in business relations in Vietnam, enterprises only trust universities that they are really satisfied with after experiencing previous transactions. When satisfied and confident with the university, enterprises often perceive this university as having a good reputation instead of expressing "I am satisfied and confident in this university". This represents a different perception of the concept of RQ in the context of research on B2B relationship quality in a particular service sector in HCMC, Vietnam. Secondly, the results of the multi-group analysis showed that the effects of the model did not differ over the relationship time. This result implies that for enterprises, the length of the relationship with the university does not change the interest in receiving benefits towards pragmatism; Compared with previous Asian cultural trading practices, this result could be one of the changes in an economy in transition.

7. Conclusions and Implications

With the aim of comparing the influence of economic benefits with social benefits in the model of integrating customer benefits and relationship quality in the context of university–enterprise relationship research in HCMC, Vietnam, from the perspective of enterprises, a study combining qualitative and quantitative research was carried out. The research results indicated that economic benefits and social benefits have a direct influence on the perceived service quality, relationship quality, and customer loyalty. The results of examining the influence of each of these types of relational benefits in the research model showed that the influence of economic benefits is significantly stronger than the influence of social benefits. This is a new finding of this study compared to previous studies on relational benefits. Besides that, the direct influence of economic benefits and social benefits on perceived service quality is also a new finding.

The research results mentioned above imply that universities that bring better economic benefits and social benefits to enterprises will be perceived more positively by enterprises in terms of service quality and relationship quality with enterprises will be better and businesses will be more loyal. It should be noted that "economic benefits" have a significantly stronger influence on other factors than "social benefits". Besides, the university in which service quality is better perceived by enterprises, the quality of the relationship with enterprises will be better and enterprises will be more loyal. In addition, perceived service quality is also an intermediate variable that increases the influence of economic and social benefits on relationship quality and loyalty of enterprises. The research results also imply that in order to gain the loyalty of enterprises, universities need to pay special attention to improving the quality of relationships with enterprises. Finally, the university should note that the length of the relationship does not change the interest in receiving benefits according to the pragmatic orientation of enterprises.

The study contributed to enhancing the understanding of the important role of the benefits of enterprises in the university–enterprise relationship by determining the degree of influence of these benefits on the quality of the relationship and corporate loyalty. The test results showed that the theoretical model fits the market data and the research hypotheses are accepted. This result can have practical implications for various audiences such as higher education institutions in Vietnam, service providers, enterprises using university services, and academic researcher in the field of relationship marketing.

8. Limitations and Future Research

This study has several limitations. First, the study only examines the effects of ECB and SOB on PSQ, RQ, and LOY in the context of a B2B relationship in a new service sector; Although this study confirmed the importance of concepts related to theoretical modeling, there may be other statistically significant relational benefits that need to be explored. Besides, this study was only conducted in HCMC, the generalizability of the research results would be higher if it was repeated with the sample structure including enterprises in other big cities of Vietnam. In addition, although the results showed that the model has a high fit; however, the generalizability of the research model will be higher if it is repeated in the study of B2B relationships in another service sector or another industry. Finally, this study was conducted from the perspective of enterprises, in order to better understand the relationship between universities and enterprises, more research may be needed to approach this issue from the perspective of universities.

Future studies may consider extending and testing this model with other relational benefits. Besides, further studies can repeat the model with a sample structure including enterprises in other big cities of Vietnam or repeat this research model in other service sectors or other industries. In addition, future studies can approach the issue of customer benefits and relationship quality from the perspective of the university.

Author Contributions: Conceptualization, P.T.N., H.M.P. and H.V.C.; methodology, P.T.N., H.M.P. and H.V.C.; software, P.T.T.; validation, P.T.N., H.M.P. and H.V.C.; formal analysis, P.T.N. and P.T.T.; investigation, P.T.N. and P.T.T.; resources, H.V.C.; data curation, P.T.T.; writing—original draft preparation, P.T.N.; writing—review and editing, P.T.N.; visualization, P.T.T.; supervision, H.M.P.; project administration, H.V.C. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by Grant No. 2022.01.28 from Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflict of interest.

List of Abbreviations

Acronyms	Acronym Meaning
COM	Commitment
ECB	Economic Benefits
FUQ	Functional Quality
IMQ	Image
LOY	Customer Loyalty
PSQ	Perceived Service Quality
RB	Relational Benefits
RM	Relationship Marketing
RQ	Relationships Quality
SAT	Satisfaction
SOB	Social Benefits
TEQ	Technical Quality
TRU	Trust

Appendix A

Table A1. Scale of Research Concepts.

Code	Dimension	Questionnaire Statement	Source
ECB1	Economic Benefits	"XYZ university offers a discounted price/service fee for my company thanks to its relationship with XYZ university".	Nguyen et al. (2021) adapted from Williamson (1988); Heide and John (1992); Kalwani and Narayandas (1995); Sheth and Parvatiyar (1995); Gwinner et al. (1998); and Li et al. (2012).
ECB2	Economic Benefits	"My company saves time in searching for other service providers thanks to its relationship with XYZ university".	Nguyen et al. (2021) adapted from Gwinner et al. (1998).
ECB3	Economic Benefits	"Thanks to the relationship with XYZ university, my company is able to recover R & D costs faster than without the relationship".	Nguyen et al. (2021) adapted from Sheth and Parvatiyar (1995).
ECB4	Economic Benefits	"XYZ university is willing to share technology, information and market access opportunities with my company thanks to its relationship with XYZ university".	Nguyen et al. (2021) adapted from Wilson (1995).
ECB5	Economic Benefits	"Thanks to the relationship, my Company can get useful knowledge updates from XYZ university".	Nguyen et al. (2021) adapted from Badaracco (1991); and Wilson (1995).
ECB6	Economic Benefits	"Thanks to the relationship, my Company can receive special additional services of XYZ university"	Nguyen et al. (2021) adapted from Gwinner et al. (1998); and Gremler et al. (2020).
SOB1	Social Benefits	"Leader of my company is invited to attend and honor in XYZ university events".	Nguyen et al. (2021) adapted from Gwinner et al. (1998); and Hennig-Thurau et al. (2002).
SOB2	Social Benefits	"Leader of my company like certain social aspects of the relationship with XYZ university (enjoy participating in the educational environment, showing corporate social responsibility, …)"	
SOB3	Social Benefits	"Leader of my company have developed a friendship with XYZ university's representatives".	
SOB4	Social Benefits	"Leaders and representatives of XYZ university know the name of the leaders of my company".	
SOB5	Social Benefits	"Through the relationship with XYZ university, my company is able to access other business opportunities".	
SOB6	Social Benefits	"The relationship with XYZ university helps to increase my company's brand awareness".	

Table A1. *Cont.*

Code	Dimension	Questionnaire Statement	Source
TEQ1	Technical quality	The capacity of XYZ university graduates meets the requirements of my company.	Phuong et al. (2022) adapted from Grönroos (1993, 2000).
TEQ2	Technical quality	XYZ university's training courses exclusively developed for my company help the company improve the quality of human resources.	
TEQ3	Technical quality	The applied/technological studies transferred by XYZ university are useful to my company.	
TEQ4	Technical quality	XYZ university has a strong and secure information technology system, which helps to quickly and smoothly fulfill my company's orders.	
TEQ5	Technical quality	XYZ university applies technological advancements to provide useful technical solutions for my company.	
FUQ1	Functional quality	XYZ university shows an interest in my company's interests.	Phuong et al. (2022) adapted from Sharma and Patterson (1999); Palaima and Auruškevičienė (2007); and Auruškevičienė et al. (2010).
FUQ2	Functional quality	XYZ university leaders cherish the relationship with my company.	
FUQ3	Functional quality	XYZ university is very accessible when my company needs to provide services.	
FUQ4	Functional quality	When providing services, XYZ university seeks to communicate with my company's employees	
FUQ5	Functional quality	XYZ university's representatives respond promptly to my company's requests / questions.	
FUQ6	Functional quality	I highly appreciate the hospitality of XYZ university's representatives and staff.	
IMQ1	Image	XYZ university has a good reputation.	Phuong et al. (2022) adapted from Grönroos (1993, 2000).
IMQ2	Image	XYZ university is sincere with my company	
IMQ3	Image	I have a good experience using XYZ university's services.	
IMQ4	Image	XYZ university has great contributions to the society	
SAT1	Satisfaction	"We are satisfied with the services provided by XYZ university".	Nguyen et al. (2021) adapted from Crosby et al. (1990); Ling and Ding (2006); and Liu et al. (2011)
SAT2	Satisfaction	"We are completely satisfied with the processes and procedures that XYZ university has done with us".	
SAT3	Satisfaction	"The communications between my company and the representative of XYZ university always make us feel satisfied".	
SAT4	Satisfaction	"Overall, I think XYZ university is a good service provider".	
TRU1	Trust	"The staff of XYZ university follow what XYZ university promises to my company".	Nguyen et al. (2021) adapted from Crosby et al. (1990); Morgan and Hunt (1994); Ulaga and Eggert (2004); Wong and Sohal (2006); and Auruškevičienė et al. (2010)
TRU2	Trust	"I believe that XYZ university considers the best benefit of my company".	
TRU3	Trust	"I feel that I can always trust XYZ university".	
TRU4	Trust	"I believe XYZ university will do everything correctly".	
TRU5	Trust	"XYZ university's staff are honest".	

Table A1. *Cont.*

Code	Dimension	Questionnaire Statement	Source
COM1	Commitment	"The relationship with XYZ university is very important to our operations".	Nguyen et al. (2021) adapted from Morgan and Hunt (1994); Hennig-Thurau et al. (2002); Wong and Sohal (2006); Ulaga and Eggert (2004); and Auruškevičienė et al. (2010)
COM2	Commitment	"The relationship with XYZ university is worthy of my company's highest effort to maintain".	
COM3	Commitment	"We will maintain the current relationship with XYZ university for an infinite time".	
COM4	Commitment	"Our relationship with XYZ university is like a family".	
LOY1	Customer Loyalty	"My company hopes to expand the scope of cooperation with XYZ university".	Nguyen et al. (2021) adapted from Sharma and Patterson (1999); and Palaima and Auruškevičienė (2007).
LOY2	Customer Loyalty	"My company intends to develop more projects with XYZ university".	
LOY3	Customer Loyalty	"Most likely in the nearest future, we will choose another partner university". (reversed)	
LOY4	Customer Loyalty	"I would recommend XYZ university to other companies".	
LOY5	Customer Loyalty	"If someone tells me that the quality of XYZ university's provided service is poor, I will try to prove that it is not true".	

All constructs are measured on a five-point scale, ranging from strongly disagree with statement (1) to strongly agree with statement (5).

References

Anderson, Erin, and Barton Weitz. 1989. Determinants of Continuity in Conventional Industrial Channel Dyads. *Marketing Science* 8: 310–23. [CrossRef]

Anderson, James C., and David W. Gerbing. 1988. Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin* 103: 411. [CrossRef]

Athiyaman, Adee. 1997. Linking student satisfaction and service quality perceptions: The case of university education. *European Journal of Marketing* 7: 528–40. [CrossRef]

Aurier, Philippe, and Gilles N'Goala. 2010. The differing & mediating roles of trust and relationship commitment in service relationship maintenance and development. *Journal of the Academy of Marketing Science* 38: 303–25.

Aurier, Philippe, and Gilles Séré de Lanauze. 2011. Impacts of in-store manufacturer brand expression on perceived value, relationship quality and attitudinal loyalty. *International Journal of Retail & Distribution Management* 39: 810–35.

Auruškevičienė, Vilte, Laura Salciuviene, and Vida Skudiene. 2010. The relationship quality effect on customer loyalty. *Pecvnia: Revista de la Facultad de Ciencias Económicas y Empresariales, Universidad de León* 10: 23–36. [CrossRef]

Badaracco, Joseph L. 1991. *The Knowledge Link: How Firms Compete through Strategic Alliances*. Boston: Harvard Business Press.

Barnes, James G. 1994. Close to the customer: But is it really a relationship? *Journal of Marketing Management* 10: 561–70. [CrossRef]

Bejou, David, Barry Wray, and Thomas N. Ingram. 1996. Determinants of relationship quality: An artificial neural network analysis. *Journal of Business Research* 36: 137–43. [CrossRef]

Berry, Leonard L. 1995. Relationship Marketing of Services—Growing Interest, Emerging Perspectives. *Journal of the Academy of Marketing Science* 23: 236–45. [CrossRef]

Berry, Leonard L., and Arun Parasuraman. 1991. *Marketing Services*. New York: The Free Press.

Berry, Leonard L., G. Lynn Shostack, and Gregory D. Upah. 1983. Relationship marketing in emerging perspectives on services marketing. *American Marketing Association, Chicago* 23: 25–28.

Bollen, Kenneth A. 1989. *Structural Equations with Latent Variables*. New York: Wiley.

Carayol, Nicolas. 2003. Objectives, Agreements and Matching in Science–Industry Collaborations: Reassembling the Pieces of the Puzzle. *Research Policy* 32: 887–908. [CrossRef]

Chang, Yu-Hern, and Fang-Yuan Chen. 2007. Relational benefits, switching barriers, and loyalty: A study of airline customers in Taiwan. *Journal of Air Transport Management* 13: 104–9. [CrossRef]

Chen, Po-Tsang, and Hsin-Hui 'Sunny Hu. 2013. The mediating role of relational benefit between service quality and customer loyalty in airline industry. *Total Quality Management and Business Excellence* 24: 1084–95. [CrossRef]

Chu, Zhaofang, and Qiang Wang. 2012. Drivers of relationship quality in logistics outsourcing in China. *Journal of Supply Chain Management* 48: 78–96. [CrossRef]

Crosby, Lawrence A. 1989. Building and Maintaining Quality in the Service Relationship. In *Quality Services*. Edited by Stephen Brown and Evert Gümmesson. Lexington: Lexington Books.

Crosby, Lawrence A., Kenneth R. Evans, and Deborah Cowles. 1990. Relationship quality in services selling: An interpersonal influence perspective. *Journal of Marketing* 54: 68–81. [CrossRef]
Czepiel, John A. 1990. Managing Relationships with Customers: A Differentiating Philosophy of Marketing. In *Service Management Effectiveness*. Edited by David E. Bowen and Richard B. Chase. San Francisco: Jossey-Bass, pp. 299–323.
Dan, Mihaela Cornelia. 2013. Why Should University and Business Cooperate? A Discussion of Advantages and Disadvantages. *International Journal of Economic Practices and Theories* 3: 67–74.
Darden, William R., and Michael J. Dorsch. 1990. An action strategy approach to examining shopping behavior. *Journal of Business Research* 21: 289–308. [CrossRef]
Dolinsky, Arthur L. 1994. A Consumer Complaint Framework with Resulting Strategies: An Application to Higher Education. *Journal of Services Marketing* 8: 27–39. [CrossRef]
Doyle, Peter. 2002. *Marketing Management and Strategy*, 3rd ed. London: Prentice Hall International.
Dwyer, F. Robert, Paul H. Schurr, and Sejo Oh. 1987. Developing Buyer-seller relationship. *Journal of Marketing* 51: 11–27. [CrossRef]
Etzkowitz, Henry, and Loet Leydesdorff. 2000. The dynamics of innovation: From national system & mode 2 to a triple helix of university-industry-government relations. *Research Policy* 29: 109–23.
Fournier, Susan. 1998. Consumers and their brands: Developing relationship theory in consumer research. *Journal of Consumer Research* 24: 343–73. [CrossRef]
Ganesan, Shankar. 1994. Determinants of long-term orientation in buyer-seller relationships. *Journal of Marketing* 58: 1–19. [CrossRef]
George, Jennifer M., and Arthur P. Brief. 1996. Motivational agendas in the workplace: The effects of feelings on focus of attention and work motivation. *Research in Organizational Behavior* 18: 75–109.
Gibb, Allan, and Paul Hannon. 2006. Towards the Entrepreneurial University. *International Journal of Entrepreneurship Education* 4: 73–110.
Gremler, Dwayne D., Yves Van Vaerenbergh, Elisabeth C. Brüggen, and Kevin P. Gwinner. 2020. Understanding and managing customer relational benefits in services: A meta-analysis. *Journal of the Academy of Marketing Science* 48: 565–83. [CrossRef]
Grönroos, Christian. 1982. *Strategic Management and Marketing in Service Sector*. Cambridge, MA: Marketing Science Institute.
Grönroos, Christian. 1993. Toward a third phase in service quality research: Challenges and future direction. In *Advances in Service Marketing and Management*, 2nd ed. Edited by Teresa A. Swartz, David E. Bowen and Stephen W. Brown. Greenwich: JAI Press.
Grönroos, Christian. 2000. *Service Management and Marketing—A Customer Relationship Management Approach*. Chichester: Wiley.
Gwinner, Kevin P., Dwayne D. Gremler, and Mary Jo Bitner. 1998. Relational Benefits in Services Industries: The Customer's Perspective. *Journal of the Academy of Marketing Science* 26: 101–14. [CrossRef]
Hair, Joseph F., William Cormack Black, Barry J. Babin, and Rolph E. Anderson. 2010. *Multivariate Data Analysis*, 7th ed. Hoboken: Prentice Hall.
Heide, Jan B., and George John. 1992. Do norms matter in marketing relationships? *Journal of Marketing* 56: 32–44. [CrossRef]
Hennig-Thurau, Thorsten, Kevin P. Gwinner, and Dwayne D. Gremler. 2000. Why customers build relationships with companies—And why not. In *Relationship Marketing: Competitive Advantage through Customer Satisfaction and Customer Retention*. Edited by Thorsten Hennig-Thurau and Ursula Hansen. Berlin: Springer, pp. 369–91.
Hennig-Thurau, Thorsten, Kevin P. Gwinner, and Dwayne D. Gremler. 2002. Understanding relationship marketing outcomes: An integration of relational benefits and relationship quality. *Journal of Service Research* 4: 230–47. [CrossRef]
Hennig-Thurau, Thorsten, Kevin P. Gwinner, Gianfranco Walsh, and Dwayne D. Gremler. 2004. Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the internet? *Journal of Interactive Marketing* 18: 38–52. [CrossRef]
Hennig-Thurau, Thorsten, Markus F. Langer, and Ursula Hansen. 2001. Modeling and Managing Student Loyalty—An Approach Based on the Concept of Relationship Quality. *Journal of Service Research* 3: 331–44. [CrossRef]
Holdford, David, and Sandra White. 1997. Testing commitment-trust theory in relationships between pharmacy schools and students. *American Journal of Pharmaceutical Education* 61: 249–56.
Isen, Alice M., and Robert A. Baron. 1991. Positive affect as a factor in organizational behavior. *Research in Organizational Behavior* 13: 1–53.
Jackson, Don. 1993. The seven deadly sins of financial services marketing and the road to redemption. *Direct Marketing (March)* 55: 43.
Jesús, J. Cambra-Fierro, and Yolanda Polo-Redondo. 2011. Post-satisfaction factors affecting the long- term orientation of supply relationships. *Journal of Business and Industrial Marketing* 26: 395–406.
Joseph, Mathew, and Beatriz Joseph. 1997. Service quality in education: A student perspective. *Quality Assurance in Education* 5: 15–21. [CrossRef]
Kalwani, Manohar U., and Narakesari Narayandas. 1995. Long-term manufacturer-supplier relationships: Do they pay off for supplier firms? *Journal of Marketing* 59: 1–16. [CrossRef]
Kempeners, Marion A. 1995. Relationship Quality in Business-to-Business Relationships. *IMP Conference* 3: 1629–39.
Kline, Rex B. 2005. *Principles and Practice of Structural Equation Modelling*. New York: The Guilford Press.
Kotler, Philip, and David Gertner. 2002. Country as brand, product, and beyond: A place marketing and brand management perspective. *Journal of Brand Management* 9: 249–61. [CrossRef]
Kotler, Philip, and Karen F. A. Fox. 1995. *Strategic Marketing for Educational Institutions*, 2nd ed. Englewood Cliffs: Prentice-Hall.

Lagace, Rosemary R., Robert Dahlstrom, and Jule B. Gassenheimer. 1991. The relevance of ethical salesperson behavior on relationship quality: The pharmaceutical industry. *Journal of Personal Selling and Sales Management* 11: 39–47.
Lee, Kwang-Hoon, Chen-Qi OU, and Choong-Ik Choi. 2021. Relational benefits, alternative attractiveness and customer loyalty—Implication for service distribution channels. *Journal of Distribution Science* 19: 5–15.
Li, Ling. 2011. Assessing the relational benefits of logistics services perceived by manufacturers in supply chain. *International Journal of Production Economics* 132: 58–67. [CrossRef]
Li, Ling, John. B. Ford, Xin Zhai, and Li Xu. 2012. Relational benefits and manufacturer satisfaction: An empirical study of logistics service in supply chain. *International Journal of Production Research* 50: 5445–59. [CrossRef]
Licata, Jane, and Gary L. Frankwick. 1996. University marketing: A professional service organization perspective. *Journal of Marketing for Higher Education* 7: 1–16. [CrossRef]
Liljander, Veronica, and Tore Strandvik. 1995. The relation between service quality, satisfaction and intentions. In *Managing Service Quality, Paul Chapman*. Edited by Paul Kunst and Jos Lemmink. Vught: Swedish School of Economics and Business Administration, pp. 45–63.
Ling, Chieh-Peng, and Cherng G. Ding. 2006. Evaluating group difference in gender during the formation of relationship quality and loyalty in ISP service. *Journal of Organizational and End User Computing* 18: 38–62. [CrossRef]
Liu, Chung-Tzer, Yi Maggie Guo, and Chia-Hui Lee. 2011. The effects of relationship quality and switching barriers on customer loyalty. *International Journal of Information Management* 31: 71–79. [CrossRef]
McCollough, Michael A., and Dwayne D. Gremler. 1999. Guaranteeing student satisfaction: An exercise in treating students as customers. *Journal of Marketing Education* 21: 118–30. [CrossRef]
McDonnell, John, Amanda Beatson, and Chih-Hsuan Huang. 2011. Investigating relationships between relationship quality, customer loyalty and cooperation. *Asia Pacific Journal of Marketing and Logistics* 23: 367–85. [CrossRef]
Meyer-Waarden, Lars, Christophe Benavent, and Herbert Castéran. 2013. The effects of purchase orientations on perceived loyalty programmers' benefits and loyalty. *International Journal of Retail and Distribution Management* 41: 201–25. [CrossRef]
Morgan, Robert M., and Shelby D. Hunt. 1994. The commitment-trust theory of relationship marketing. *Journal of Marketing* 58: 20–38. [CrossRef]
Muafi, Muafi. 2015. Green IT Empowerment, Social Capital, Creativity and Innovation: A Case Study of Creative City, Bantul, Yogyakarta, Indonesia. *Journal of Industrial Engineering and Management* 8: 719–37. [CrossRef]
Muafi, Muafi. 2016. Analyzing Fit in CSR Strategy Research in State-Owned Enterprises: Indonesia Context. *Journal of Industrial Engineering and Management* 9: 179–206. [CrossRef]
Oliver, Richard L. 1999. Whence consumer loyalty. *Journal of Marketing* 63: 33–44. [CrossRef]
Palaima, Tomas, and Viltė Auruškevičienė. 2007. Modeling relationship quality in the parcel delivery services market. *Baltic Journal of Management* 2: 37–54. [CrossRef]
Parasuraman, Arun, Valarie Zeithaml, and Leonard Berry. 1988. SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing* 64: 12–40.
Parsons, Amy L. 2002. What Determines Buyer-Seller Relationship Quality? An Investigation from the Buyer's Perspective. *The Journal of Supply Chain Management* 38: 4–12. [CrossRef]
Peterson, Robert A. 1995. Relationship marketing and the consumer. *Journal of the Academy of Marketing Science* 23: 278–81. [CrossRef]
Nguyen, Phuong Thanh, Hieu Viet Cao, Hiep Minh, and Tran Thanh Phong. 2021. Effects of Relational Benefits on Relationship Quality and Customer Loyalty: A Study of the University-Business Relationship in HCMC-VN. *Proceeding of The International Conference on Management and Business* 12: 481–500.
Phuong, T. Nguyen, Hieu V. Cao, Hiep M. Phuoc, and Phong T. Tran. 2022. The Mediating Role of Relationship Quality in The Linkage Between Perceived Quality and Customer Loyalty. *The International Journal of Business and Management* 10: 70–78.
Podsakoff, Philip M., and Scott B. MacKenzie. 1997. Impact of organizational citizenship behavior on organizational performance: A review and suggestions for future research. *Human Performance* 10: 133–52. [CrossRef]
Price, Linda L., and Eric J. Arnould. 1999. Commercial Friendships: Service Provider-Client Relationships in Context. *Journal of Marketing* 63: 38–56.
Prince, Melvin, Dayananda Palihawadana, Mark A. P. Davies, and Robert D. Winsor. 2016. An Integrative Framework of Buyer–Supplier Negative Relationship Quality and Dysfunctional Interfirm Conflict. *Journal of Business-to-Business Marketing* 23: 221–34. [CrossRef]
Purnasari, Hasti, and Henry Yuliando. 2015. How Relationship Quality on Customer Commitment Influences Positive e-WOM. Paper presented at 2014 International Conference on Agro-industry (ICoA): Competitive and sustainable Agroindustry for Human Welfare. Agriculture & Agricultural Science Procedia, Yogyakarta, Indonesia, November 24–25; vol. 3, pp. 149–53.
Rauyruen, Papassapa, and Kenneth E. Miller. 2007. Relationship Quality as a Predictor of B2B Customer loyalty. *Journal of Business Research* 60: 21–31. [CrossRef]
Raykov, Tenko, and Keith F. Widaman. 1995. Issues in applied structural equation modeling research. *Structural Equation Modeling: A Multidisciplinary Journal* 2: 289–318. [CrossRef]
Reynolds, Kristy E., and Sharon E. Beatty. 1999. Customer benefits and company consequences of customer-salesperson relationships in retailing. *Journal of Retailing* 75: 11–32. [CrossRef]

Segarra-Moliner, Jose-Ramon, Miguel-Angel Moliner-Tena, and Javier Sánchez-Garcia. 2013. Relationship quality in business to business: A cross-cultural perspective from universities. *Marketing Intelligence and Planning* 31: 196–215. [CrossRef]
Sharma, Neeru, and Paul G. Patterson. 1999. The impact of communication effectiveness and service quality on relationship commitment in consumer, professional services. *Journal of Service Marketing* 13: 151–70. [CrossRef]
Sheth, Jagdish N., and Atul Parvatiyar. 1995. The evolution of relationship marketing. *International Business Review* 4: 397–418. [CrossRef]
Skarmeas, Dionysis, Constantine S. Katsikeas, Stavroula Spyropoulou, and Esmail Salehi-Sangari. 2008. Market and Supplier Characteristics Driving Distributor Relationship Quality in International Marketing Channels of Industrial Products. *Industrial Marketing Management* 37: 23–36. [CrossRef]
Smith, J. Brock. 1998. Buyer–seller relationships: Similarity, relationship management, and quality. *Psychology and Marketing* 15: 3–21. [CrossRef]
Storbacka, Kaj, Tore Strandvik, and Christian Grönroos. 1994. Managing customer relationships for profit: The dynamics of relationship quality. *International Journal of Service Industry Management* 5: 21–38. [CrossRef]
Susanta, Taher Alhabsji, M. S. Idrus, and Umar Nimran. 2013. The Effect of Relationship Quality on Customer Advocacy: The Mediating Role of Loyalty. *IOSR Journal of Business and Management (IOSR-JBM)* 10: 41–52. [CrossRef]
Sweeney, Jillian C., and Dave Webb. 2002. 'Relationship benefits: An exploration of buyer-supplier dyads. *Journal of Relationship Marketing* 1: 77–92. [CrossRef]
Tajvidi, Mina, Yichuan Wang, Nick Hajli, and Peter ED Love. 2021. Brand value Co-creation in social commerce: The role of interactivity, social support, and relationship quality. *Computers in Human Behavior* 115: 105238. [CrossRef]
Tsimonis, Georgios, Sergios Dimitriadis, and Suha Omar. 2020. An integrative typology of relational benefits and costs in social media brand pages. *International Journal of Market Research* 62: 216–33. [CrossRef]
Ulaga, Wolfgang, and Andreas Eggert. 2004. Relationship value and relationship quality: Broadening the nomological network of business-to-business relationships. *European Journal of Marketing* 40: 311–27. [CrossRef]
Vieira, Armando Luís, Heidi Winklhofer, and Christine T. Ennew. 2008. Relationship Quality: A Literature Review and Research Agenda. *Journal of Customer Behavior* 7: 269–91. [CrossRef]
Walsh, Gianfranco, Thorsten Hennig-Thurau, Kai Sassenberg, and Daniel Bornemann. 2010. Does relationship quality matter in e-services? A comparison of online and offline retailing. *Journal of Retailing and Consumer Services* 17: 130–42. [CrossRef]
Williamson, Oliver E. 1988. Technology and transaction cost economics: A reply. *Journal of Economic Behavior and Organization* 10: 355–63. [CrossRef]
Wilson, David T. 1995. An Integrated Model of Buyer–Seller Relationships. *Journal of the Academy of Marketing Science* 23: 335–45. [CrossRef]
Wong, Amy, and Amrik S. Sohal. 2006. Understanding the quality of relationships in consumer services. *International Journal of Quality and Reliability Management* 23: 244–64. [CrossRef]
Wray, Barry, Adrian Palmer, and David Bejou. 1994. Using Neural Network Analysis to Evaluate Buyer-Seller Relationships. *European Journal of Marketing* 28: 32–48. [CrossRef]
Yang, Shuai, Yiping Song, Sixing Chen, and Xin Xia. 2017. Why are customers loyal in sharing-economy services relational benefits perspective. *Journal of Services Marketing* 31: 48–62. [CrossRef]
Zammuto, Raymond F., Susan M. Keaveney, and Edward J. O'Connor. 1996. Rethinking student services: Assessing and improving service quality. *Journal of Marketing for Higher Education* 7: 45–70. [CrossRef]

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Digital Entrepreneurship and Sustainability: The State of the Art and Research Agenda

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Abstract: Digital technologies have changed and disrupted the dynamics of the economy and society as a whole, offering new opportunities for entrepreneurs with potential impact on economic, environmental, and social value creation. This paper examines the scientific research on digital entrepreneurship (DE) and sustainability based on data from Scopus database. The main purpose is to identify both the predominant themes and further research opportunities to this topic. This study uses a bibliometric analysis, analyzing and synthesizing research on DE and sustainability, based on a total of 58 publications. Co-word analysis used to identify the conceptual structure reveals three thematic clusters: (1) innovation and entrepreneurship, (2) digital transformation: strategy and business models, and (3) sustainability and sustainable development goals. For each thematic cluster, the most significant contributions are presented. Further, this paper offers a future research agenda and holds significant implications for the theory and practice of the different subtopics of DE and sustainability.

Keywords: digital entrepreneurship; sustainability; bibliometric analysis; Scopus

Citation: Fernandes, Catarina, Rui Pires, and Maria-Ceu Gaspar Alves. 2023. Digital Entrepreneurship and Sustainability: The State of the Art and Research Agenda. *Economies* 11: 3. https://doi.org/10.3390/economies11010003

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 15 November 2022
Revised: 8 December 2022
Accepted: 16 December 2022
Published: 20 December 2022

1. Introduction

The growth of the digital economy owes its existence largely to the entrepreneurial activity supported by digital technologies (Zaheer et al. 2019). Digital economy is widely recognized as one of the most substantial economic developments since the industrial revolution, characterized by the capability to transform economies, jobs, and even society as a whole, and DE is at the origins of this disruptive revolution (Akpan and Ibidunni 2021; Manea et al. 2021). Digital economy performance is a matter of national strategies for attaining economic development and socioenvironmental growth (Laitsou et al. 2020; Manea et al. 2021).

Given todays' technological and digital developments, several distinct industries have been forced to adapt or transform their traditional strategies, procedures, and business models to tackle the digital challenges and seize emerging opportunities (Akpan and Ibidunni 2021; Fernandes et al. 2022; Gavrila and Ancillo 2022; Gregori and Holzmann 2020; Manea et al. 2021; Zaheer et al. 2019). Moreover, the steady advances of digital technologies (e.g., internet of things, artificial intelligence, and big data) have created room for new digital startups. DE, built on the existence or development of the digital ecosystem, has the potential to promote sustainable business (George et al. 2021; Jha et al. 2022; Tim et al. 2021; Tohănean et al. 2020) from the economic, environmental, and social points of view.

The digitalization of businesses creates several opportunities and enables higher levels of sustainability, as confirmed by positive interdependencies among these two megatrends (Lichtenthaler 2021). On the one hand, digital solutions that enable DE improve connectivity and accessibility, lower costs and carbon footprint, and promote the inclusion and

participation of users (Baran and Berkowicz 2021; Gregori and Holzmann 2020; Lichtenthaler 2021). On the other hand, stakeholders' sustainability concerns encourage the adoption of sustainable solutions, such as digital technologies.

In the last years, some literature review studies have been published on DE (e.g., Fernandes et al. 2022; Kraus et al. 2019; Sahut et al. 2021; Zaheer et al. 2019; Zhai et al. 2022), on sustainable entrepreneurship (e.g., Anand et al. 2021), on sustainability (e.g., Niñerola et al. 2019), and on the intersection of entrepreneurship and other topics (e.g., Glinyanova et al. 2021; Hota et al. 2020; Lampe et al. 2020; Santos et al. 2018). However, to the best of our knowledge, there is no integrative bibliometric analysis on DE and sustainability research. Keeping in mind this gap in the academic literature, the main goal of this paper is to examine the scientific research on the topic to help us to understand where it comes from and where it is going. Specifically, we intend to achieve the following aims: (i) to analyze the evolution of the research on DE and sustainability, (ii) to identify the most productive journals and authors, (iii) to identify the most impactful articles in the research topic, (iv) to identify and to synthesize the predominant research themes, and (v) to recommend future research opportunities.

This paper makes some significant contributions to the literature. First, we present a complete assessment of the research on DE and sustainability through a bibliometric analysis, which contributes to the understanding of the knowledge structure of the research topic and helps to identify key knowledge gaps. Second, our paper extends the understanding of the linkage between DE and sustainability in its different dimensions. In this paper, we adopt a broad concept of sustainability, which includes the three interconnected pillars of sustainability: economic (profit), environmental (planet), and social (people) well-being. Finally, we suggest potential directions for further research by proposing a research agenda.

The remainder of this paper is organized into four sections. Section 2 introduces the theoretical background on the topic. Section 3 describes the methodology employed in the study. Section 4 provides the results and discussion and proposes a future research agenda. Finally, Section 5 reports the main conclusions, theoretical and practical implications, and limitations.

2. Theoretical Background

The literature review gives guidance through the academic research dealing with the topics of DE and sustainability by providing a systematized overview on the existing literature.

2.1. Digital Entrepreneurship

Entrepreneurship is commonly viewed as a driver of innovative dynamics and economic growth and entrepreneurs, in the Schumpeterian approach, as "creative destructors". The recent development of digital technologies has strongly influenced the entrepreneurial process (Fernandes et al. 2022; Nambisan 2017; Zhai et al. 2022), both through the digitization and digitalization of existing businesses and the creation of digital firms (Fernandes et al. 2022). Against this background, DE describes the entrepreneurial action enabled by the use of digital technologies (Nambisan 2017; Sussan and Acs 2017; Zhai et al. 2022). In the words of Hull et al. (2007, p. 293), DE "is a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organisation has been digitised", such as digital goods or services and distribution. In turn, the definition of Sahut et al. (2021) is wider, including the role of digital enablers to support all the phases of the process of venture creation (e.g., idea generation and opportunity recognition, and distribution). Accordingly to their view, and contrary to Hull et al. (2007), DE cannot be reduced to a subcategory of entrepreneurship but, rather, as advocated by Le Dinh et al. (2018, p. 1), DE is "the reconciliation of traditional entrepreneurship with the new way of creating and doing business in the digital era". Table 1 contains a summary of alternative definitions of DE.

Table 1. Definitions of digital entrepreneurship.

Source	Definition
Hull et al. (2007, p. 293)	"Digital entrepreneurship is a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organisation has been digitised". data
Kraus et al. (2019, p. 354)	"In general, any entrepreneurial activity that transfers an asset, service or major part of the business into digital can be characterised as digital entrepreneurship".
Le Dinh et al. (2018, p. 1)	"Digital entrepreneurship is defined as the reconciliation of traditional entrepreneurship with the new way of creating and doing business in the digital era".
Nambisan (2017, p. 1029)	Digital entrepreneurship as the "intersection of digital technologies and entrepreneurship".
Sahut et al. (2021, p. 1162)	"DE as the process of entrepreneurial creation of digital value through the use of various socio-technical digital enablers to support effective acquisition, processing, distribution, and consumption of digital information".
Sussan and Acs (2017, p. 66)	"Digital entrepreneurship (. . .) includes any agent that is engaged in any sort of venture be it commercial, social, government, or corporate that uses digital technologies. (. . .) In other words, they are performing activities that need digital engagement but may not in themselves be digital (. . .)".

Based on the definitions, one can note that DE has several differences compared to traditional entrepreneurship. According to Hull et al. (2007, p. 292) "one major difference between digital entrepreneurship and traditional entrepreneurship is how they market". Products, marketing activities, and workplace are differentiation criteria commonly pointed out by the literature (Hull et al. 2007; Kraus et al. 2019). Additionally, in some studies, other differences can be found, such as personal characteristics of entrepreneurs (Colombo and Delmastro 2001), evolution patterns of business models (König et al. 2019), and how the regulatory environment influences entrepreneurial activity (Dong 2019; Steininger et al. 2022). Regulators across different countries have to deal with different challenges, such as data privacy and security. It is truly challenging "to protect digital products and digital knowledge through intellectual property rights and other forms of protection such as secrecy. This can create a problem for digital start-ups to raise capital from banks and other traditional providers of corporate finance" (Steininger et al. 2022, p. 6). With most digital firms operating globally, country-specific regulation is an important source of risk (Kraus et al. 2019).

Digital technologies are not only opening up interesting innovation opportunities for entrepreneurs, but also creating new challenges (Fernandes et al. 2022; Kraus et al. 2019; Sahut et al. 2021; Zhai et al. 2022). The "digital" offers significant potential for previously excluded groups, contributing to democratizing entrepreneurship through, for instance, the promotion of gender equality (Zhai et al. 2022). Digital ecosystems, where firms, customers, and other stakeholders interact with each other, allow entrepreneurs to access a considerable amount of relevant data, for business improvement (i.e., business exploitation) and new business development (i.e., business exploration) to create and capture value (Kraus et al. 2019; Sussan and Acs 2017). Value creation increasingly takes place through the production and easy access of digital information (Sahut et al. 2021).

Digital technologies also give consumers the possibility to influence product design, production, and delivery (Zhai et al. 2022). Consumers are no longer just passive recipients but can actively participate in this process, enabling entrepreneurs to customize their offerings. DE creates new business opportunities for promoting sustainability by developing and using new digital technologies, which "support the development of value propositions

that blend environmental, social, and economic value" (Gregori and Holzmann 2020, p. 2). A growing awareness of environmental and social issues means that entrepreneurship should consider the impact of business activities on current and future economic (e.g., long-term profitability), environmental (better use of natural resources), and social (e.g., local community development) well-being.

2.2. Sustainability

Sustainability has become a significant issue in all aspects of human and organizational routines. The notion of sustainability incorporates the integration of economic, environmental, and social purposes (Anand et al. 2021; Manea et al. 2021). In business, sustainability implies finding solutions and making decisions grounded on the relationships among profit, planet, and people (3 Ps). Sustainable business models go beyond simple financial profit, including also environmental and social values and goals. Entrepreneurs are now seen as agents of change who are committed to seeking a balance between the three pillars of sustainability.

Economic sustainability is linked to the resource efficiency in order to reach profitability in the long term (Niñerola et al. 2019). Environmental sustainability implies that natural resources should be managed at a sustainable rate (e.g., material saving, decrease energy consumption, and increase waste recycling), as these are scarce and generally nonrenewable (Niñerola et al. 2019). Finally, social sustainability embraces social capital, equality of opportunities, community development, improvement of living conditions, and social responsibility (Eizenberg and Jabareen 2017; Niñerola et al. 2019).

By launching the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), the United Nations Member States, and, thus, the world community in general, reiterated its commitment to sustainability. SDGs, embracing a wide range of economic, environmental, and social issues, pose new and important challenges for all actors in society (civil society, governments, and the private sector), but both researchers and practitioners recognize the particular impact on businesses. Firms must adjust their strategies and operations not only to achieve SDGs, but also to respond to the demand of environmentally and socially conscious clients.

2.3. Digital Entrepreneurship and Sustainability

The development and use of digital technologies create new opportunities for entrepreneurs (Fernandes et al. 2022), enabling new businesses' development and business improvement that ensure economic, environmental, and social sustainability (Baran and Berkowicz 2021; George et al. 2021; Gregori and Holzmann 2020; Jha et al. 2022; Tim et al. 2021; Tohănean et al. 2020). That is, these technologies support digitization, digitalization, and digital transformation, which breaks with the past and leads to new sustainable growth business models (Gavrila and Ancillo 2022).

Therefore, DE plays a major role in contributing towards sustainability as it not only creates financial value, but also enhances resource optimization and promotes social inclusion and fighting poverty through digital technologies (Manea et al. 2021; Srivastava and Shainesh 2015). For instance, the association of digital technologies with the circular economy into DE enables the achievement of the sustainable development goal related to the responsible consumption and production, that is, resource optimization by reducing the need to use new resources (Manea et al. 2021). DE holds potential for helping to make entrepreneurship more inclusive. Underserved societal segments could be more likely to benefit from certain attributes of digital technologies for business creation and growth, including the wider access to global markets offered by the internet (McAdam et al. 2020; Srivastava and Shainesh 2015; Tim et al. 2021). Moreover, smart city initiatives, which mainly follow sustainable and/or digital orientations to enhance performance city and citizens' well-being, may provide a propitious climate for green and/or digital entrepreneurs (Manjon et al. 2022).

3. Methodology

We followed a bibliometric analysis approach, as outlined by Zupic and Čater (2015) and Donthu et al. (2021), to achieve the aim of structuring extant research on DE and sustainability. Similar studies on the intersection of entrepreneurship and other topics used the same approach (e.g., Anand et al. 2021; Glinyanova et al. 2021; Hota et al. 2020; Lampe et al. 2020; Santos et al. 2018). This approach includes the following four main steps: (1) to define the research design (delimitate the main purpose and scope of the study), (2) to choose the method of bibliometric analysis (based on the main goal defined in step one), (3) to collect the data for bibliometric analysis (select the appropriate database and specify the search query), and (4) to run the bibliometric analysis, report and disseminate the review findings.

In the first step, we defined the main purpose of the study, that is, identified both the predominant themes and future research opportunities on DE and sustainability. Accordingly, in the second step, we decided to analyze the productivity of journals and authors, the impact of publications, and use as a bibliometric method the co-word analysis, which is interpreted as a representation of the conceptual structure of the research field (Donthu et al. 2021; Fernandes and Pires 2021; Zupic and Čater 2015). Co-word analysis uses an advanced content analysis technique to investigate the relationships between terms/words in a set of documents (Callon et al. 1983) and to delimit the boundaries of scientific areas (Castriotta et al. 2019). "The idea underlying the method is that when words frequently co-occur in documents, it means that the concepts behind those words are closely related" (Zupic and Čater 2015, p. 435). Because words' co-occurrence reveals which words are jointly mentioned, it shows patterns and trends in the field of study. Co-word analysis was conducted using the VOSviewer 1.6.18 software.

The bibliographic data were collected from Elsevier's Scopus database, which is widely used in systematic literature reviews and bibliometric analyses (e.g., Anand et al. 2021; Niñerola et al. 2019; Fernandes and Pires 2021). Moreover, Scopus database has a larger publications coverage in this field of research than Web of Science database (e.g., Mongeon and Paul-Hus 2016). Figure 1 shows the process of data collection following the PRISMA flowchart (Page et al. 2021).

The search was performed on 11 April 2022, using as keywords "digital*" OR "digiti$ation" AND "entrepreneur*" AND "sustainab*" in three alternative fields: title, abstract, and keywords. These keywords were defined based on previous studies (e.g., Anand et al. 2021; Fernandes et al. 2022; Kraus et al. 2019). We used an asterisk for our search to ensure we did not leave out any publications of interest, since an asterisk can substitute for the absence of a character, a single character, or multiple characters in a word. For instance, "entrepreneur*" can be entrepreneur, entrepreneurs, entrepreneurial, and entrepreneurship. We also used the symbol "$" to substitute different characters. Thus, "digiti$ation" can be digitization and digitisation. In this step, the query search resulted in 431 publications. Then, according to the previous literature, we limited the sample to articles written in English and published in international journals (Anand et al. 2021; Kraus et al. 2019, 2020). No start date was specified, enabling the search engine to detect the earliest articles in the research field. As we are in 2022, we limited our search to articles published (online) up to 2021. This reduced the number of publications to 191 articles.

Finally, the three authors of the study applied separately the previously defined criteria. All articles' title, abstract, and keywords were analyzed and, when necessary, the full text read. The articles selected by each of those authors were subsequently compared and discussed. As a result, 133 articles not specifically related to the research were removed. Thus, the final sample includes 58 articles that appeared appropriate for structuring the research on DE and sustainability.

In the next step, the 58 articles eligible for the bibliometric analysis were analyzed. In the next section, we synthesize the data (performance analysis) and highlight the important issues (main research streams) related to DE and sustainability.

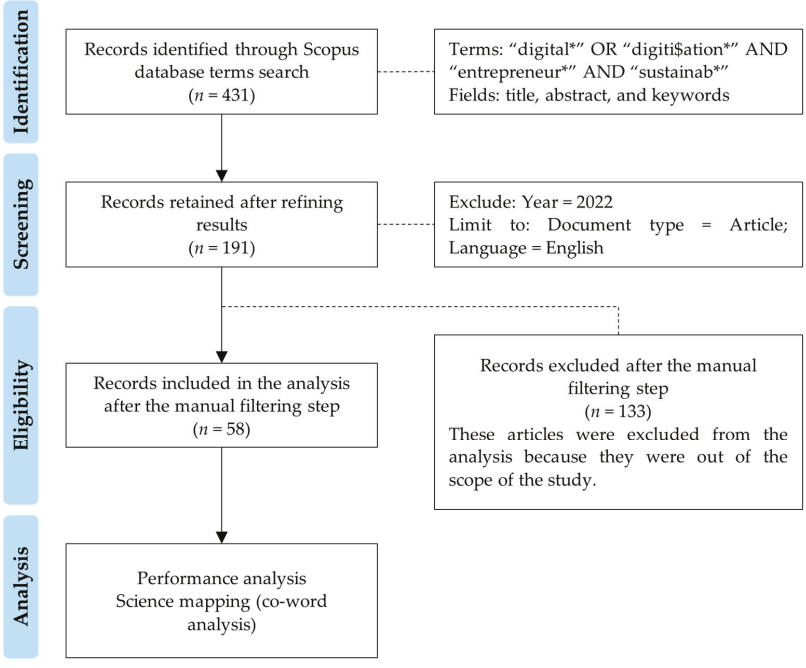

Figure 1. Process of data collection and analysis (PRISMA flowchart).

4. Results and Discussion

The results and discussion section is structured as follows. Firstly, we present the characterization of the sample of articles that make up this investigation (performance analysis). To this end, the chronological evolution of the publications, the most publishing journals, authors, and cited articles, and the authors' keywords most quoted are provided and analyzed. Next, the main research streams on DE and sustainability are presented.

4.1. Performance Analysis

Figure 2 displays the number of articles published on DE and sustainability between 2012 and 2021. The growing interest in this research field began to develop over the last decade, with some evident progress after 2018, suggesting that this subject has been gaining popularity in the academic community in the last years. In fact, the scientific literature on DE is recent (Fernandes et al. 2022) and, thus, the same is true regarding DE and sustainability. As can be seen in Figure 2, 2021 was the most productive year, with 25 articles.

The 58 articles were published in 46 journals. Table 2 presents only the journals with two or more articles. Sustainability appears as the most productive journal (nine articles).

The dataset includes 155 authors for 58 articles. No author stands out from the rest because all of them have the same number of articles (i.e., one article). One possible explanation for this finding is that the topic under analysis is very recent, although attracting increasing attention.

Table 3 shows the 11 articles with the highest number of citations. Seven of them were published in the last three years. Srivastava and Shainesh (2015) stands out with 139 citations, followed by Angelidou et al. (2018) (102 citations) and Gössling and Hall (2019) (80 citations).

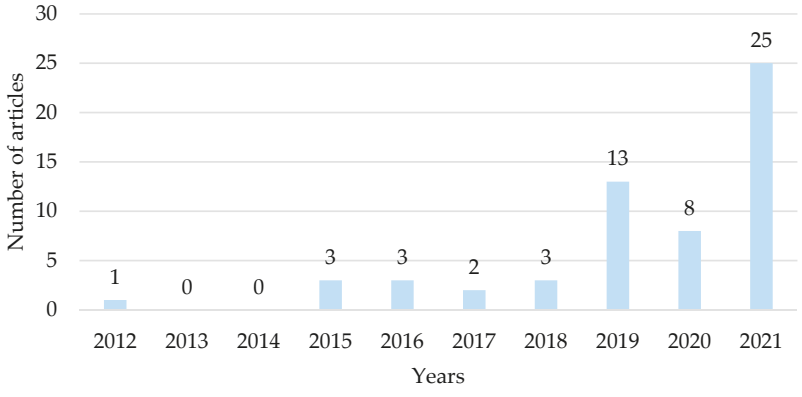

Figure 2. Evolution and quantification of the articles (n = 58).

Table 2. Most publishing journals (two or more articles).

Journal Title	Number of Articles
Sustainability	9
Amfiteatru Economic	2
British Food Journal	2
Journal of Media Business Media	2
Thunderbird International Business Review	2

Table 3. Most cited articles on DE and sustainability.

Authors (Year)	Title	Journal	TC	AC
Srivastava and Shainesh (2015)	Bridging the service divide through digitally enabled service innovations: Evidence from Indian healthcare service providers	MIS Quarterly: Management Information Systems	139	17.38
Angelidou et al. (2018)	Enhancing sustainable urban development through smart city applications	Journal of Science and Technology Policy Management	102	20.40
Gössling and Hall (2019)	Sharing versus collaborative economy: How to align ICT developments and the SDGs in tourism?	Journal of Sustainable Tourism	80	20.00
Naldi and Picard (2012)	"Let's start an online news site": Opportunities, resources, strategy, and formational myopia in startups	Journal of Media Business Studies	51	4.64
Richter et al. (2015)	The Smart City as an opportunity for entrepreneurship	International Journal of Entrepreneurial Venturing	39	4.88
Bican and Brem (2020)	Digital business model, digital transformation, digital entrepreneurship: Is there a sustainable "digital"?	Sustainability	37	12.33
George et al. (2021)	Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development	Entrepreneurship: Theory and Practice	34	17.00
De Bernardi et al. (2019)	Online and on-site interactions within alternative food networks: Sustainability impact of knowledge-sharing practices	Sustainability	31	7.75
Akhter (2017)	Unlocking digital entrepreneurship through technical business process	Entrepreneurship and Sustainability Issues	25	4.17
Gregori and Holzmann (2020)	Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation	Journal of Cleaner Production	20	6.67
Bjørn and Boulus-Rødje (2018)	Infrastructural inaccessibility: Tech entrepreneurs in occupied Palestine	ACM Transactions on Computer-Human Interaction	20	4.00

TC = total number of citations; AC = average number of citations by year.

Srivastava and Shainesh (2015) extend the digital divide perspective (goods-centric view) to that of a service divide (service-centric view) in order to understand the role of information and communication technologies (ICT) in facilitating equitable development. Specifically, they examine the development of sustainable telemedicine healthcare service delivery models for the rural population in India, stressing the use of digital technologies by social entrepreneurs to serve disadvantaged segments of the population. Angelidou et al. (2018) also make a relevant contribution to the literature by investigating how digital technologies, in particular ICT, used in smart city applications, enable environmental sustainability. These technologies are critical not only to create smart sustainable cities, but also to support entrepreneurship in digital services and development of data-driven applications. In turn, Gössling and Hall (2019) investigate the sustainability dimensions of the sharing economy in the accommodation sector, underlining the role of ICT (in particular, digital platforms) to transform business models and create new opportunities for entrepreneurship.

Figure 3 shows the frequently occurring words in the author keywords of the articles analyzed, indicating the thematic focus in these studies. The most prevalent keywords are entrepreneurship, sustainability, digital entrepreneurship, innovation, sustainable development goals, and digital technology.

Figure 3. Word cloud of the authors' keywords.

4.2. Main Research Streams on DE and Sustainability

Using the VOSviewer software and the co-word analysis, the conceptual structure of the research on DE and sustainability was obtained. The network visualization is presented in Figure 4. Colors show clusters of keywords that are related to each other. Keywords located near each other exhibit a high co-occurrence frequency in articles, and keywords further apart depict low co-occurrence frequency. Each cluster represents a research stream in DE and sustainability. The size of the circle depends on the number of occurrences the keywords have. In this way, large circles represent keywords that have more occurrences.

Based on the analysis of the network diagram and through an interpretative analysis of the authors' keywords included in each cluster, three research streams were identified: (1) innovation and entrepreneurship, (2) digital transformation: strategy and business models, and (3) sustainability and sustainable development goals. It can be observed that the clusters of authors' keywords are linked with each other, reinforcing that research themes should not be addressed as being mutually exclusive. This is particularly evident when the topic is recent and, therefore, the research focuses on a limited number of keywords. One should expect that, with increasing studies on DE and sustainability, the research concentrates in specific subtopics and the clusters are more delimited.

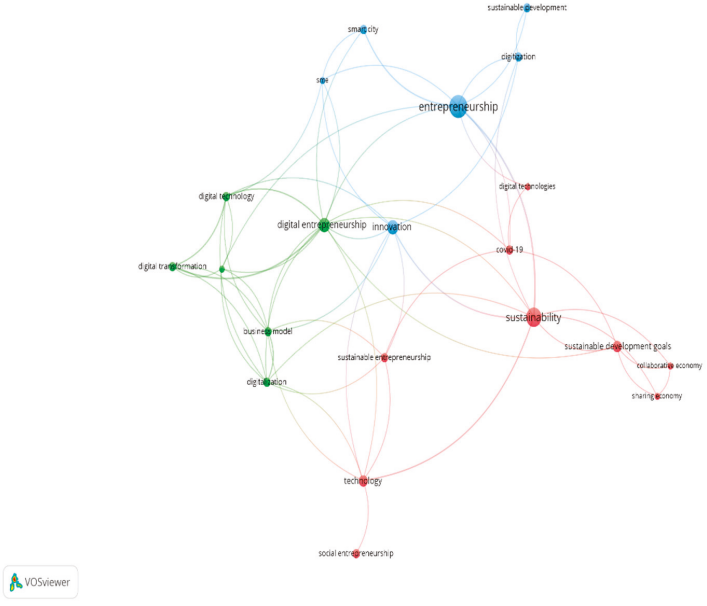

Figure 4. Global thematic network in DE and sustainability research based on keywords co-occurrence analysis.

4.2.1. Cluster 1 (Blue Cluster): Innovation and Entrepreneurship

The blue cluster includes a set of articles that relates entrepreneurship and innovation based on a reinterpretation of the (traditional) Schumpeterian approach, where the development is driven by entrepreneurial innovation. This "new" approach, prompted by the current context, shapes the concepts of development and entrepreneurship/entrepreneur by specifically focusing on sustainable development (in economic, environmental, and social dimensions) and digitization of the entrepreneurial process, respectively. The articles address this subtopic in two different perspectives: governmental level (public sector, in particular, smart cities) (Angelidou et al. 2018; Manjon et al. 2022; Richter et al. 2015) and firm level (private sector, in particular, small and medium enterprises) (Akpan and Ibidunni 2021; Irimiás and Mitev 2020).

Digitization, meaning the automation of processes through ICT or the integration of ICT with existing tasks, being the first step in the process of the digital transformation, is considered to be an efficient means to support sustainable economic, environmental, and social development. "ICT for sustainability" plays a relevant role in urban and business contexts (Akpan and Ibidunni 2021; Angelidou et al. 2018).

Rapid adoption of technological solutions by different actors involved in the process of innovation is a critical factor that influences the speed and quality of the "smartization" of cities (Angelidou et al. 2018; Gitelman et al. 2020), and, in turn, it contributes to the sustainable urban development (e.g., smart energy or energy efficiency, smart city infrastructure, and smart road traffic management) (Angelidou et al. 2018; Gitelman et al. 2020; Richter et al. 2015). Therefore, smart cities represent an opportunity for entrepreneurship, in particular, for technology entrepreneurship, since, on the one hand, they create a climate conducive to the creation of new solutions and, on the other hand, technology entrepreneurs focus on the creation of breakthrough innovations that change the existing markets (Gitelman et al. 2020; Manjon et al. 2022; Richter et al. 2015).

Within a firm, sustainable development often requires changes in strategy and structure. Into the small business context, scholars have highlighted the digitization and technology adoption as a strategic competitive factor for survival and growth (Akpan and

Ibidunni 2021). However, SME's resources (e.g., knowledge and funding) are frequently limited (Irimiás and Mitev 2020; Ochinanwata et al. 2021) and, thus, the ability to innovate through the use of ICT, which enhances the efficient use of resources and waste reduction and supports sustainable development, is often constrained (Irimiás and Mitev 2020).

4.2.2. Cluster 2 (Green Cluster): Digital Transformation: Strategy and Business Models

The green cluster comprises articles that focus on the two steps of the process of digital transformation beyond digitization, that is, digitalization and digital transformation. These three steps represent different levels of adoption and use of digital technologies, digital transformation being the one that embraces the most profound changes and implications (Bican and Brem 2020). The articles investigate how organizations integrate these digital technologies within their strategies and operations and employ them to develop new digital business models, highlighting, also, the potential contribution of digital business models for sustainability (e.g., Gregori and Holzmann 2020; Karimi and Walter 2021; Tohănean et al. 2020). Digital technologies provide several (digital and sustainable) entrepreneurial opportunities, which Gregori and Holzmann (2020) label as "digital sustainable entrepreneurship".

Digitalization occurs when digital technologies and digital data are adopted and used to introduce changes in the way businesses are carried out (e.g., improving businesses and transforming business processes) and revenues are created (Bican and Brem 2020; Gregori and Holzmann 2020; Tohănean et al. 2020). In turn, digital transformation, representing the integration of digital technologies within all aspects and operations of the organizations, which influences value proposition, value creation, and value capture, may lead to improved or new (digital) business models with sustainable potential (Gregori and Holzmann 2020). Digital transformation results not only from the interplay between digital technology and digital innovation, but is also influenced by the organization, its digital readiness, and external collaborations to promote the digital transformation (Bican and Brem 2020).

Nowadays, technological and digital transformation is a strategic decision that successful organizations need to make to be particularly well placed in the current digital economy and industry 4.0 (Akpan and Ibidunni 2021). Organizations that do not quickly develop and implement digital transformation strategies are unlikely to keep pace and compete in this new reality (Akhter 2017; Tohănean et al. 2020). Through digital transformation, current and more closed business models can be renewed to develop more open and platform-based business models to capture external opportunities. The combination of diverse digital technologies in these new business models allows creation of spaces for community integration, engagement in co-creation activities, and integration of an increasingly diverse set of stakeholders going beyond customers and suppliers (Gregori and Holzmann 2020). Moreover, digital technologies enable the transformation of current business models into digital business models towards a sustainable and circular economy (Bican and Brem 2020; Manea et al. 2021).

4.2.3. Cluster 3 (Red Cluster): Sustainability and Sustainable Development Goals

The red cluster contains a set of articles that highlights the key role of digital technologies in offering new possibilities for sustainable business practices, grounded on the balance between economic, environmental, and social sustainability, and, thus, substantially contributing to achieve SDGs (e.g., sustainable economic growth, sustainable production and consumption, gender equality, and clean water and sanitation) (Bican and Brem 2020; George et al. 2021; Gregori and Holzmann 2020; Tim et al. 2021). Digital technologies in business activities not only bring better use of scarce resources, but also provide opportunities for sustainable innovations. In other words, the integration of digital technologies with entrepreneurship results in sustainable entrepreneurship and in the development of innovative business models (Gössling and Hall 2019; Gregori and Holzmann 2020; Jha et al. 2022), supporting the transition from the linear economy to a circular economy (Manea et al. 2021).

Articles in this cluster show that entrepreneurial agents are using digital technologies to tackle critical sustainability challenges (George et al. 2021).

In this context, much of the literature relates the sharing economy, which is increasingly being replaced by the collaborative economy, to the sustainability and SDGs (Gössling and Hall 2019), stressing its role in employment generation and dematerialization, as well as in enabling the use of underutilized and redundant resources and a more efficient utilization (e.g., reduction in water and energy use) (Gössling and Hall 2019; Jha et al. 2022). "At its core, the sharing economy is about sharing of idle assets, usually via tech platforms, in ways that produce economic, environmental, social and practical benefits" (Jha et al. 2022, p. 518). Digital platforms have turned into the most important pillars in the sharing economy (Gössling and Hall 2019; Jha et al. 2022), viewed as living labs for sustainable entrepreneurship and innovation (Baran and Berkowicz 2021). During the COVID-19 crisis, the importance of the sharing economy in managing business efficiency was evidenced by the research (Jha et al. 2022). Moreover, the pandemic crisis has led to the need to rethink and redefine the concept of sustainability to include human wealth.

4.3. Future Research Directions

The results reveal some gaps in the literature and provide some potential opportunities for further research. First, although the literature stresses the contribution of smart cities to sustainable development, clearly reflected in the SDGs (Goal 11, "make cities and human settlements inclusive, safe, resilient and sustainable"), and, thus, the particular relevance of public policies, the role of collaboration across different stakeholders to achieve SDGs remains underdeveloped. Further research should examine how public–private partnerships contribute to the implementation of sustainable projects and SDGs. Additionally, considering the urgency of addressing climate change, with harmful effects to the society in general, more investigation is needed to better understand the impact of smarts cities in combating/mitigating climate change and promoting inclusive economic growth.

Second, while the need for "digital" is currently beyond an optional decision for business agents and SMEs are the backbone of most world economies, in particular, in less developed and emerging economies, they face several obstacles in implementing digital technologies (e.g., limited human and financial resources) in the entrepreneurial process. Future research should investigate efficient solutions to overcome the hurdles of access to digital resources by SMEs. Many challenges continue to hamper the adoption of digital technologies by SMEs, which are critical to create sustainable competitive advantages and compete locally and globally.

Third, even though the existing research argues for the integration of economic, environmental, and social issues to achieve enduring development and highlights the role of DE in generating business for enhancing sustainability, there are still gaps in the literature on the balance and incorporation of all the dimensions of sustainability in the business process and models. Further research should investigate how firms and specific sectors/industries strike a balance in maintaining economic, environmental, and social sustainability, especially entrepreneurial actors that intend to generate socioenvironmental value through financially viable business models, and well-being of all stakeholders in the ecosystem, how they integrate SGDs in their operations, processes, and value chains and how these influence the ability to compete with the other players in the local and global markets. Such research may be timely in the post-COVID-19 pandemic crisis, as there is increased need for business reconversion and adaption towards more sustainable strategies and business models.

5. Conclusions, Implications, and Limitations

This paper intended to identify and synthesize both the predominant themes and further research opportunities on DE and sustainability. In accordance, we performed a bibliometric analysis of 58 articles indexed to Scopus database. The results of the performance analysis allow us to achieve the research goals (i), (ii), and (iii), reporting the

evolution of the publications, the most prolific journals and authors, as well as the most influential articles. Additionally, we present the conceptual structure of the research on DE and sustainability using the co-word analysis method, which allowed us to synthesize research trends in the field (paper's goal (iv)). Finally, we provide an agenda for future research on DE and sustainability (paper's goal (v)).

Over the past two decades, the topic under analysis received increased attention in research, especially since 2018. Sustainability is the journal that published more articles on DE and sustainability. No author stands out with a much higher production than the rest. The most cited article, with 139 citations, is entitled "Bridging the service divide through digitally enabled service innovations: Evidence from Indian healthcare service providers" and was co-authored by Srivastava and Shainesh (2015).

The results of the clusters analysis (science mapping) indicate the existence of three research streams (not mutually exclusive) on DE and sustainability that we label as follows: (1) innovation and entrepreneurship, (2) digital transformation: strategy and business models, and (3) sustainability and sustainable development goals. Our analysis shows that the topics addressed in the different identified clusters are inter-related.

The findings of this study have relevant theoretical and practical implications. From the theoretical point of view, this study was the first, to the best of our knowledge, to perform a bibliometric analysis to understand the link between DE and sustainability, contributing to the theoretical body of entrepreneurship in general and DE in particular and how it impacts on economic and socioenvironmental value creation. The knowledge provided by this study is expected to enable researchers to be involved in this field and/or focus their research more effectively.

From the practical point of view, this paper offers important insights for practitioners, entrepreneurs, and public actors. It helps to understand the complex and dynamic nature of entrepreneurship in a digital world and provides knowledge on how digital technologies can be embedded not only in the definition and development of digital sustainable business models, but also in the implementation of public policies in distinct domains, such as transportation, energy, public lighting, and waste management and, in general, in intelligent engineering infrastructure in cities. Government, industry, and universities need to collaborate to maximize societal and individual effects of DE and its outcomes.

As with every piece of research, our paper is not without limitations. Our study focuses only on scientific articles, excluding other types of scientific publications, such as conference papers, books, or book chapters. Although they could be included in future studies, this represents a big challenge and may affect the standards of scientific quality. On the one hand, the homogeneity of the sample is compromised. On the other hand, these types of publications may not be subject to the double-blind peer review system. Moreover, they may afterwards be published in the form of academic articles, thus introducing the potential for repetition, which could distort the results. A second limitation is associated with the application of the bibliometric method by itself, which can lead to the elimination of research topics with marginal importance.

Author Contributions: Conceptualization, C.F. and R.P.; methodology, C.F. and R.P.; software, C.F. and R.P.; validation, C.F., R.P. and M.-C.G.A.; formal analysis, C.F. and R.P.; investigation, C.F. and R.P.; resources, C.F. and R.P.; data curation, C.F., R.P. and M.-C.G.A.; writing—original draft preparation, C.F. and R.P.; writing—review and editing, C.F., R.P. and M.-C.G.A.; visualization, C.F. and R.P.; supervision, C.F., R.P. and M.-C.G.A.; project administration, C.F.; funding acquisition, C.F. and M.-C.G.A. All authors have read and agreed to the published version of the manuscript.

Funding: The research of the author Catarina Fernandes was supported by National Funds through the FCT (Portuguese Foundation for Science and Technology), I.P., within the scope of the project Ref. UIDB/04105/2020. The research of the author Maria-Ceu G. Alves was supported by National Funds through the FCT, I.P., within the scope of the project Ref. UIDB/04630/2020.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

References

Akhter, Fahim. 2017. Unlocking digital entrepreneurship through technical business process. *Entrepreneurship and Sustainability Issues* 5: 36–42. [CrossRef]

Akpan, Ikpe Justice, and Ayodotun Stephen Ibidunni. 2021. Digitization and technological transformation of small business for sustainable development in the less developed and emerging economies: A research note and call for papers. *Journal of Small Business & Entrepreneurship*, 1–7, *ahead-of-print*. [CrossRef]

Anand, Amitabh, Padmaja Argade, Ralf Barkemeyer, and Fanny Salignac. 2021. Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda. *Journal of Business Venturing* 36: 106092. [CrossRef]

Angelidou, Margarita, Artemis Psaltoglou, Nicos Komninos, Christina Kakderi, Panagiotis Tsarchopoulos, and Anastasia Panori. 2018. Enhancing sustainable urban development through smart city applications. *Journal of Science and Technology Policy Management* 9: 146–69. [CrossRef]

Baran, Grzegorz, and Aleksandra Berkowicz. 2021. Digital platform ecosystems as living labs for sustainable entrepreneurship and innovation: A conceptual model proposal. *Sustainability* 13: 6494. [CrossRef]

Bican, Peter M., and Alexander Brem. 2020. Digital business model, digital transformation, digital entrepreneurship: Is there a sustainable "digital"? *Sustainability* 12: 5239. [CrossRef]

Bjørn, Pernille, and Nina Boulus-Rødje. 2018. Infrastructural inaccessibility: Tech entrepreneurs in occupied Palestine. *ACM Transactions on Computer-Human Interaction* 25: 1–31. [CrossRef]

Callon, Michel, Jean-Pierre Courtial, William A. Turner, and Serge Bauin. 1983. From translations to problematic networks: An introduction to co-word analysis. *Social Science Information* 22: 191–235. [CrossRef]

Castriotta, Manuel, Michela Loi, Elona Marku, and Luca Naitana. 2019. What's in a name? Exploring the conceptual structure of emerging organizations. *Scientometrics* 118: 407–37. [CrossRef]

Colombo, Massimo G., and Marco Delmastro. 2001. Technology-based entrepreneurs: Does internet make a difference? *Small Business Economics* 16: 177–90. [CrossRef]

De Bernardi, Paola, Alberto Bertello, and Francesco Venuti. 2019. Online and on-site interactions within alternative food networks: Sustainability impact of knowledge-sharing sractices. *Sustainability* 11: 1457. [CrossRef]

Dong, John Qi. 2019. Moving a mountain with a teaspoon: Toward a theory of digital entrepreneurship in the regulatory environment. *Technological Forecasting & Social Change* 146: 923–30. [CrossRef]

Donthu, Naveen, Satish Kumar, Debmalya Mukherjee, Nitesh Pandey, and Weng Marc Lim. 2021. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research* 133: 285–96. [CrossRef]

Eizenberg, Efrat, and Yosef Jabareen. 2017. Social sustainability: A new conceptual framework. *Sustainability* 9: 68. [CrossRef]

Fernandes, Catarina, and Rui Pires. 2021. Exploring the conceptual structure of the research on innovation in hotels through co-word analysis. *Administrative Sciences* 11: 78. [CrossRef]

Fernandes, Cristina, João J. Ferreira, Pedro Mota Veiga, Sascha Kraus, and Marina Dabić. 2022. Digital entrepreneurship platforms: Mapping the field and looking towards a holistic approach. *Technology in Society* 70: 101979. [CrossRef]

Gavrila, Sorin Gavril, and Antonio De Lucas Ancillo. 2022. Entrepreneurship, innovation, digitization and digital transformation toward a sustainable growth within the pandemic environment. *International Journal of Entrepreneurial Behavior & Research* 28: 46–66. [CrossRef]

George, Gerard, Ryan K. Merrill, and Simon J. D. Schillebeeckx. 2021. Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. *Entrepreneurship: Theory and Practice* 45: 999–1027. [CrossRef]

Gitelman, Lazar D., Mikhail V. Kozhevnikov, Evgeniy M. Starikov, and Alexander V. Gamburg. 2020. Technology entrepreneurship as a factor os sustainable energy in smart cities. *WIT Transactions on Ecology and the Environment* 246: 101–12. [CrossRef]

Glinyanova, Maria, Ricarda B. Bouncken, Victor Tiberius, and Antonio C. Cuenca Ballester. 2021. Five decades of corporate entrepreneurship research: Measuring and mapping the field. *International Entrepreneurship and Management Journal* 17: 1731–57. [CrossRef]

Gössling, Stefan, and C. Michael Hall. 2019. Sharing versus collaborative economy: How to align ICT developments and the SDGs in tourism? *Journal of Sustainable Tourism* 27: 74–96. [CrossRef]

Gregori, Patrick, and Patrick Holzmann. 2020. Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation. *Journal of Cleaner Production* 272: 122817. [CrossRef]

Hota, Pradeep Kumar, Balaji Subramanian, and Gopalakrishnan Narayanamurthy. 2020. Mapping the intellectual structure of social entrepreneurship research: A citation/co-citation analysis. *Journal of Business Ethics* 166: 89–114. [CrossRef]

Hull, Clyde Eiríkur, Yu-Ting Caisy Hung, Neil Hair, Victor Perotti, and Richard DeMartino. 2007. Taking advantage of digital opportunities: A typology of digital entrepreneurship. *International Journal of Networking and Virtual Organisations* 4: 290–303. [CrossRef]

Irimiás, Anna, and Ariel Mitev. 2020. Change management, digital maturity, and green development: Are successful firms leveraging on sustainability? *Sustainability* 12: 4019. [CrossRef]
Jha, Ajay, Rohit Sindhwani, Ashish Dwivedi, and Venkataramanaiah Saddikuti. 2022. Sustainable recovery for digital entrepreneurs with shared resources: Enablers, challenges and solutions. *Journal of Asia Business Studies* 16: 515–37. [CrossRef]
Karimi, Jahangir, and Zhiping Walter. 2021. The role of entrepreneurial agility in digital entrepreneurship and creating value in response to digital disruption in the newspaper industry. *Sustainability* 13: 2741. [CrossRef]
König, Marc, Christina Ungerer, Guido Baltes, and Orestis Terzidis. 2019. Different patterns in the evolution of digital and non-digital ventures' business models. *Technological Forecasting & Social Change* 146: 844–52. [CrossRef]
Kraus, Sascha, Carolin Palmer, Norbert Kailer, Friedrich Lukas Kallinger, and Jonathan Spitzer. 2019. Digital entrepreneurship: A research agenda on new business models for the twenty-first century. *International Journal of Entrepreneurial Behavior & Research* 25: 353–75. [CrossRef]
Kraus, Sasha, Matthias Breier, and Sonia Dasí-Rodríguez. 2020. The art of crafting a systematic literature review in entrepreneurship research. *International Entrepreneurship and Management Journal* 16: 1023–42. [CrossRef]
Laitsou, Eleni, Antonios Kargas, and Dimitris Varoutas. 2020. Digital competitiveness in the European Union Era: The Greek case. *Economies* 8: 85. [CrossRef]
Lampe, Jan, Pricilla Sarai Kraft, and Andreas Bausch. 2020. Mapping the field of research on entrepreneurial organizations (1937–2016): A bibliometric analysis and research agenda. *Entrepreneurship: Theory and Practice* 44: 784–816. [CrossRef]
Le Dinh, Thang, Manh Chein Vu, and Ayi Ayayi. 2018. Towards a living lab for promoting the digital entrepreneurship process. *International Journal of Entrepreneurship* 22: 1939–4675.
Lichtenthaler, Ulrich. 2021. Digitainability: The combined effects of the megatrends digitalization and sustainability. *Journal of Innovation Management* 9: 64–80. [CrossRef]
Manea, Daniela-Ioana, Nicolae Istudor, Vasile Dinu, and Dorel-Mihai Paraschiv. 2021. Circular economy and innovative entrepreneurship, prerequisites for social progress. *Journal of Business Economics and Management* 22: 1342–59. [CrossRef]
Manjon, Miguel, Zineb Aouni, and Nathalie Crutzen. 2022. Green and digital entrepreneurship in smart cities. *Annals of Regional Science* 68: 429–62. [CrossRef]
McAdam, Maura, Caren Crowley, and Richard T. Harrison. 2020. Digital girl: Cyberfeminism and the emancipatory potential of digital entrepreneurship in emerging economies. *Small Business Economics* 55: 349–62. [CrossRef]
Mongeon, Philippe, and Adèle Paul-Hus. 2016. The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics* 106: 213–28. [CrossRef]
Naldi, Lucia, and Robert G. Picard. 2012. "Let's start an online news site": Opportunities, resources, strategy, and formational myopia in startups. *Journal of Media Business Studies* 9: 69–97. [CrossRef]
Nambisan, Satish. 2017. Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship: Theory and Practice* 41: 1029–55. [CrossRef]
Niñerola, Angels, Maria-Victòria Sánchez-Rebull, and Ana-Beatriz Hernández-Lara. 2019. Tourism research on sustainability: A bibliometric analysis. *Sustainability* 11: 1377. [CrossRef]
Ochinanwata, Nonso, Patrick Oseloka Ezepue, Theodore Chinonso Nwankwo, Chinedy Ochinanwata, and Paul Agu Igwe. 2021. Public–private entrepreneurial financing partnership model in Nigeria. *Thunderbird International Business Review* 63: 369–79. [CrossRef]
Page, Matthew J., Joanne E. McKenzie, Patrick M. Bossuyt, Isabelle Boutron, Tammy C. Hoffmann, Cynthia D. Mulrow, Larissa Shamseer, Jennifer M. Tetzlaff, Elie A. Akl, Sue E. Brennan, and et al. 2021. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ* 372: n71. [CrossRef] [PubMed]
Richter, Chris, Sascha Kraus, and Pasi Syrjä. 2015. The Smart City as an opportunity for entrepreneurship. *International Journal of Entrepreneurial Venturing* 7: 211–26. [CrossRef]
Sahut, Jean-Michel, Luca Iandoli, and Frédéric Teulon. 2021. The age of digital entrepreneurship. *Small Business Economics* 56: 1159–69. [CrossRef]
Santos, Gina, Carla Susana Marques, and João J. Ferreira. 2018. A look back over the past 40 years of female entrepreneurship: Mapping knowledge networks. *Scientometrics* 115: 953–87. [CrossRef]
Srivastava, Shirish C., and G. Shainesh. 2015. Bridging the service divide through digitally enabled service innovations: Evidence from Indian healthcare service providers. *MIS Quarterly* 39: 245–67. [CrossRef]
Steininger, Dennis M., M. Kathryn Brohman, and Jörn H. Block. 2022. Digital entrepreneurship: What is new if anything? *Business & Information Systems Engineering* 64: 1–14. [CrossRef]
Sussan, Fiona, and Zoltan J. Acs. 2017. The digital entrepreneurial ecosystem. *Small Business Economics* 49: 55–73. [CrossRef]
Tim, Yenni, Lili Cui, and Zhenzhong Sheng. 2021. Digital resilience: How rural communities leapfrogged into sustainable development. *Information Systems Journal* 31: 323–45. [CrossRef]
Tohănean, Dragoș, Alexandru Ilie Buzatu, Cristina-Andrada Baba, and Bogdan Georgescu. 2020. Business model innovation through the use of digital technologies: Managing risks and creating sustainability. *Amfiteatru Economic* 22: 758–74. [CrossRef]
Zaheer, Hasnain, Yvonne Breyer, and John Dumay. 2019. Digital entrepreneurship: An interdisciplinary structured literature review and research agenda. *Technological Forecasting & Social Change* 148: 119735. [CrossRef]

Zhai, Yuming, Kaibo Yang, Lu Chen, Han Lin, Mingchuan Yu, and Ruoyu Jin. 2022. Digital entrepreneurship: Global maps and trends of research. *Journal of Business & Industrial Marketing*, *ahead-of-print*. [CrossRef]
Zupic, Ivan, and Tomaz Čater. 2015. Bibliometric methods in management and organization. *Organizational Research Methods* 18: 429–72. [CrossRef]

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Investigating the Impact of Digital Transformation on the Labor Market in the Era of Changing Digital Transformation Dynamics in Saudi Arabia

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Abstract: In Saudi Arabia, limited studies have developed models related to measuring the impact of the digital economy on the labor market. This model concerns the agricultural, service, and industrial sectors in Saudi Arabia. This study further investigates the relationship between digitalization, labor productivity, and unemployment using the ARDL error correction method for time-series data obtained from the World Bank database for the period of 2001–2019. The findings of this study illustrate, digital variables such as fixed broadband subscriptions (LNFBS), mobile cellular subscriptions (LNMCS), and computer, communications, and other services (LNCCO) do not significantly affect the labor market in the agricultural sector. LNMCS and LNCCO do not influence the service sector. However, they are negatively influencing the industrial sector and labor productivity. In contrast, LNFBS has a positive impact on both the service and industrial sectors. Interestingly, all three digital variables significantly reduce unemployment in the long run in Saudi Arabia. However, in the short run, digitalization does not have a positive impact on the economy. This study hopes to benefit policymakers in considering how to reorganize the socioeconomic infrastructure to balance economic growth through greater technology and the utilization of the country's human resources.

Keywords: digital transformation; labor market; labor productivity; unemployment; Saudi Arabia

Citation: Sarabdeen, Masahina, and Hind Alofaysan. 2023. Investigating the Impact of Digital Transformation on the Labor Market in the Era of Changing Digital Transformation Dynamics in Saudi Arabia. *Economies* 11: 12. https://doi.org/10.3390/economies11010012

Academic Editors: Renata Korsakienė, Laima Jesevičiūtė-Ufartienė and Neringa Vilkaitė-Vaitonė

Received: 9 November 2022
Revised: 20 December 2022
Accepted: 26 December 2022
Published: 4 January 2023

1. Introduction

The phrase "digital economy" refers to how the technological revolution is transforming value chains in revolutionary ways and opening new opportunities for value addition and structural change (Digital Economic Report 2019). Meantime, Bukht and Heeks (2017) define it as "part of economic output derived solely or primarily from electronic technologies with a business model based on digital goods or services". Knickrehm et al. (2016) defined simplicity as the proportion of economic output derived from broad "technological inputs", such as "computer talents, computer equipment (hardware, software, and communications equipment), and intermediary digital goods and services. Such broad endeavors are the foundations of the digital economy.

Digitalization has the potential to support economic growth throughout the world. Moreover, it is expected that greater efficiency in production due to digital transformation would lead to lower costs and increased productivity. This would lead to higher aggregate demand, higher employment, and potentially higher wages, thus making up for the underlying interruption. Since a significant number of firms and associations are adopting advanced digital technologies to reshape plans of action and associations (Ping and Ying 2018), technological innovations require workforces to possess a wide range of expertise, such as self-direction, critical thinking, correspondence skills, and web management.

With the advent of digitalization, certain aspects of the marketplace have undergone massive changes. These changes in demand for skills and employment caused bound employment to disappear. This changed the positions of companies in terms of development,

market capitalization, and many more. In the innovative era, the most effective strategies are still in progress or uncertain (Walwei 2016).

An OECD report published in 2016 suggests the long-term effects of digitalization on labor are ambiguous, as mechanical manipulation should be minimal. Meantime, it is believed that digital competence has not resulted in the creation of modern jobs on a large enough scale to replace traditional jobs. An additional 2018 OECD report shows that digitalization and robotization do not constitute a threat to widespread employment in the indefinite future (Nedelkoska and Quintini 2018).

The studies of Kvochko (2013) and Katz and Koutroumpis (2016) investigated the impact of digital transformation on the labor market. The findings show that digital transformation is expected to create 22% of new employment (760,000) by 2020 in the USA alone, and 25,000 innovative jobs annually in Australia. Moreover, the study of Katz and Koutroumpis (2016) revealed that a 1% increase in digitization of the consumption index would lead to a 0.07% reduction in unemployment worldwide between 2004 and 2015. This result is in line with the study of Kunming (2019) which found that every additional score in the Digital China Index has prompted more than 660,000 job opportunities.

The effects of technological innovation on employment were investigated by Su et al. (2022). A correlation was found between patents and jobs created between 2013 and 2021. Employment is positively impacted by technological innovation. Technological innovation may also have a negative impact on employment because it tends to have a greater substitution effect than a creation effect in Chinese society.

The study of Ping and Ying (2018) shows that the devastating impact of digitalization on employment would in general require significant changes in working style, executives, and decision-making processes. As a result, a company's lower costs of production would increase its labor income. Therefore, an increase in income would increase expectations of living, expand labor efficiency, and advance the economic progress of events and collective improvement.

A study by Aly (2020) reviewed the association between the digital revolution and employment among 25 developing countries in 2017. Malaysia, Chile, and China succeeded in converting the digital revolution into more extensive working opportunities. However, Turkey, South Africa, and even Jordan were absent from creating the ideal number of vacancies.

In the meantime, the study of Autor et al. (1998) shows that the demand for computers and skilled laborers is high, which leads to polarization in the USA. The studies of Acemoglu and Autor (2011); Goos et al. (2014); Michaels et al. (2014); and Ju (2014) found that as technology advances, the demand for "middle-skilled" labor declines while high and "low-skilled" labors continue to grow. Moreover, Sachs and Kotlikoff (2019) propose that insolent innovations accompany untalented work by youth, resulting in lesser earnings for incompetent youth and impeded efforts to obtain skills. However, digitalization and the demand for skilled labor have a positive impact, as digitalization and the exchange have not yet prompted polarization of the work market among lower–middle-income countries (Ugur and Mitra 2017). Meanwhile, the study of Banga and Velde (2018) shows that digitalization does not affect the labor market in 12 African countries. At the same time, the study of Arntz et al. (2016) found that pioneering digital innovations have a minimal impact on absolute business rates yet lead to enormous developments in labor among occupations and enterprises.

Despite this, the industrial revolution did not have the same impact on employment across different sectors. A recent study by Chinorackỳ et al. (2019) examined OECD countries' employment in agricultural, services, and industrial sectors and the probability of job automation. Sector-specific job automation risks were identified in the results. The agricultural and industrial sectors are more susceptible to job automation than the service sector. Therefore, countries that have a highly tensive labor force in agriculture and industry will experience high risk from job automation.

The literature is clear in showing that digitalization of the economy helps to boost economic development by taking the skilled labor force while victimizing the low and middle-skilled laborers. Several studies have been conducted in developed countries. The impacts are different from country to country. However, there is still a lack of literature in developing countries, specifically in the Middle East. There is no evidence to show how digital transformation impacts job creation in Saudi Arabia. It is still debatable and not predictable.

Saudi Arabia has prioritized the development of the digital economy, as it contributes significantly to achieving one of the primary goals of "Vision 2030", which is to create jobs. The government is especially optimistic regarding decreasing the young unemployment rate and expanding the participation of women in the workforce (SABR 2021).

On the other hand, it is noted that Saudi Arabia faces significant challenges in moving towards a digital transformation or knowledge-based economy. First, there is a mismatch in skills between jobs. Second, the unemployment rate among Saudis is 12.3%, and youth unemployment and female unemployment were 25.55% and 42%, respectively, in 2019 (SAMA 2020). The high unemployment rate among Saudi youth remains a component of the Saudi economy.

Considering the above challenges existing in the Saudi Arabian labor market, there is a need to do in-depth research on to what extent digital transformation dynamics affect the labor market by sectors in Saudi Arabia. Therefore, this research intends to develop a model for investigating the impact of digital transformation on the labor market by sector in Saudi Arabia. It will contribute to filling the knowledge gap.

To realize the objectives of this study, secondary data from the World Bank database and digital reports has been utilized. Eviews were used as a research tool for data analysis. It is useful to study the short- and long-term effects of digital transformation on the Saudi labor market using the ARDL error correction method. It is expected that the findings of this study will contribute to the empirical findings on the impact of digital transformation on the labor market and will help monitor emerging labor market trends in Saudi Arabia. Moreover, this study hopes to benefit policymakers in considering how to reorganize the socioeconomic infrastructure. This is to balance economic growth through greater technology and the utilization of the country's human resources.

Having said that, this paper is structured as follows: A detailed introduction including the impact of digital transformation on the labor market is discussed in Section 1 followed by the methodology in Section 2. Section 2 provides details of data and model specification and technical details on the statistical methods of the study. In Section 3, empirical findings and discussions are presented while Sections 4 and 5 consist of the conclusion and the policy implications followed by limitations and future research directions.

2. Methodology

Eviews software was used to measure the impact of the digital economy on the labor market. This was done using secondary time-series data collected from the World Bank from 2001 to 2019. ARDL error correction method was used, as it is useful to study the short- and long-term effects of digital transformation on the Saudi labor market. Moreover, the ARDL approach can easily be expanded to include multiple data and can accept general lag patterns (Econometric Approach Report 2010). Therefore, ARDL approach was utilized in this study.

This section is divided into two portions. First portion discusses the data and the variables used in the model specification. Meanwhile, the second portion explains the technical details of the statistical methods employed in the study.

2.1. Data and Model Specification

As a measure of digital expansion in a country, variables such as 'mobile cellular subscriptions' and 'fixed broadband subscriptions' were selected from the literature (Duasa and Ramadan 2019). Enrollment in tertiary education reflects human capital capability

(absorption of digital transformation), which is the root of succeeding technical inventions (Jafari-Sadeghi et al. 2021). Gross domestic product per person represents the labor productivity of an economy. It hopes to investigate how ICT empowers an economy by combining labor and capital inputs more efficiently, enhancing total factor productivity (Aly 2020; Duasa and Ramadan 2019). Unemployment is an independent indicator of the impact of the digital revolution on vulnerable employment in the country. The variable 'computer, communications, and other services' (LNCCO) was chosen to examine the relationship between diversification in trade and digitalization (Matthess and Kunkel 2020). As expected in the literature, the creation of intermediate input and services trade, notably modern services trade, are positively connected to digitalization. We also treated LNCCO as one of the digital development variables in this study (Matthess and Kunkel 2020; WTO 2017, 2019).

Five models were used to achieve the objectives of this study. The first three models examine the relationship between digital transformation and employment rate in the agricultural, service, and industrial sectors, respectively. The fourth model refers to the link between digital transformation and labor productivity. The last equation intends to investigate the association between the technological revolution and unemployment in Saudi Arabia. Table 1 shows the variables and the data used in the research models.

Table 1. Variables and data used in the research models specifications.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	
Dependent variables	LF-AGR	LF-SEV	LF-IND	TLF	UEM	
Variable description	Labor force participation rate in agriculture	Labor force participation rate in the service sector	Labor force participation rate in industries	Total labor force	Unemployment	
Independent variables	LNGDPP	LNCCO	LNSE	LNFBS	LNMCS	TLF
Variable description	Gross domestic product per person employed	Computer, communications, and other services (% of commercial service imports)	Enrollment in tertiary education (numbers)	Fixed broadband subscriptions (per 100 people)"	Mobile cellular subscriptions (per 100 people)"	Total labor force (numbers)

Source of data: World Bank Database.

2.2. Technical Details on the Statistical Methods

The following technical processes were taken for the data analysis in this study.

2.2.1. Unit Root Test

As a first stage in the analysis, a unit root test was performed with "Augmented Dickey-Fuller (ADF)", "DF-GLS", and "Phillips Perron (PP)" through "Akaike Information Criterion (AIC)" with constants to assure the order of integration of each variable.

2.2.2. Lag Length Criterion

The second step was to check the appropriate lag order. The appropriate lag order is one of the criteria for the ARDL method, and appropriate lag selection would help to eliminate the serial correlation of the error correction terms.

2.2.3. Bound Test

When the model meets all the criteria for an optimal fit, the bound test was performed to confirm the long-run relationship among the variables. ARDL, the most suitable model, was selected using "least Akaike Information Criteria", which has leased residual. From 2001–2019, cointegration tests were conducted on a long-run basis according to the following hypothesis.

H0: *There is no cointegration among the variables.*

H1: *There is cointegration among the variables.*

2.2.4. Long-Run and Short-Run Relationship

Long-run and short-run parameters were gained using the error correction model as stated in base model where λ is the speed of adjustment parameter with a negative sign, *ECT* is the error correction term, and *X* is the variable in the regression.

$$\Delta Y_t = \alpha_{0i} + \sum_{i=1}^{P} \gamma i Y_{t-i} + \sum_{i=0}^{q} \alpha_1 X_{t-i} + \lambda ECT_{t-1} + U_t \text{ (Base Model)}$$

2.2.5. Pairwise Granger Causality Test

This study used pairwise Granger causality tests to investigate the short-run relationship between the variables.

2.2.6. Diagnostic Test

Moreover, the adequacy of the models was verified using numerous diagnostic tests, such as Breusch–Godfrey Serial Correlation LM test, Ramsey RESET test, normality test, and CUSUM of squares.

3. Findings and Discussions

In the analysis of unit root test, we used mixed order variables and found that they remained stationary at the level and first difference between I(0) and I(1) at 1%, 5%, and 10% (Refer Appendix A). So, this study enables the use of ARDL-bound test models.

We used LR, FPE, AIC, SC, and HQ criteria to select the optimal lag length, as shown in Table 2. It shows that the maximum appropriate lag length is 1.

Table 2. Lag Length Criterion.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	178.82	NA	9.05×10^{-16}	−20.44	−20.20	−20.42
1	221.63	55.40 *	1.30×10^{-16} *	−22.54 *	−21.07 *	−22.39 *
2	294.81	51.65	1.32×10^{-18}	−28.21	−25.51	−27.94

* "Indicates lag order selected by the criterion. LR: sequentially modified LR test statistic; FPE: final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan–Quinn information criterion".

From 2001–2019, cointegration tests were conducted. There is a cointegration relationship between variables in five models in the long run as the F-statistic is greater than the critical value of the lower and upper bounds of I(0) and I(1), as stated by Pesaran et al. (2001) (Refer to Appendix B Bound test).

The further analysis illustrates how the selected variables affect the long run and short run in the following sections.

3.1. Long-Run Relationship

Long-run and short-run parameters were gained using the error correction model as presented in Tables 3 and 4, respectively. Table 3 denotes how the selected variables affect them in the long run (refer to the models in Appendix C). In Model 1, LNGDPP significantly affects the labor market in the agricultural sector. Other factors do not influence LNLF-AGR. In Model 2, LNGDPP, LNMCS, and LNSE have a negative relationship while LNFBS has a positive relationship with LNLF_SER in the long run. LNGDPP has significance at a 10% level. This implies that LNLF_SER decreases by 0.654 percent for every 1 percent increase in LNGDPP. Moreover, a 1% increase in "education level" and "mobile cellular subscriptions" would reduce the demand for the labor force in the service sector by 0.0024% and 0.008%, correspondingly. At the same time, LNLF-SER increases by 0.03 percent for

every 1 percent increase in LNFBS at a 5% significance level. Nevertheless, LNSE has a negative relationship with LNLF-SER, which is not in line with this theory. However, in Model 3 LNSE has a positive impact on LNLF-IND. An increase in LNSE by 1 percent would increase LNLF-IND by 0.26%. Therefore, we could mention that since the existing educational system is suitable for adopting digital transformation in the industrial sector rather than the service or agricultural sectors, all levels of educational institutions should ensure that their courses meet the labor market demand in the era of digital transformation.

Moreover, independent digital development variable LNCCO significantly increases the LNLF-IND by 0.03%. Meantime LNFBS has a negative impact on LNLF-IND in Model 3, which is in contrast with the finding of Duasa and Ramadan (2019).

Table 3. Estimates of Long Run Relationship.

Dependent Variables	**LNLF-AGR**	**LNLF-SEV**	**LNLF-IND**	**LNTLF**	**LNUEM**
Independent Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
LNGDPP (Coefficient)	23.529	−0.6540	−0.4086	−0.4337	0.6177
(Prob)	0.0960 ***	0.0661 ***	0.1310	0.2110	(0.4007)
LNCCO (Coefficient)	−0.3273	−0.0018	0.0439	−0.0089	−0.0916
(Prob)	(0.5051)	0.8882	0.0895 ***	0.0481 **	(0.4811)
LNSE (Coefficient)	2.0683	−0.1574	0.2575	0.0899	−0.2326
(Prob)	(0.1393)	0.0024 *	0.0003 *	0.5657	(0.4434)
LNFBS(Coefficient)	−0.2063	0.0177	−0.0284	0.0122	−0.0804
(Prob)	(0.4148)	0.0341 **	0.0245 **	0.0238 **	0.0115 **
LNMCS(Coefficient)	0.2527	−0.0083	−0.0041	−0.0173	−0.0316
(Prob)	(0.1121)	0.0464 **	0.4797	0.0134 **	0.0467 **
C(Coefficient)	−303.78	14.188	4.2471	17.596	−1.7999
(Prob)	(0.0968) ***	0.0087 *	0.2388	0.0004 *	0.4521

Note: Significant at * 1%, ** 5%, and *** 10%.

In Model 4, digital development variables LNCCO and LNMCS negatively influence GDPP at the 5% significant level while LNFBS is positively significant at the 5% level. In Model 5, the digital variables LNFBS and LNMCS influence unemployment. The unemployment rate decreased by 0.09%, 0.08%, and 0.032% for every 1 percent increase in LNCCO, LNFBS, and LNMCS, respectively. This finding shows evidence of the importance of digital transformation to reduce unemployment rates and increase productivity. Some economic sectors have benefited more from digitalization than others. Therefore, this study recommends empowering digitalization and enhancing ICT readiness in all sectors to boost economic diversification, job creation, and economic development. In particular, the agricultural sector should conduct a thorough study to identify the challenges and opportunities of using digital technology in KSA to meet the food demands of its citizens.

In Saudi Arabia, the adoption of digitization can act as a catalyst for long-term growth in the postoil sector and serve as a crucial pillar for welfare, transparency, and enhancing citizens' access to public services. Saudi Arabia should establish a sound economic foundation, acknowledge the importance of education in this era, and increase its investments in human capital to help young people develop their abilities. This could help increase the employment and production of the country.

3.2. Short-Run Estimates of the ARDL Approach

The result of the error correction model and short-run relationship is discussed in Table 4. In Model 1, the estimated results show that the sign of the error correction term (ECM_{t-1}) is negative and statistically significant. ECT_{t-1} is −2.2534, which indicates that adjustments are corrected by 225.34% from the short run to the long run of the period over every year.

Table 4. Estimates of Short Run Relationship.

Model 1	**Dependent Variable: D(LNLF_AGR)**	
Independent Variables	**Lag Order**	
	0	1
D(LNLF_AGR)		1.5497 ** (0.0290)
D(LNGDPP)	3.2025 (0.101)	5.8509 ** (0.0472)
D(LNCCO)	0.3174 ** (0.0414)	−0.6643 ** (0.025)
D(LNSE)	−0.5355 (0.5330)	
D(LNFBS)	−1.2798 ** (0.0282)	1.0922 ** (0.0194)
D(LNMCS)	0.0226 (0.4389)	0.0487 (0.1275)
ECT(−1)	−2.2534 ** (0.0435)	
Model 2	Dependent variable: D(LNLF_SER)	
D(LNLF_SER)		−0.5598 (0.2525)
D(LNGDPP)	0.0519 (0.7319)	0.0054 (0.9806)
D(LNCCO)	−0.0030 (0.7552)	−0.0153 (0.3971)
D(LNSE)	−0.2086 ** (0.0401)	
D(LNFBS)	−0.0184 (0.5641)	0.0231 (0.4296)
D(LNMCS)	−0.0027 (0.4056)	
ECT(−1)	−0.048464 ** (0.02786)	
Model 3	Dependent variable: D(LNLF_IND)	
D(LNLF_IND)		−0.3377 (0.8712)
D(LNGDPP)	−0.4514 (0.4439)	−0.2545 (0.7372)
D(LNCCO)	0.0019 (0.9528)	0.0571 (0.3156)
D(LNSE)	0.3326 (0.1661)	
D(LNFBS)	0.0670 (0.5189)	−0.1109 (0.2506)
D(LNMCS)	−0.0044 (0.6763)	0.0009 (0.9218)
ECT(−1)	0.040149(0.7795)	
Model 4	Dependent variable: D(LNGDPP)	
D(LNGDPP)		−0.0632 (0.8297)
D(LNTLF)	0.7393 (0.5203)	−1.9361 (0.1318)
D(LNCCO)	−0.0106 (0.5554)	
D(LNSE)	−0.0741 (0.7949)	0.4396 (0.1143)
D(LNFBS)	0.0185 (0.5867)	−0.0039 (0.8695)
D(LNMCS)	−0.0120 ** (0.0500)	
ECT(−1)	−0.1103 *** (0.0774)	
Model 5	Dependent variable: D(LNUNE)	
D(LNUNE)		−0.0996 (0.7796)
D(LNTLF)	−0.0371 (0.9876)	−0.3989 (0.8091)
D(LNCCO)	−0.0129 (0.7050)	−0.0738 *** (0.0595)
D(LNSE)	0.0709 (0.09012)	
D(LNFBS)	−0.1028 (0.1227)	
D(LNMCS)	−0.0097 (0.4576)	−0.0129 (0.3409)
D(LNGDPP)	−0.4364 (0.6400)	−0.2104 (0.7964)
ECT(−1)	−0.4813 *** (0.0978)	

Note: Significant at ** 5%, and *** 10%.

The greater the error term activists, the faster the economies correct to the stable growth rate. Moreover, in Models 2, 3, 4, and 5, the lagged error correction is negative

and statistically significant. However, the coefficient of ECM_{t-1} representing the slow adjustments toward equilibrium is corrected by 5%, 4%, 11%, and 4.8% in Models 2, 3, 4, and 5, respectively.

Most of the digital transformation variables have shown negative implications in the short run. In Model 1, LNGDPP and LNFBS have positive and LNCCO has a negative relationship with LNLF_AGR at order 1. However, LNCCO shows a positive relationship at lag order 0. In Model 2, only LNSE has a negative impact on LNLF_SER. In Models 2, 3, 4, and 5, the digital development variables LNCCO, LNFMS, and LNMCS are insignificant in the short run. These results are consistent with the study of Duasa and Ramadan (2019).

However, in Model 4, LNMCS has a negative implication on LNGDPP. Meanwhile, in Model 5, LNCCO has a negative implication on LNUNE in the short run. These outcomes could be attributed to the country's digital divide. The digital gap is a significant difficulty for economies in the digital revolution period due to significant variations in the development and quality of life between and within countries.

The results of the pairwise Granger causality tests show that unidirectional causality takes place among the variables. In Models 1 and 3, there is no causal relationship between the variables. In Model 2, LNLF_SER has a relationship with LNSE but the LNSE has no Granger cause with LNLF_SER. Thus, we can conclude that there is a unidirectional relationship between these variables. In Model 4, LNGDPP has a relationship with LNCCO, LNFBS, and LNMCS, but LNCCO, LNFBS, and LNMCS have no Granger cause with LNGDPP. This shows that there is a unidirectional relationship between these variables. In Model 5, LNFBS has a relationship with LNUNE. However, LNUNE has no Granger cause with LNFBS. LNUNE has a relationship with LNMCS and LNGDPP. However, the LNMCS and LNGDPP have no Granger cause with LNUNE. Therefore, there is a unidirectional relationship between these variables (refer to Appendix D).

Moreover, the results of the diagnostic tests indicate the stability of the specified models of the study, as shown in Table 5.

Table 5. Estimates of Diagnostic tests.

Models	Ramsey Reset Test	Normality Test	Serial Correlation LM Test
	F Statistic (Prob)		
Model 1	0.605	0.551	0.552
Model 2	0.657	0.516	0.053
Model 3	0.917	0.653	0.821
Model 4	0.330	0.884	0.268
Model 5	0.917	0.871	0.932

4. Conclusions

For a country's economic growth and flexibility, technological capabilities are essential. As a result, a country's economy must comprehend its current state as well as the trajectory of its technological development and its economic influence. The purpose of this study was to examine the impact of digital transformation on the labor market in a variety of sectors. In the short-term, digital transformation in the labor market has negative effects probably because of the nation's digital divide, which affects network availability and connectivity. However, in the long run, digital transformation in the labor market is profound in Saudi Arabia. The main findings of this study are:

- LNGDPP significantly affects the labor market in the agricultural sector. However, the digital variables do not significantly affect the labor market in the agricultural sector.
- An increase in labor productivity (LNGDPP) by 1% would decrease the demand for labor by 0.65%. Meanwhile, an increase in digital development, LNFBS, by 1% would increase the demand for labor by 0.03% in the service sector.

- An increase in digital development variables such as LNCCO and LNMCS has a negative impact on the demand for labor in the industrial sector while LNFBS and human capital have a positive impact.
- The unemployment rate is decreased by 0.09%, 0.08%, and 0.032% for every 1 percent increase in LNCCO, LNFBS, and LNMCS, respectively. Therefore, it is evident that digital variables LNCCO, LNFBS, and LNMCS are influencing the unemployment rate in Saudi Arabia.

5. Policy Implications

Saudi Arabia ranked second among the G20 countries in technological competitiveness, up 20 places from the previous year according to the Digital Riser Report (Digital Riser Report 2021). This advancement reflects the ambition and progress of Saudi Arabia's strategy in developing the country's telecommunications infrastructures. Since 2016, when Saudi Vision 2030 was initiated, several digital programs have been administered in collaboration between the government and service providers to improve telecommunications infrastructure, both fixed and mobile, and to optimize fixed and mobile broadband network performance to reduce the digital divide between densely populated and rural areas.

In 2017, Saudi Arabia's Ministry of Communications and Information Technology made an agreement with IBM to teach and qualify more than 38,000 people in information and communication technology (ICT) programs over the next four years through 30 new educational institutions. Around 19,000 trainees were projected to receive certification in the profession by 2020. The ministry's fundamental concerns, particularly "the shortage of specialized human capital" and "low user skills in the communication and information technology industry," was addressed through a deal with IBM. Through the ministry, "the Kingdom launched five upcoming programs involving the training, qualification, and recruiting of ICT experts" (Saudi Arabia: Political, Economic & Social Development Report 2017).

Furthermore, in 2021, the Saudi government established the Digital Government Authority to regulate the work of digital government in its agencies and to develop a technologically advanced and proactive government capable of providing highly efficient electronic services, such as e-education, e-government, and e-commerce to consumers, enterprises, and society. The government aims at accelerating digital transformation by adopting and implementing telecommunication systems and ICT technology. This would provide access to the internet for all regardless of their economic status.

The more extensive the use of ICT and other computerized apparatuses, the more enlightening and effective the residents will be. The Saudi Master Plan 2030 should achieve its goal by cooperating with the International Telecommunication Union (ITU), portable administrators, banks, retailers, and other specialist organizations.

This joint effort will improve worldwide interoperability and drive economies of scale to increase opposition and interest in ICT ventures in the area. A strong administrative strategy is also necessary to stimulate competition in the ICT markets of the locale. A government could direct the market to ensure that the positive ramifications of digital change on the way of life are acknowledged in the short and long term.

This research concludes with a call for active state intervention in promoting R&D, investing in infrastructure and education, and introducing regulatory practices that ensure that technology-induced organizational arrangements generate decent jobs while remaining mindful of possible government overreach with new technologies. Saudi Arabia, the use of digitization can constitute a catalyst for sustainable development in the post oil area and become a key pillar of transparency, welfare, and improving citizens' access to public services. To accomplish digital transformation, Saudi Arabia must base the economy on the recognition that education plays a key role in this phase, and the Saudi government should make greater investments in human capital to enhance skills among youth.

6. Limitation and Future Research Directions

Based on the results of this study, there are several directions for further investigation. To begin with, rather than investigating the impact of technological transformation within different sectors of the country, this study focused on the impact of technological transformation on the labor market at the sector level. The impact of technological transformation on the labor market varies by sector. Therefore, this impact can be the focus of upcoming research, which would be fantastic to investigate within the sector. The next study can investigate the impact of technological transformation among households. Finally, future studies can be carried out using primary data rather using limited secondary data within sectors to investigate the microlevel effect. All of these upcoming and current research endeavors can be improved by taking into account the capacity for alternative technological transformation of different businesses.

Author Contributions: Conceptualization, M.S. and H.A.; methodology, M.S.; software, M.S.; validation, M.S., H.A.; formal analysis, M.S.; investigation, H.A.; resources, H.A.; data curation, M.S.; writing—original draft preparation, M.S.; writing—review and editing, H.A.; visualization, M.S.; supervision, H.A.; project administration, M.S. and H.A.; All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Unit root test.

Variables	*p*-Value: ADF Test (Intercept Only)		*p*-Value: PP Test (Intercept Only)	
	Level	**1st Diff**	**Level**	**1st Diff**
LNGDPP	0.8156	0.0114 **	0.8786	0.0007 *
LNCCO	0.0000	0.0103 **	0.0832	0.0008 *
LNSE	0.4110	0.1000 ***	0.6599	0.0800 ***
LNUNE	0.0928	0.0414 **	0.0207	0.0037 *
LNFBS	0.0601	0.0655 ***	0.0852	0.0008 *
LNTLF	0.8330	0.1000 ***	0.6065	0.0120 **
LNMCS	0.0000	0.0064 *	0.0002	0.0064 *
LNLF_IND	0.9198	0.0093 *	0.9187	0.0093 *
LNLF_ AGR	0.1332	0.0516 ***	0.5576	0.1000 ***
LNLF_SER	0.7473	0.0289 **	0.6557	0.0289 **

Note: Significant at * 1%, ** 5%, and *** 10%.

Appendix B

Table A2. Bound test.

		Model 1		
Test Statistic	**Value**	**Sign**	**I(0)**	**I(1)**
F-statistic	3.840882	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
		Model 2		
F-statistic	4.027924	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
		Model 3		
F-statistic	3.773361	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
		Model 4		
F-statistic	8.177814	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
		Model 5		
F-statistic	4.854579	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Appendix C

Model specification:
Model (1)

$$\begin{aligned}\Delta logLFAGR_t = \; & \alpha_0 + \sum_{i=1}^{P} \gamma i \Delta logLFAGR_{t-i} \\ & + \sum_{i=0}^{q} \alpha_1 \Delta logGDPP_{t-1} + \sum_{i=0}^{q} \alpha_2 \Delta logCCO_{t-i} \\ & + \sum_{i=0}^{q} \alpha_3 \Delta logSE_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta logFBS_{t-i} + \sum_{i=0}^{q} \alpha_5 \Delta logMCS_{t-i} \\ & + \beta_1 \, logLFAGR_{t-1} + \beta_2 \, logGDPP_{t-1} + \beta_3 \; logCCO_{t-1} \\ & + \beta_4 \, logSE_{t-1} + \beta_5 \, logFBS_{t-1} + \beta_6 \, logMCS_{t-1} + U_t\end{aligned}$$

Model (2)

$$\begin{aligned}\Delta logLFSER_t = \; & \alpha_0 + \sum_{i=1}^{P} \gamma i \Delta logLFSER_{t-i} \\ & + \sum_{i=0}^{q} \alpha_1 \Delta logGDPP_{t-1} + \sum_{i=0}^{q} \alpha_2 \Delta logCCO_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta logSE_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta logFBS_{t-i} \\ & + \sum_{i=0}^{q} \alpha_5 \Delta logMCS_{t-i} + \beta_1 \, logLFIND_{t-1} + \beta_2 \, logGDPP_{t-1} + \beta_3 \; logCCO_{t-1} + \beta_4 \, logSE_{t-1} \\ & + \beta_5 \, logFBS_{t-1} + \beta_6 \, logMCS_{t-1} + U_t\end{aligned}$$

Model (3)

$$\begin{aligned}\Delta logLFIND_t = \; & \alpha_0 + \sum_{i=1}^{P} \gamma i \Delta logLFIND_{t-i} \\ & + \sum_{i=0}^{q} \alpha_1 \Delta logGDPP_{t-1} + \sum_{i=0}^{q} \alpha_2 \Delta logCCO_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta logSE_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta logFBS_{t-i} \\ & + \sum_{i=0}^{q} \alpha_5 \Delta logMCS_{t-i} + \beta_1 \, logLFIND_{t-1} + \beta_2 \, logGDPP_{t-1} + \beta_3 \; logCCO_{t-1} + \beta_4 \, logSE_{t-1} \\ & + \beta_5 \, logFBS_{t-1} + \beta_6 \, logMCS_{t-1} + U_t\end{aligned}$$

Model (4)

$$\begin{aligned}\Delta logGDPP_t = \; & \alpha_0 + \sum_{i=1}^{P} \gamma i \Delta logGDPP_{t-i} \\ & + \sum_{i=0}^{q} \alpha_1 \Delta logTLF_{t-1} + \sum_{i=0}^{q} \alpha_2 \Delta logCCO_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta logSE_{t-i} \\ & + \sum_{i=0}^{q} \alpha_4 \Delta logFBS_{t-i} + \sum_{i=0}^{q} \alpha_5 \Delta logMCS_{t-i} + \beta_1 \, logGDPP_{t-1} \\ & + \beta_2 \, logTLF_{t-1} + \beta_3 \; logCCO_{t-1} + \beta_4 \, logSE_{t-1} \\ & + \beta_5 \, logFBS_{t-1} + \beta_6 \, logMCS_{t-1} + U_t\end{aligned}$$

Model (5)

$$\begin{aligned}\Delta logUNE_t = \; & \alpha_0 + \sum_{i=1}^{P} \gamma i \Delta logUNE_{t-i} \\ & + \sum_{i=0}^{q} \alpha_1 \Delta logGDPP_{t-1} + \sum_{i=0}^{q} \alpha_2 \Delta logCCO_{t-i} \\ & + \sum_{i=0}^{q} \alpha_3 \Delta logSE_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta logFBS_{t-i} + \sum_{i=0}^{q} \alpha_5 \Delta logMCS_{t-i} \\ & + \sum_{i=0}^{q} \alpha_6 \Delta logTLF_{t-i} + \beta_1 \, logUNE_{t-1} + \beta_2 \, logGDPP_{t-1} \\ & + \beta_3 \; logCCO_{t-1} + \beta_4 \, logSE_{t-1} + \beta_5 \, logFBS_{t-1} \\ & + \beta_6 \, logMCS_{t-1} + \beta_7 \, logTLF_{t-1} + U_t\end{aligned}$$

Appendix D

Table A3. Pairwise Granger Causality Test.

Null Hypothesis	Probability Value
Model 2	
D(LNLF_SER) does not Granger cause D(LNSE)	0.0640 **
Model 4	
D(LNGDPP) does not Granger cause D(LNCCO)	0.0236 **
D(LNGDPP) does not Granger cause D(LNFBS)	0.0204 **

Table A3. *Cont.*

Null Hypothesis	Probability Value
D(LNMCS) does not Granger cause D(LNGDPP) D(LNGDPP) does not Granger cause D(LNMCS)	0.0946 * 0.0952 *
Model 5	
D(LNFBS) does not Granger cause D(LNUNE)	0.0557 *
D(LNUNE) does not Granger cause D(LNMCS)	0.0353 **
D(LNUNE) does not Granger cause D(LNGDPP)	0.0120 **

Note: Significant at * 1% and ** 5%.

References

Acemoglu, Daron, and David Autor. 2011. Skills, tasks, and technologies: Implications for employment and earnings. In *Handbook of Labor Economics*. Amsterdam: Elsevier, vol. 4, pp. 1043–171.

Aly, Heidi. 2020. Digital transformation development and productivity in developing countries: Is artificial intelligence a curse or a blessing? *Review of Economics and Political Science*. Available online: https://www.emerald.com/insight/2631-3561.htm (accessed on 20 December 2022). [CrossRef]

Arntz, Melanie, Terry Gregory, and Ulrich Zierahn. 2016. The risk of automation for jobs in OECD countries: A comparative analysis. In *OECD Social, Employment and Migration Working Papers*. No. 189. Paris: OECD.

Autor, David H., Lawrence F. Katz, and Alan B. Krueger. 1998. Computing inequality: Have computers changed the labor market? *The Quarterly Journal of Economics* 113: 1169–213. [CrossRef]

Banga, Karishma, and Dirk Willem Velde. 2018. Digitalization and the Future of African Manufacturing, SET Supporting Economic Transformation. Available online: https://setodi2020.wpenginepowered.com/wp-content/uploads/2018/03/SET_Future-of-manufacturing_Brief_Final.pdf (accessed on 20 December 2022).

Bukht, Rumana, and Richard Heeks. 2017. *Defining, Conceptualizing and Measuring the Digital Economy*. GDI Development, Informatics Working Papers, no. 68. Manchester: University of Manchester.

Chinoracký, Roman, Stanislava Turská, and Lucia Madleňáková. 2019. Does Industry 4.0 have the same impact on employment in the sectors? *Management (18544223)* 14: 5–17.

Digital Economic Report. 2019. New York: United Nations Publications.

Digital Riser Report. 2021. European Center for Digital Competitiveness, ESCP Business School. Available online: https://digital-competitiveness.eu/wp-content/uploads/Digital_Riser_Report-2021.pdf (accessed on 20 December 2022).

Duasa, Jarita, and Aisha Elalim Ramadan. 2019. Digital development and economic growth in selected Asian countries: Applying response surfaces for critical bounds of co-integration test. *Journal of Southeast Asian Studies* 24: 1–18. [CrossRef]

Econometric Approach Report. 2010. *How Has the Preferred Econometric Modal Been Derived?* Oxera: Department for Transport, Transport Scotland, and the Passenger Demand Forecasting Council.

Goos, Maarten, Alan Manning, and Anna Salomons. 2014. Explaining job polarization: Routine baised technological change and offshoring. *American Economic Review* 104: 2509–26. [CrossRef]

Jafari-Sadeghi, Vahid, A. García-Pérez, E. Candelo, and Jerome Couturier. 2021. Exploring the impact of digital transformation on technology entrepreneurship and technological market expansion: The role of technology readiness, exploration, and exploitation. *Journal of Business Research* 124: 100–11. [CrossRef]

Ju, Jaeuk. 2014. The effects of technological change on employment: The role of ICT. *Korea and the World Economy* 15: 289–307.

Katz, Raul L., and Pantelis Koutroumpis. 2016. *Assessment of the Economic Impact of Telecommunications in Senegal (2003–2014)*. Columbia Institute for Tele-Information Working Paper. New York: Columbia Institute for Tele-Information.

Knickrehm, Mark, Bruno Berthon, and Paul Daugherty. 2016. *Digital Disruption: The Growth Multiplier*. Dublin: Accenture.

Kunming, He Wei In. 2019. Digital Industry Plays a Bigger Role in Economic Growth. China Daily. Available online: http://www.chinadaily.com.cn/a/201905/23/WS5ce5f791a3104842260bd477.html (accessed on 20 December 2022).

Kvochko, Elena. 2013. Five Ways Technology Can Help the Economy. World Economic Forum. Available online: https://www.weforum.org/agenda/2013/04/five-ways-technology-can-help-the-economy/ (accessed on 20 December 2022).

Matthess, Marcel, and Stefanie Kunkel. 2020. Structural change and digitalization in developing countries: Conceptually linking the transformations. *Technology in Society* 63: 101428. [CrossRef]

Michaels, Guy, Ashwini Natraj, and John Van Reene. 2014. Has ICT polarized skill demand? Evidence from eleven countries over twenty five years. *The Review of Economics and Statistics* 96: 60–77. [CrossRef]

Nedelkoska, Ljubica, and Glenda Quintini. 2018. *Automation, Skills Use and Training, OECD Social, Employment and Migration Working Papers, No. 202*. Paris: OECD Publishing. [CrossRef]

Pesaran, M. Hashem, Yongcheol Shin, and Richard J. Smith. 2001. Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics* 16: 289–326. [CrossRef]

Ping, He, and Gao Yao Ying. 2018. Comprehensive view on the effect of artificial intelligence on employment. *Topics in Education, Culture and Social Development (TECSD)* 1: 32–35.
SABR. 2021. Saudi Arabia Budget report. A review of the Saudi Arabia 2021 Budget in the Context of Recent Economic Developments. KSA. Available online: https://home.kpmg/sa/en/home/insights/2020/12/saudi-arabia-2021-budget-report.html (accessed on 20 December 2022).
Sachs, Jeffrey D., and Laurence J. Kotlikoff. 2019. Smart machine and long-term misery 0898-2937, national bureau of economic. *Journal of Economic Literature* 57: 3–43.
SAMA. 2020. Saudi Central Bank, Saudi Arabia Economic Report. Available online: https://www.sama.gov.sa/en-us/economicreports/pages/yearlystatistics.aspx (accessed on 20 December 2022).
Saudi Arabia: Political, Economic & Social Development Report. 2017. Ministry of Foreign Affairs. Available online: https://www.saudiembassy.net/sites/default/files/WhitePaper_Development_May2017.pdf (accessed on 20 December 2022).
Su, Chi-Wei, Yuan Xi, Umar Muhammad, and Lobont Oana-Ramona. 2022. Does technological innovation bring destruction or creation to the labor market? *Technology in Society* 68: 101905. [CrossRef]
Ugur, Mehmet, and Arup Mitra. 2017. Technology adaptation and employment in less developed countries: A mixed-method systematic review. *World Development* 9: 1–18. [CrossRef]
Walwei, Ulrich. 2016. *Digitalization and Structural Labor Market Problems: The Case of Germany*. ILO Research Paper No 17. Geneva: International Labour Organization, pp. 1–31.
WTO, World Trade Report. 2017. *Trade, Technology and Jobs*. Geneva: WTO.
WTO, World Trade Report. 2019. *The Future of Service Trade*. Geneva: WTO.

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ISBN 978-3-0365-7969-6