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Great Minds Think Alike, Fools Seldom Differ: An Empirical Analysis of Opportunity Assessment in Technology Entrepreneurs

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Abstract: This study extends the literature on self-employment and entrepreneurship by offering empirical insights into the factors that influence technology entrepreneurs at the early stages of the new venture creation process. Specifically, this research focuses on how technology entrepreneurs assess opportunities at the start of the process. Using data from technology entrepreneurs in Ireland, we analyze differences between part-time entrepreneurs and full-time entrepreneurs and discover that not all entrepreneurs attach importance to activities that were previously considered fundamental. While we confirm that opportunity cost, market assessment, and financial analysis are critical and ever-present, we argue that aspiring technology entrepreneurs must be cognizant that when employment-related costs are included as a dimension of opportunity costs, the level and importance of opportunity costs rise for both part-time and full-time entrepreneurs. We also find that whether nascent entrepreneurs work full-time or part-time on the new venture has an impact on which activities are completed and at what point of the process they are completed. For example, we show that part-time entrepreneurs identify markets earlier than full-time entrepreneurs whereas the opposite is true when it comes to financial data preparation. We argue that a greater understanding of these issues will help technology entrepreneurs to make informed decisions. As a result, our findings may influence an aspiring entrepreneur's decision to start a new venture. They also have ramifications for investors and support services. Consequently, we discuss theoretical contributions, practical ramifications, and future research possibilities.

Keywords: opportunity cost; market assessment; financial analysis; nascent entrepreneurship; incubation centers



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1. Introduction

This research is motivated by a realization that the success of new businesses is crucial to world economies [1,2] as well as the rate at which new businesses emerge annually [3]. There are already many studies on entrepreneurship examining what entrepreneurs do, how they think and how they discover opportunities [4–10]. Additionally, theory suggests that there are several distinct stages in opportunity development—discovery, evaluation and exploitation of ideas [11–14], yet there remains a dearth of empirical studies on factors impacting success in the early stages of the entrepreneurial process.

While the importance of exploiting opportunities is unquestionable for any successful venture [15,16], we argue that some type of evaluation is required in the early phases of the entrepreneurial process. This is because whether or not an opportunity is successfully exploited is determined at the evaluation or assessment stage [12,17–19]. Therefore, this research focuses on how entrepreneurs assess opportunities in the early stages of the process and examines whether traditional evaluation approaches still apply and whether such applications are universal in a real-world context. Furthermore, it examines whether there

is a difference between part-time entrepreneurs and full-time entrepreneurs. In order to frame the study and capture context-specific data, we focus on technology entrepreneurs. While technology entrepreneurs follow a similar process to other entrepreneurs, the mechanisms used to create their product or service may differ from other new business creators. Technology entrepreneurs typically assemble specialized people and employ scientific and technological advances to create new products, services or solutions which requires significant investment. The lead time from development to market is often long and the probability of failure is high.

The current study recognizes that there is a considerable body of prior work on entrepreneurial behavior, but contends that a large proportion of it concerns itself with opportunity recognition and entrepreneurial characteristics rather than evaluation. For example, Welpel et al. [20] argue that the intention or decision to start a business is a result of the interplay between objective opportunity characteristics, subjective evaluations of these objectives, and an individual's emotional interference. Yasir et al. [21] emphasize the role of entrepreneurs' personal values, Dorcas et al. [22] examine entrepreneurs' traits while Khazami et al. [23] examine the role of social motivation. Other authors emphasize the role that cognition plays in the subjective evaluation of opportunities [19,20,24] and yet more studies examine the role that counterfactual thinking—imagining what might have been—plays in the entrepreneurial decision-making process [4,25].

The manner in which expert entrepreneurs frame decisions is examined by Dew et al. [9], and although comparing different stages in an individual's entrepreneurial journey, their finding that expert entrepreneurs use effectual logic when making decisions and invest only what they can afford to lose is indicative of the importance of rationality-based measures in framing such decisions, while others believe that intuition assumes primacy in managerial decision making [26]. An explanation for such disparate views is expressed by Choi et al. [12], who contend that a trade-off exists between the time needed to gather knowledge to inform a decision and the necessity to take the decision to exploit an opportunity. However, in assessing this trade-off we have found that little is empirically documented on what specific criteria are used in forming such decisions, particularly during the early entrepreneurial process. In addressing this issue, we recognize what has already been shown in literature, that three key constructs—opportunity costs, market assessment and financial analysis—are of singular importance in the evaluation process [11,12,14,27] and by examining these constructs in the context of our chosen demographic, will address a gap in current knowledge on new venture creation.

Specifically, we analyze opportunity costs using measures about human capital including employment status and employment choice, employment experience, educational level, and impacts of entrepreneurship on income. We consider entrepreneurs' market assessment by exploring if and when entrepreneurs actually identify a target market, gather competitor and customer information and if the resulting findings impact their decision-making. We also consider financial analysis from the perspective of timing, i.e., if and when financial statements and financial projections are prepared during evaluation. Additionally, we ask respondents about their time commitment to entrepreneurship, whether it is full-time or part-time and test to see whether and how this impacts on the evaluation processes.

Because our research constructs are tightly coupled with an entrepreneur's personal circumstances and the external influences on him/her [28] our study examines technology entrepreneurs ($n = 88$) in their natural setting rather than using hypothetical perceptual measures (i.e., a student sample). This sampling strategy lends itself to greater contextual relevance and validity in our findings and also represents a point of novelty from many prior studies.

This research seeks to enrich our understanding of the mechanisms involved in the entrepreneurial evaluation process and whether these differ between full-time or part-time entrepreneurs. By doing so, our study makes several significant contributions. First, it extends a line of research and explicitly examines an important but neglected area relevant to technology entrepreneurs. Second, it adds to the academic debate by providing insights

into the activities of technology entrepreneurs. Finally, it enhances the field of new venture creation by providing practical suggestions for potential technology entrepreneurs who seek to better understand the early stages of the new venture creation process.

The remainder of the paper is organized as follows. The next section and its constituent subsections synthesize the relevant literature on opportunity cost, market assessment, and financial analyses. We then outline and justify the research method employed in our study. Next, we present the findings of the study and discuss these findings. Finally, we offer a conclusion incorporating some limitations of the study and avenues for future research.

2. Literature Review

Defining entrepreneurship can be problematic and maybe sometimes misleading. For example, the assertion that entrepreneurship is concerned with the discovery and exploitation of profitable opportunities [14] does not appear to take account of the notion of risk, which because of uncertainty is always inherent in new market decisions [29]. This is borne out by reality, where evidence indicates that a large percentage of start-ups (often thought to be between 50% and 70%) fail within the first 5 years [18,30,31]. This fact, coupled with research suggesting that idea generation, by itself, is not an issue, implies that the key challenge lies in the effective evaluation of those ideas [17,18]. This means that entrepreneurs must be honest with themselves and objectively assess whether they have identified a viable business opportunity, as distinct from a good idea with limited or no commercial prospects [27]. This is particularly important for technology entrepreneurs as the lead time to market is often long and the risk of failure is high. Central therefore to the resulting opportunity confidence [16,32] leading to adoption or rejection of an idea is an iterative process of evaluation, which in the first instance is critical in nascent entrepreneurial processes [12,27].

2.1. Opportunity Cost

Opportunity costs are considered to be the foregone benefit of the next available alternative as a consequence of making a choice [33]. In general, this refers to the cost of an alternative that must be relinquished in order to pursue a certain action and includes items such as income and perceived security from alternative employment, personal liquidity changes, and alternative career development opportunities. That is not to say that the opportunity cost of new business venturing represents a dichotomous choice between entrepreneurship and non-entrepreneurial activity.

For example, many individuals begin the process of new venture creation while maintaining regular employment [34]. This can have the effect of lowering opportunity costs because the part-time or hybrid entrepreneur does not forgo an income, and at the same time may increase human capital through continued learning [35,36]. Choice-making is also necessary in the context of preference for specific entrepreneurial ventures, and so for existing or experienced entrepreneurs, selecting from among several viable ventures also creates an opportunity cost when evaluating those opportunities [16]. Additionally, opportunity cost-based decisions form part of the early-stage processes because entrepreneurs are resource-constrained [28,37,38] and therefore not only have to choose between alternative projects but also have to decide between applying resources to further opportunity evaluation or opportunity exploitation [12,15].

Theorists suggest that individuals engage in a form of cost-benefit analysis in which current opportunities and their returns are compared to prospects associated with alternative opportunities [39–42]. Sometimes this evaluative exercise may be informal or unscientific [32], although the process tends to become more formal once the application of resources (other than the entrepreneur's time) is factored into the equation. Often these costs are financial in nature. For example, Amit et al. [40] used the opportunity cost framework to study the transition to entrepreneurship from salaried or paid employment. They found that the individuals who started new ventures had lower income compared to those who chose to remain in paid employment, a finding mirrored in Cohen's [43]

classic work. A similar financial formulation of opportunity cost is evidenced in situations where entrepreneurs invest their personal funds or personally guarantee borrowings when starting a business [14,29] or where they incur unlimited liability resulting from the debt structure of the business [44].

However, opportunity cost in the context of entrepreneurial intention is a multi-dimensional construct. Cassar [33] explored indicators of household income as a proxy for the financial dimension along with influences such as the education level of the entrepreneur and their managerial experience—effectively introducing the notion of human capital as a dimension of opportunity cost. Defining human capital as “the extent to which an individual has invested in their knowledge and can subsequently apply such knowledge to tasks as required”, he goes on to assert that individuals with greater human capital levels incur greater opportunity costs when starting a business, because they have better alternatives available to them. However, entrepreneurial activity can, in turn, increase human capital [11] which is of major significance given the assertion that individuals that possess it, on average, possess better judgment and evaluative skills [45] and are more likely to become entrepreneurs in the first instance [29]. This view is consistent with Shane and Venkataraman’s [14] seminal work which asserts that human capital in the form of learning, reduces the cost of exploiting an opportunity when the learning or experience is transferrable.

While studies commonly assess human capital using measures around education level, start-up experience and industry experience and combine it with specific factors such as ‘bank connections’ [46], a wider view is taken in some studies. For example, in one study the concept of ‘Pre-Venture Managerial Experience’ (PVME) is explored and found to be relevant in several aspects, namely; the decision to engage in entrepreneurial activity, the goals set for the new venture and the level of risk that is acceptable [47]. Other authors concur with PVME theory concluding that it drives overall expectations, scope, and direction [48–52]. This is because individuals who have extensive managerial experience typically enjoy high earnings and usually also have several career alternatives available to them. Since technology innovation start-ups are typically characterized by high potential returns, they are likely to be appealing especially to those with high pre-venture experience.

However, studies around the impact of opportunity cost and human capital are not exclusively concerned with the intention to engage in entrepreneurship, often resulting in disparate findings. Hormiga et al. [42] found an additional influence—the propensity to innovate, and Arora and Nandkumar [41] found that people with greater opportunity cost tended to operate to a different planning horizon and were more likely to ‘cash-out’ sooner. In the realm of experience and education, there is also a lack of unanimity. For example, while many support the proposition that entrepreneurs gain important insights from applicable prior experience [27,53–57] others do not. On the one hand, empirical studies have shown that experience is associated with greater task performance, including forecasting ability [58–60] but on the other hand, such claims are disputed by those who argue against the benefit of experience, due to the heterogeneity across tasks limiting transferability of knowledge [61–63], the lack of task repeatability [64,65] and cognitive biases that may inhibit learning [30,66–68].

Notwithstanding these debates, the literature reviewed for this study found only limited empirical research that directly investigates the influence that experience has on entrepreneurs’ new business expectations and judgments, with inconclusive findings. This alone provides a compelling reason for addressing this topic in the current work. In addressing it, various dimensions of the construct and their place in the literature are outlined in Table 1. These dimensions are tested in our fieldwork.

Table 1. Dimensions of opportunity cost.

Dimension	Consideration	Reference
Extent to which an entrepreneur has choices	The cost incurred versus alternative choices, specific to the individual, where the lower the cost, the more likely to pursue entrepreneurship	[14,20,33]
Full-time versus part-time	Part-time or hybrid entrepreneurship can reduce financial uncertainty	[34,35,69]
Level of human capital	Individuals with greater human capital incur a greater opportunity cost	[16,29,33]
Employment and education history	Work experience and high education levels may promote successful entrepreneurship	[11,29,35,70]
Liquidity and economic risk	Entrepreneurs incur financial costs in terms of income foregone in financing the business and risk in guaranteeing debts and loans	[33,38,44,71]

2.2. Market Assessment

In order to achieve even a modicum of success, entrepreneurs must determine if there is an identifiable market for the opportunity they wish to exploit through some process of market evaluation or assessment [28,72]. Intending entrepreneurs need to make decisions based on identified customer needs rather than unconfirmed assumptions [7,27,73] and this includes considering revenue and cost drivers as well as assessing potential competition [16]. In fact, competition is particularly pertinent where an entrepreneur is employing a first-mover strategy [74], and so while market-related decisions can be some of the most profound organizational decisions an entrepreneur will face, they can also be overwhelming for an aspiring entrepreneur [15].

Much of the research in the area of market assessment and quantitative work on target markets stems from the areas of economics and econometrics. The focus of this research has largely been on estimating strategies for the mode of market entry for new opportunities [75,76]. This becomes challenging and costly, particularly for firms with limited managerial capacity and other resource constraints [77]. Beginning by gathering information for assessment [12,28,78] a secondary but equally vital demand is to rally the resources required to enter their preferred market(s), set up their operations, advertise their presence, promote their products, and establish distribution channels, and compounding these demands is uncertainty—around customers preferences, product mix, and pricing and the marketing strategies [35]. As a process, evaluation often begins with an informal investigation of a potential market need, which may precipitate further, more formal reviews [32] which traditionally take the form of feasibility analysis, market research or market experimentation [12,73]. However, the dilemma for the entrepreneur is about where to stop the evaluation and begin to exploit the opportunity and enter the market to recoup such early resource spending [16,79].

In addressing this issue, Choi et al. [12] theorize that there exists a trade-off between the time needed to increase legitimacy and the requirement to act. Conceiving a concept described as an “ignorance threshold”, they posit that once an entrepreneur reaches a threshold of accumulated knowledge then they should move to the next stage of exploitation action. In turn, there are several factors that influence this. For example, serial entrepreneurs tend to identify more potential markets before moving on [9,80] and consistent with the human capital discussion in the previous section of this paper, individuals

with prior industry experience may already have prior market knowledge [11,81]. Clearly, this may represent an advantage over entrepreneurs who have no such experience, although such consideration needs to be balanced against the common entrepreneurial cognitive biases such as overconfidence and excessive risk-taking propensity [82]. Equally, while expert entrepreneurs often apply both predictive and non-predictive logic in evaluating a market opportunity [9], there also exists the possibility that their experience may be irrelevant, thereby rendering it ineffective in arriving at the ignorance threshold.

Market evaluation is essentially about addressing a customer problem and building value around a defined need rather than creating a novel but perhaps unnecessary or superfluous idea [15]. This not only has the effect of improving decision-making but also improves credibility in the eyes of potential stakeholders and financiers. Specifically, in the context of nascent entrepreneurship, one of the most critical aspects of this process is in the assessment of competitive forces. Timing is crucial [12] because the longer that is spent on evaluation, the greater the chance given to competitors to assimilate information on the new venture and thus become better prepared to compete against it—a factor that becomes more critical as the opportunities are novel. In this light, the dimensions of the construct are shown in Table 2. These dimensions are used to guide the development of our data collection instrument.

Table 2. Dimensions of market evaluation.

Dimension	Consideration	Reference
Evaluation of an opportunity	Begins with an informal market investigation, becoming more formal as the likelihood of exploitation increases The more defensible a market position, the more attractive the opportunity	[12,15,32,83,84]
Evaluation of market opportunities	Identifying more potential markets to provide a choice of the market to pursue	[9,15]
Evaluation of customer value	Must be market-orientated to create superior customer value	[7,84–86]
Evaluation of competition	At a threshold, need to cease evaluation and action the exploitation in order to gain a first-mover advantage before the competition learns to compete	[12,27,83]
Evaluation of exploitation decision	Exploitation is more likely when the entrepreneur perceives more knowledge of customer demand for the opportunity	[7,12,14]

2.3. Financial Analysis

People enter the entrepreneurial fray for a variety of reasons and financial considerations are of central import, whether they represent the primary motivation or not. Consistent with the opportunity cost arguments, Shane and Venkataraman [14] found that exploiting opportunities is more common when people have access to financial capital, and Shane [87] provides empirical evidence that in addition to radicalness and patent scope, the commercialization of inventions and innovations is heavily influenced by the magnitude of their economic value. However, this is not a static concept, and so in considering financial analysis in the context of opportunity evaluation, this must take two forms—current state analysis and future state predictions. The former refers to the examination and review of accounting statements measuring what is actually happening in the new business and the

latter to projections and predictions of sales and other indicators. In turn, this means that the frequency with which a firm prepares such statements determines the minimum interval for performing such evaluations [3]. The resulting conundrum results from the fact that the stability and consequently the ability to estimate such figures may be problematic in a fledgling firm, raising additional questions about whether to abandon further opportunity evaluation and instead exploit the business opportunity to drive a potential income stream and promote its own survival [12,27,83].

What is not the subject of debate, however, is the fact that undercapitalization and cash-flow problems are some of the main reasons for venture failure, especially in technology-oriented ventures [88,89]. Therefore, acquiring the confidence of potential investors is critical and can be achieved by reliable predictions about future firm performance and viability [3,28,89]. Research has shown that nascent entrepreneurs who devoted time to preparing financial projections were substantially more likely to attract investment [29] and not just from external sources [71,89]. However, uncertainty presents a challenge in the early stages of the process [3,29,89] and may lead to optimistic prediction error [90].

Despite these recognized difficulties, nearly all research dealing with the acquisition of financial capital concerning entrepreneurship concerns itself with the firm rather than the venture [5,89–92]. This means that such studies are based around legal constructions of the firm rather than the more general exploitable opportunity stage of venture creation and notwithstanding the fact that some studies have captured their samples at the time that firms were born, the literature provides an incomplete picture of the exploration phase in the entrepreneurial process, suggesting an imperative for including it in this and future research—the dimensions of which are summarized in Table 3. They are used to inform the development of our data collection instrument for our fieldwork.

Table 3. Dimensions of financial analysis.

Dimension	Consideration	Reference
Evaluation of current financial position and performance	Financial statements are a communication tool for investors where the frequency of preparation reflects minimum evaluation interval	[3,7,16,28,29]
Evaluation of an opportunity	Focus is on opportunities with the ability to generate positive cash flow	[14,16,53]
Evaluation of market opportunities	Entrepreneurs only invest what they can afford to lose	[7,9,37]
New business evaluation/ financial projections	Industry experience is associated with more accurate forecasts	[11,38]
Importance of finance	Financial resources are critical to early new venture development	[3,28,29]
Importance of previous experience	Higher levels of education and net worth associated with a greater likelihood of external funding	[71,93]

2.4. Connection to the Current Study

Prior work suggests that entrepreneurs have little difficulty generating a large number of ideas for potential businesses; however, their key challenge is in the effective evaluation of those ideas. We argue that the evaluation of opportunities is perhaps the most critical element in the early entrepreneurial process because it describes the entrepreneur's assessment of whether his or her idea can generate the requisite returns for the resources available. This is particularly important for technology entrepreneurs as investments are often high, lead times from development to market are long and the risk of failure is high. The outcome of the evaluation process ultimately determines whether and how the opportunity will be exploited, and thus whether the new enterprise will succeed or fail.

Despite the importance of this domain, much of the extant academic literature focuses on how entrepreneurs recognize opportunities rather than how these opportunities are evaluated and what leads to the decision to pursue exploitation or to abandon the concept. Indeed there is a paucity of studies that focus on evaluation in the context of technology entrepreneurship.

A synthesis of the literature reveals that the opportunity cost of a new business and how market and financial information influence the direction of a new business are particularly important to entrepreneurs. Despite their importance, there is insufficient empirical research quantifying the importance of these constructs in practice and to the best of our knowledge no studies focusing on the context of technology entrepreneurship currently exist. To close this gap, our study builds on previous research discussed above and adds to the debate by empirically examining the important decisions entrepreneurs confront during the early phases of the new venture creation process. To do so, we generated a questionnaire to operationalize the constructs discussed in the literature and collected real-world data from technology entrepreneurs. Details of the research strategy are discussed in the following section.

3. Methodology

The nature of the research objective is often the primary driver of chosen research methods and in this case, the nature of the study is largely descriptive rather than exploratory or explanatory [94]. As the goal of this study is to gain a profile of events, persons and situations, the use of a survey instrument was deemed appropriate in this case. While surveys have their critics, they also have the advantage of being relatively cost-effective with a rapid turnaround in data collection and are suited to cases where respondents are sensitive about the information they are disclosing [95,96].

3.1. Sample

A purposive sampling strategy was employed to target the research at a particular entrepreneurial demographic—those involved in nascent entrepreneurial activity as distinct from nascent entrepreneurs. While nascent entrepreneurs are people that are typically described as first-time entrepreneurs, those involved in nascent entrepreneurial activity consider nascence from a process rather than a person perspective. Consequently, respondents were primarily sourced from 12 technology incubation centers in Ireland. These centers accelerate and assist new firm development by being enablers for project resources and marketing communications linking talent, technology, capital and know-how [28,60,97]. The resulting sample spanned all early stages of the entrepreneurial process.

3.2. Data Collection Instrument

The survey instrument was based on the research constructs presented in Tables 1–3 above. Table A1 presents the variables and measures used to collect the data. Respondents were asked to answer questions based on the business opportunity they were pursuing at that time. Every effort was made to ensure heterogeneity within the sample in terms of key attributes (e.g., age, entrepreneurial experience, industry, etc.) to render the findings generalizable. Initially, content validity was assessed by eliciting expert opinion from a start-up consultant, an incubation center manager, as well as three academic experts in the disciplines of both business and engineering. Following some amendments, a second stage of content validity was conducted with 4 more subjects, thus increasing the review panel to 9, which is in line with recommendations that such panels should be between 3 and 10 members.

The final questionnaire consisted of 4 main sections; the first dealt with demographics and the remaining sections contained items that explored the three primary constructs in this study—opportunity cost, market evaluation and financial analysis (see Table A1 in the Appendix A). The placement of the demographic questions at the beginning of

the instrument follows the finding in Teclaw et al. [98], that such placement can actually increase response rates by drawing people into the act of answering questions.

3.3. Protocols

All participants were presented with the same standardized questions to ensure reliability. Additionally, even though administration of the survey was achieved using both face-to-face interaction and an online system, it was ensured that all participants completed the questionnaire independently to ensure no bias was introduced. Responses were then collected, coded and analyzed using the statistical analysis software IBM SPSS version 24 and following the guidance provided in well-established literature [99,100].

4. Results

In total, 88 participants provided useful responses; 86 of the useful responses were completed in full while two were partially completed. The vast majority of respondents were male and aged between 25 and 54. All participants in the study were actively engaged in technology entrepreneurship, the nascence of which is evidenced by the fact that 77% of respondents were in receipt of accelerator or incubation center support programs. A total of 50 (58.1%) respondents were working on their business full-time and 36 (41.9%) were working on the business on a part-time basis. This is illustrated in Figure 1.

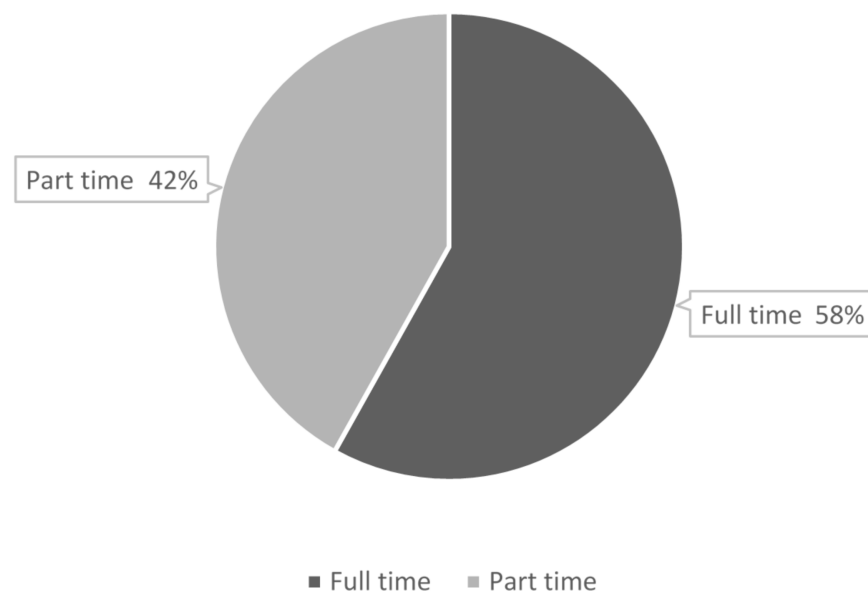


Figure 1. Full-time or part-time entrepreneurs.

An additional lens through which respondents were profiled is outlined in Table 4. The target demographic was technology entrepreneurs who had recently started a new business and aspiring entrepreneurs possessing an idea, who are actively considering starting a business. Only a modest percentage of respondents (14%) had previously been a beneficial owner of more than two businesses and 4.5% of respondents were involved with more than two businesses currently. Contrary to what this suggests, the sample did include some serial entrepreneurs. By cross tabulating the previous business and current business numbers a picture emerges where 18 (20%) of the sample have no previous or current experience and are therefore classed as aspiring entrepreneurs. Those with a combined total of two current or previous businesses total 45 (51%) and the remaining 20% are categorized as serial entrepreneurs. The presence of serial entrepreneurs in the sample is consistent with the target demographic as it is the newness of the business rather than the maturity of the entrepreneur that is the subject of this study. The fact that 80% of the sample have been working in their current business for less than two years coupled with the objective

measure that over 70% of the sample do not even have an output that is ready for sale or delivery is a testament to this fact.

Table 4. Demographic profile of respondents.

Dimension	Category	Number (<i>n</i> = 88)	Percent (%)
Gender	Male	70	79.5%
	Female	18	20.5%
Age	<25	6	6.8%
	25–54	78	88.6%
	≥54	4	4.6%
# Previous businesses	0	26	29.5%
	1	34	38.6%
	≥2	26	29.5%
# Current businesses	0	31	35.2%
	1	48	54.5%
	≥2	9	10.2%
Status of current business	Evaluation	63	71.6%
	Exploitation	25	28.4%
Years working in the current business	<2 years	69	78.4%
	≥2 years	19	21.6%

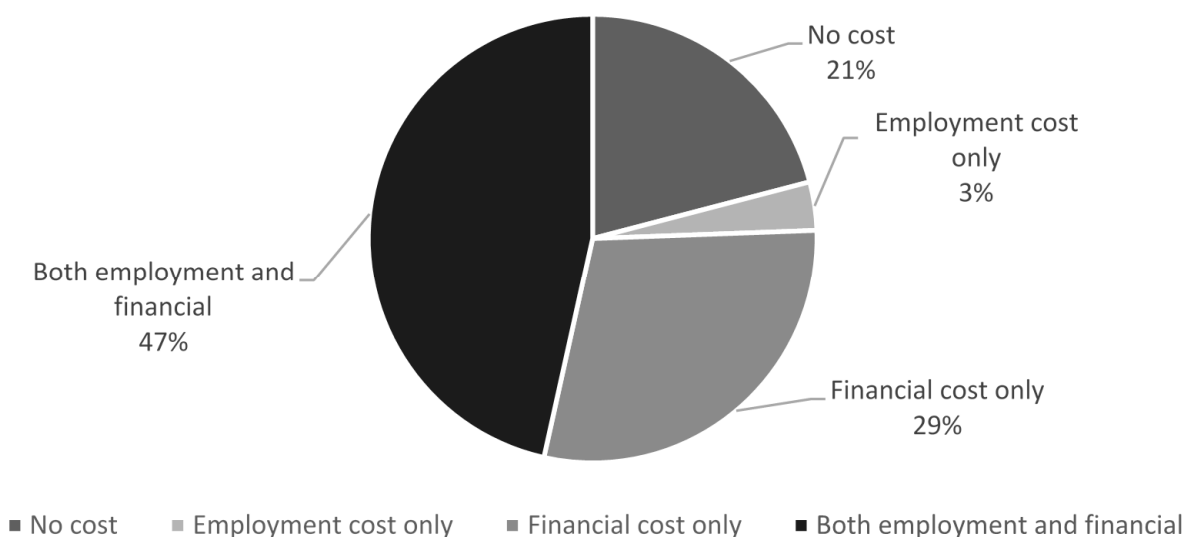
4.1. Opportunity Cost

The concept of opportunity cost was examined using two specific dimensions in this study—employment-related costs and actual financial costs. The measurement of these dimensions was based on the triangulation of several different measures, and the following analysis also presents some additional mapping of these factors onto aspects of the human capital base. Respondents were asked to indicate whether they were pushed or pulled [101] into the current opportunity, i.e., if their motivation was by necessity or choice, respectively. In total, 77 (89.5%) of the sample said they chose to pursue their business by choice. Only nine (10.5%) indicated that they started the business because they had no better choice, or they were unemployed. Those that indicated that they were pursuing the opportunity out of necessity were deemed to have incurred zero related opportunity cost. Comparing this result with responses on whether the subject was engaged in the business full-time or not yielded a result that 43 people (50%) were identified as being engaged full-time in the business, having started it by choice, thereby incurring an alternative employment cost. Further exploration of this subset of the data, as summarized in Table 5, indicates the extent to which human capital levels are associated with employment-related opportunity cost. Measuring human capital from the twin perspectives of education and prior experience, our results indicated that an overwhelming majority (81%) of those that incurred an employment opportunity cost had previously occupied senior roles before embarking on the venture, a point mirrored by the education level attained by respondents, where 93% had proceeded past second-level education. Cross-tabulating these particular results at the individual respondent level showed that almost all (91%) featured under both criteria, indicating not just the existence but also the importance of employment cost.

Table 5. Human capital dimension of alternative employment cost.

Dimension	Level	Number (n = 88)	Percent (%)
Recent role	Managerial supervisory	22	51%
	Business owner	13	30%
	Worker support	7	17%
	Student	1	2%
Education level	PhD MSc	16	37%
	Degree [B.A., B.Sc., B.Eng.]	13	30%
	Other 3rd level [e.g., Diploma]	11	26%
	2nd level [e.g., Baccalaureate]	3	7%

The second dimension of opportunity cost—financial—was measured using two separate approaches. The first, whether individuals provided financial assistance to the business showed that 64% of respondents had provided financial assistance to the business. However, when the number of respondents that indicated that they had not provided financial assistance but had found a reduced effect on their current income is considered, this figure increases to 75.5%. Thus, a significant majority of the entrepreneurs in the early stages of the entrepreneurial process incur a financial opportunity cost as illustrated in Figure 2. Further statistical analysis indicated that those who work full-time in the business were more likely to suffer a reduced income and provide financial assistance to the business. A total of 40 respondents or 46.5% of the sample incurred an employment cost as well as a financial cost, 25 (29%) incurred a financial cost only, and 3 (3.5%) incurred an employment cost only. In total, the number of respondents that did not incur any opportunity cost from a financial or employment standpoint numbered 18 or 20.9% of the sample, meaning that almost 80% did incur an opportunity cost.

**Figure 2.** Summary of opportunity costs.

4.2. Market Assessment

Respondents were asked specific questions regarding their target market, competitors and customers to determine what market information they accrued, when they did this research and whether or not they believed the information gathered influenced their business decisions (Table 6). This was considered using three separate dimensions: overall target market, potential customers, and potential competitors.

Table 6. Market assessment timings.

		Part-Time		Full-Time	
Timing of target market identification	Ideas stage	27	75%	20	40%
	Prototype stage	5	14%	22	44%
	Market ready stage	4	11%	8	16%
	Ideas stage	27	75%	20	40%
Timing of gathering competitor information	Irrelevant	3	8%	-	-
	Ideas stage	21	58%	26	52%
	Prototype stage	5	14%	18	36%
	Market ready stage	7	20%	6	12%
Confidence in understanding customer needs	No	1	3%	2	4%
	Yes	35	97%	48	96%

4.2.1. Overall Target Market

As expected, all the respondents indicated that a target market had been identified for the business, or that they were close to identifying one. Of the 84 respondents that stated a target market had been identified, 47 (56%) did so early in the evaluation stage, 27 (32%) during prototyping and the remaining 10 (12%) when they had a product or service ready for sale. This was then assessed in the light of whether the entrepreneurs were working full-time or part-time in the business. A Pearson Chi-square and Fisher's exact test for association both confirm there is an association between working part-time or full time and when the target market was identified (Chi-square 11.39, $df = 4$, $p < 0.05$; where df refers to the degrees of freedom and p relates to the probability that an observed difference could have occurred by random chance). Both Kendall's Tau-b and Spearman's correlation were calculated at greater than 0.2 ($p < 0.05$) indicating that this relationship is significant. This suggests that those working part-time in a business tend to identify their target market earlier in the process. In all cases, the information gleaned during target market identification and research was shown to have affected the direction of the business.

4.2.2. Potential Customers

This dimension was considered by determining if respondents had actually spoken with potential customers, as well as perceptual measures of how well the entrepreneurs felt that they understood their customers' needs and whether this research had proven significant in their decision making. In total, 76 (88%) participants indicated they had spoken to potential customers. Of these, 36 (47%) began this process while evaluating an idea with a similar number doing so when prototyping. Only six (8%) respondents left it until they had a product or service ready for sale before contacting customers. Almost all these respondents felt that such contact with customers influenced their business. When the entire sample is considered, 97% considered that they understood the needs of their customers. A Pearson Chi-square and Fisher's exact test for association both confirm there is an association between working full time on the business and belief in understanding the target customer (Chi-square 11.20, $df = 4$, $p < 0.05$). Both Kendall's Tau-b and Spearman's correlation were calculated at near 0.3 ($p < 0.01$) indicating that this relationship is significant. While nearly all respondents feel that they understand their customers, this is stronger in the case of those working full-time rather than part-time.

4.2.3. Potential Competitors

Most respondents (90.7%) collected information about their competitors with only three (3.5%) considering it irrelevant. A total of 73 (85%) asserted that information gleaned about competitors influenced their business decisions subsequently. Of the respondents that did collect such information, 70 (89.7%) did so during the evaluation stage, with two-thirds of those doing so while they were still evaluating an idea or multiple ideas. In line with the other aspects of market assessment, a Pearson Chi-square and Fisher's exact

test for association both confirm there is an association between working full time and collecting information about competitors (Chi-square 5.21, $df = 2$, $p < 0.05$). Both Kendall's Tau-b and Spearman's correlation were calculated at greater than 0.2 ($p < 0.05$) indicating that this relationship is significant.

In an overall sense, market assessment showed several distinct patterns when analyzed according to whether entrepreneurs worked full-time or part-time on the business. While virtually all respondents were confident that they understood their customers' needs, the number of entrepreneurs that identified a target market at the ideas stage of business development is markedly different between full-time and part-time entrepreneurs.

4.3. Financial Analysis

The practical manifestation of financial analysis was tested using two perspectives, namely the preparation of financial projections including breakeven analysis and the preparation and analysis of formal financial accounting statements.

Taking the act of looking forward first, more than half of those surveyed (57%) indicated that they had prepared some form of financial projections. Of the remaining 37 respondents, all but two indicated that they intended to do so. Of the 49 respondents who had prepared financial projections, 31 (63%) had were at various points on the evaluation/prototyping stage of development. Additionally, of the 35 respondents who had not yet prepared, but who intended to prepare projections, 85% were still in development stages with their businesses. All respondents who were working full-time in the business either had prepared projections or intended to, with the majority in the former category. Tests indicate that there is a statistically significant association between working full-time and the development of financial projections (Chi-square 9.69, $df = 2$, $p < 0.01$), with those working full-time being more likely to have developed financial projections than those working part-time.

Considering the importance of financial projections, some respondents ($n = 3$) indicated that the information from financial projections had not affected the direction of the business. Of the remainder, 10 respondents were only in mild agreement that the information was of significance with 36 (73%) being more definite that the use of financial projections had a business impact, and in turn, this was more pronounced among the full-time cohort.

Using financial information to review past performance is more problematic to measure in early-stage businesses, and only a little over a quarter of our respondents had actually prepared historical financial statements (see Figure 3). However, nearly all of the remainder (65%) saw this as a timing issue and intended to do so in the future, with seven respondents viewing the preparation of financial statements as irrelevant and non-value added. Regarding the type of entrepreneur that had prepared financial statements, a Chi-square and Fisher's exact test for association both confirm there is an association between working full time and the preparation of financial statements (Chi-square 7.91, $df = 2$, $p < 0.05$). Both Kendall's Tau-b and Spearman's correlation were calculated to be greater than 0.2 ($p < 0.05$), which would indicate there is a statistically positive relationship between the variables. Therefore, similarly to financial projections, those working full-time are more likely to have created financial statements.

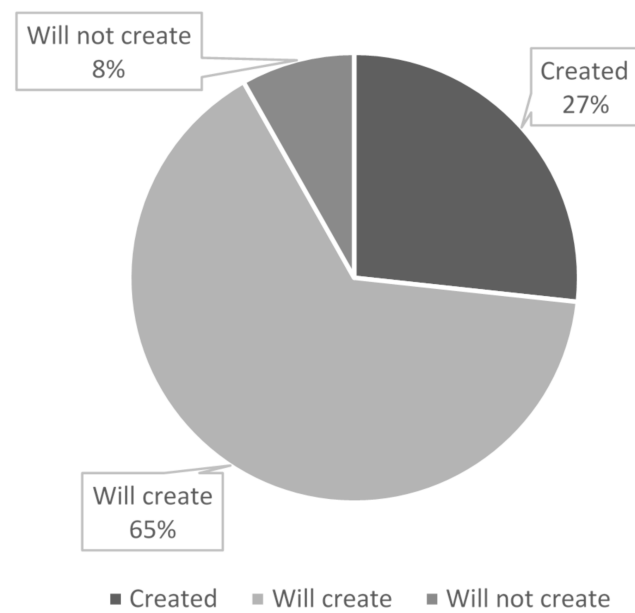


Figure 3. Preparation of financial statements.

5. Discussion

This research primarily sought to confirm whether conventionally held beliefs about the entrepreneurial process applied to those in the early stages of new business development. Specifically, it sought to determine if, and in what way, opportunity costs or sacrifices manifested themselves and whether entrepreneurs employed traditional evaluation techniques in their decision making. This was done by considering the extent to which entrepreneurs were invested in their business (part-time versus full-time), framed against the background of businesses based in organized technology incubation centers.

The gender profile of our sample is consistent with the extant literature [38,102] and although the age profile is slightly older than typically seen, this could simply be reflective of a higher level of employment dissatisfaction, acting as push factors for self-employment [29,103,104]. In keeping with the objective of the study, the nascence of the sample is evidenced by the fact that 80% of those surveyed were working on businesses less than two years old.

The study confirms the view in the literature that entrepreneurs incur an opportunity cost when starting a new business [14,16,33]. The fact that entrepreneurship begins with sacrifices is not something new, particularly when considered in the context of direct financial effects. However, in this study, by including employment-related costs as a dimension of opportunity costs, we found that the overall level of entrepreneurs that suffered an opportunity cost rose to 80% of our sample. Significantly, this was found for both part-time and full-time entrepreneurs, so despite the suggestion in the literature that entrepreneurship often begins with moonlighting or hybrid working [34,105], this is not the same as avoiding opportunity costs. In fact, given the association between human capital and opportunity cost, and considering the educational profile of the sample (where the education level is an indicator of human capital), this renders this finding more significant. Given the reasonably small number of respondents who were found to have entered entrepreneurship because they had no other choice [104], it seems reasonable to assume that nearly all entrepreneurs will, or are likely to, suffer some form of opportunity cost, regardless of industry or level of involvement in the business, and despite the presence of accelerator support.

Our findings concerning opportunity cost imply that the sample is rich in pre-venture industrial experience, previous entrepreneurial experience, and possesses a high level of education. This in turn suggests that the findings concerning the evaluation processes should

be more interesting because our sample, although engaged in nascent entrepreneurship, is not comprised of naïve or inexperienced individuals.

While the literature stresses the importance of market knowledge at the early stages of the entrepreneurial process, marketing problems are still common in new businesses [11,32] and little empirical research exists around identifying which marketing activities are important to early-stage innovation survival [28,60]. In attempting to redress this issue our findings are confirmatory. A large majority of respondents had identified a target market and actual contact had been initiated with potential customers. Similarly, a large majority had gathered information about competitors and indicated that it had already affected some business decisions. However, it is in subsequent analysis of these findings according to the type of entrepreneur (part-time versus full-time) that some interesting points emerge. The positive relationship between working full-time and collection of information on competitors indicates that those working full-time are more likely to collect information about competitors than those working part-time, and so the latter are more likely to be blindsided by the competition, with obvious implications.

An even more surprising finding is that those working part-time on a business tend to identify their target market at an earlier stage in the business development process than those in engaged in the business on a full-time basis. This may indicate that ideas are discounted or abandoned before entrepreneurs move from part-time to full-time involvement, but nevertheless is interesting and represents an avenue for future research.

Early consideration of cash-flow and capital requirements through the preparation of current and projected financial statements is consistent with nascent entrepreneurs being able to predict funding needs and prevent funding shortfalls [3,16,28] and just over half of the total sample indicated that their businesses were influenced by them. Nevertheless, the lack of preparation of financial and management accounts is understandable in new businesses and may account for the relatively small percentage of respondents who had actually prepared such statements at the time of being surveyed. However, what is somewhat surprising is that only 57% of respondents had prepared some form of financial projections. This is contrary to conventional wisdom on the subject and when viewed through the part-time/full-time prism, may indicate a potential problem in regard to those who are only engaged in entrepreneurship on a part-time basis.

6. Conclusions, Limitations and Further Research

An immediate conclusion from this research is that policymakers should develop measures that promote the usefulness of business plan and business model preparation, and that these measures are targeted at younger businesses. This is particularly important and relevant to businesses that are already availing of state-aid in the form of incubator support and may have the greatest impact if additionally focused on part-time entrepreneurs. A further conclusion is that policymakers need to recognize that all entrepreneurs incur some level of opportunity cost and that a greater understanding of this concept will add to their ability to effectively target supports to entrepreneurs. To that end, this study confirms some of the extant beliefs in relation to the non-financial dimensions of opportunity cost.

6.1. Limitations

Although this study provides much needed empirical evidence and analysis on evaluation in the early entrepreneurial process, certain limitations must be borne in mind. First, by using a single survey, it provides a cross-sectional dataset of entrepreneurs working in business incubators. To an extent this limits the depth of the analysis, which in some cases may benefit from a more longitudinal examination, in particular relating to some of the temporal aspects of the items examined. Second, given the discontinuous nature of business growth, a snapshot survey may not be able to capture variations of performance that occur over long periods of time and a longitudinal analysis would be of value. Third, the sample for this study were contacted primarily through Irish incubation centers, so therefore the study is limited to entrepreneurs who were accessible through that channel. It is possible too, that

by confining the survey to a single national geographical context, the generalizability of its conclusions may be biased by cultural factors, not examined in the study, and thereby limiting the generalizability of the study to a single cultural environment.

The research methodology has certain weaknesses over mixed-method research in terms of data collection, data analysis and interpretation. While efforts were made to reduce response bias in the introduction and distribution of the questionnaire, the threat of response bias cannot be ruled out.

Despite these limitations, we believe our study results in an original dataset and provides key empirical insights into the factors that influence entrepreneurs at the early stages of the new venture creation process. The findings contribute to the development of theoretical and knowledge bases, as well as offering results that are of interest to research and policy communities.

6.2. Future Research

While human capital is both an element of opportunity cost and an apparent factor in determining the entrepreneurial decision, there is ample scope to research these at a more granular level and in addition to looking at other components of opportunity cost such as loss of free time. Studies conducted by Cassar [11] and Dimov [16] have sought to investigate the relationship between human capital and the size and emergence of a new venture, but the question as to why people with high human capital appear to be more likely to become entrepreneurs remains. Similarly, part-time entrepreneurs, representing over 40% of the sample, have only been examined in limited cases and therefore, studies relating it to venture success as well as its impact on the part-time entrepreneur's other career could prove interesting.

Several longitudinal studies could enhance the findings of this study. For example, from an evaluation perspective, there is potential to investigate the influence of financial and market information and the impact on key decisions and judgements made by the entrepreneur throughout the entrepreneurial process. Contributing to the body of knowledge in this way is more than just of academic interest because according to Wennekers et al. [106], achieving increasing returns to scale does not simply involve building up purchasing power and technologies but also a critical mass of knowledge and skills.

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Appendix A

Table A1. Questionnaire.

Section 1: Demographics	
This section aims to capture some general information about you, your entrepreneurial history and your new business.	
Variable	Measure
Which of the following best describes your gender?	Male Female Other
How old are you?	<25 25–54 ≥54
How many other businesses have you helped to start as an owner or part-owner?	Open
How many other businesses do you currently own or part-own?	Open
How many business ideas did you consider before working on your current business idea?	Open
What is the current state of the product or service that this new business will sell?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
How many years have you been devoting time to this new business/business idea?	Below 1 1–2 3–5 5+
What industry is your new business in, e.g., finance, medical device, software engineering etc.?	Open
Section 2: Opportunity costs	
In this context, opportunity cost is the cost of pursuing a new business to alternatives such as alternative choices of employment or other businesses. This section aims to capture information relating to the opportunity cost of this new business to you.	
Variable	Measure
Why did you become involved in this business?	Take advantage of business opportunity No better choices for work/unemployed Other
Are you working on this new business full-time?	Yes No
How would you describe your most recent full time position?	Worker Manager, supervisor or executive Support staff Combination of managerial and other staff functions Owned other business Other
How many years (have you had/did you have) this position?	Open

Table A1. Cont.

Section 2: Opportunity costs	
In this context, opportunity cost is the cost of pursuing a new business to alternatives such as alternative choices of employment or other businesses. This section aims to capture information relating to the opportunity cost of this new business to you.	
Variable	Measure
What is the highest level of education you have completed?	Primary education Junior Certificate Leaving Certificate Post Leaving Certificate Diploma Degree Masters/PHD
Have you personally provided financial assistance to the new business, like equity, loans, or loan guarantees to help with this new business?	Yes No
How has this new business affected your current income?	Increased Reduced No impact
Which one of the following, do you feel is the most important motive for pursuing this business?	Greater independence Increase personal income Just to maintain income Other
Section 3: Market evaluation	
This section aims to ascertain if market information has influenced the direction of your business/business idea and if so at what stage it began.	
Variable	Measure
Has a target market been identified for this new business?	Yes No, not yet, will in future No, not relevant
If yes, what was the state of the product or service when you began identifying the target market?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
Information about the target market has influenced the direction of my business.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
Has an effort been made to collect information about the competitors of this new business?	Yes No, not yet, will in future No, not relevant
If yes, what was the state of the product or service when the effort began?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
Information about competitors has influenced the direction of my business.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree

Table A1. Cont.

Section 3: Market evaluation	
This section aims to ascertain if market information has influenced the direction of your business/business idea and if so at what stage it began.	
Variable	Measure
Has an effort been made to talk with potential customers about the product or service of this new business?	Yes No, not yet, will in future No, not relevant
If yes, what was the state of the product or service when the effort began?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
Information from customers has influenced the direction of my business.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
I believe I understand the needs of my target customer.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
I believe my new product or service will be value for money.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
I believe customers will pay for my new product or service.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
Section 4 Financial analysis	
This section aims to ascertain how financial information has influenced the direction of your business and if so at what stage it began.	
Variable	Measure
Have financial projections, such as projected income or cash flow statements or break-even analyses, been developed?	Yes No, not yet, will in future No, not relevant
If yes, what was the state of the product or service when the effort began?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
Information from financial projections has influenced the direction of my business.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree

Table A1. Cont.

Section 4 Financial analysis	
This section aims to ascertain how financial information has influenced the direction of your business and if so at what stage it began.	
Variable	Measure
Have financial statements such as monthly or end of year accounts been prepared for this business?	Yes No, not yet, will in future No, not relevant
If yes, what was the state of the product or service when the effort began?	Ready for sale or delivery Prototype or procedure tested with customers Prototype or procedure being developed Idea for a business being evaluated Multiple ideas for a business being evaluated
Information from financial statements have influenced the direction of my business.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
I know how much money/capital my business needs to survive for the next 12 months.	Strongly Agree Agree Somewhat Agree Strongly Disagree Disagree Somewhat Disagree
How do you intend to ensure your new business will have enough money/capital to survive for the next 12 months?	The business already has enough money/capital for the next 12 months. Generate positive cash flow (income greater than expenditure) Seek investment Don't know Other

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