NBS Research Study on Training Opportunity Identification Competence

Summary report on the findings from the study titled “Can Opportunity Identification be Trained? A Field Experiment”.

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Executive Summary

Our research aimed to address the question of whether opportunity identification can be trained, and if so, what the most important elements to be included in such training are. In addition, we sought to understand how opportunity identification training would affect different groups of people. To answer these questions, we collected data on participants who attended a series of training sessions aimed at imparting skills associated with identifying and developing business opportunities. In total, 64 hours of physical training (Phase 1, n = 152) and 60 hours of online training (Phase 2, n = 145) were conducted between June 2019 to December 2019 and July 2020 to December 2021, respectively.

A mixed methods approach combining quantitative and qualitative methods was used to identify the effects of our training approach (e.g., using design thinking and opportunity evaluation) and mediating mechanisms (e.g., active feedback seeking) as well as to understand the effects of these factors on entrepreneurial and opportunity identification outcomes.

Given that Phase 2 of the training occurred during the COVID-19 pandemic, we also used this opportunity to understand the impact of COVID-19 on firms as well as their coping strategies and resilient behaviours.

A summary of the key findings are as follows:

- *Impact of Training on Opportunity Identification:* Opportunity identification competence can be trained, and its effects was observed in the following ways:
  - Training increases the number of new opportunities identified compared to those who did not receive the training.
  - Training also increased the amount of progress made on ideas.
  - Participants who received the training reported more feedback-seeking behaviour, and higher engagement.
  - Participants who received the training also reported higher entrepreneurial self-efficacy, more observing behaviour, and more networking behaviour, which are all important aspects for entrepreneurship.
  - Physical training had a greater effect than online training.
- *Opportunity Identification During a Pandemic:* We examine the effects of individual emotions and company traits and how they respond to a global crisis such as the COVID-19 pandemic.
  - Managers in firms that operate in a dynamic and everchanging environment reported more changes in their products and services.
  - Managers in firms that have the capacity to be more flexible with their available resources reported more changes in their marketing strategies.
  - Managers in firms with a positive climate for psychological safety are more likely to report more changes in their products and services, as well as marketing.
  - Managers in firms with a better climate for personal initiative reported more changes in products and services, distribution channels, and their target market(s).
  - Positive emotions are important for building resilience and developing business ideas despite experiencing a global-level crisis. The empowering effect of positive emotions is even more salient for those working in heavily impacted industries.

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Acknowledgements

The completion of the research project "Can Opportunity Identification be Trained? A Field Experiment" would not have been possible without the support of our stakeholders and partners.

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We would also like to thank all the participants in this project for taking time to share their valuable insights about their entrepreneurial experience and innovation journey.

About the Team

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1 Introduction

1.1 Research Background

An entrepreneurial opportunity refers to the chance of meeting a market need, interest, or want through a creative combination of resources to deliver superior value (Kirzner, 1973; Casson, 1982). Opportunities describe phenomena that begin unformed and become more developed through time. Thus, business opportunity identification is the first key event that spurs entrepreneurial activity, irrespective of whether this eventually leads to the development of a viable business model or not.

Opportunity identification competence (OIC) refers to the ability to identify entrepreneurial opportunities and introduce innovative products, services, or processes to the marketplace or industry. OIC is important because a key factor driving individuals' and organizations' ability to innovate is their ability to identify new opportunities, and innovations and enterprises that result from such identified opportunities have significant impact in the creation of novel and useful products and services, as well as the establishment of new companies, jobs, and industries (Saks & Gaglio, 2002; Timmons & Spinelli, 1999).

Our study responds to a call from the Committee on the Future Economy (CFE) to build the nation's capabilities in this area and motivate aspiring entrepreneurs to actively seek out worthwhile business opportunities. We address three main questions:

1. Can opportunity identification be trained?
2. What are the most important elements to be included in the training?
3. Why is the training effective, and what does the training change?

If we find that opportunity identification cannot be trained, then it implies that educational programs in the area of opportunity identification is of limited significance and the roles of such programs might be reduced to a purely informative one. On the other hand, if opportunity identification can indeed be trained, then offering structured training programs would be an important approach towards enhancing innovation in enterprises and encouraging entrepreneurship amongst aspiring entrepreneurs.

We undertook the present research to improve our understanding of the opportunity identification process and determine if opportunity identification competence can be trained. Through this study, we investigated the mechanisms that underlie people's ability to identify business opportunities and develop them into mature and applicable solutions. Data used for the analysis was collected in two phases spanning periods from June 2019 to December 2019 and from July 2020 to December 2021. In Phase 1, 152 working professionals and aspiring entrepreneurs participated in our training, while in Phase 2, 145 managers and supervisors, including senior management and business owners, from both Singapore- and Malaysia-based companies participated.

1.2 Research Objectives

The overarching aim of the research is to gain a better understanding of opportunity identification competence and whether it is trainable. With this goal in mind, we investigated various factors that influence opportunity identification competence, such as its cognitive processes and its various correlates including feedback seeking, engagement, entrepreneurial self-efficacy, discovery behaviour, and idea networking behaviour. We also examined the challenges faced by entrepreneurs during COVID-19 as well the strategies adopted to survive and remain viable in the event of a pandemic.

Overall, our study sought to address the following research questions:

- Can opportunity identification be trained?
- What are the most important elements to be included in training opportunity identification?
- How does opportunity identification training affect different groups of people?
- How can firms develop resilience in the face of crisis such as the COVID-19 pandemic?

1.3 Research Design

Based on the objectives discussed in the earlier section, a robust 3-month long longitudinal study was designed, gathering data using multiple methods and from multiple sources. In terms of methodology, we adopted an integrated approach towards data collection using both survey questionnaires and semi-structured interviews. The development of the survey and instrument questions was guided by appropriate theories from multiple domains such as entrepreneurship, psychology, organization science, and strategic management. A mixed-methods approach combining quantitative and qualitative methods was used to identify and understand entrepreneurial behaviours as well as the innovation activities and progress of their ideas. Structured questionnaires with validated scales from the literature were used to capture various constructs of interest. The data collection effort was approved by the NTU Institutional Review Board (IRB-2019-02-011).

Various aspects of the participants' characteristics, behaviours, and firm-related parameters were investigated using surveys and interviews.

Furthermore, we had two different phases of data collection that required the recruitment of two types of participants: aspiring entrepreneurs and managers (intrapreneurs).

The respondents recruited were identified through various contact points of NBS, including NTU affiliated bodies such as NTUitive, government agencies such as educational institutions, accelerators, and industry associations. Each potential respondent was individually contacted and recruited through various means including direct contact, phone calls and emails which ensured acceptable response rates. The number of individuals contacted for each of the two phases of data collection and the corresponding response rates are provided in Table 1-1 below:

	Individuals Registered	Final Sample	Response Rate
Phase 1	364	152	42%
Phase 2	524	145	28%

Additionally, topics of special interest in our selected context such as business opportunity identification, evaluation of business ideas, and idea development and progress were probed at length in a qualitative interview before and after the training, each lasting 30 to 60 minutes. The interviews were audio recorded and transcribed verbatim. All interviews and surveys were gathered online via Zoom (zoom.us) and one-to-one to make it convenient for the participants and lower the barrier of entry to sign up for the programme.

We randomly assigned these registered individuals to a treatment or a control condition. In the treatment condition, also known as the "training group", the participants were provided a free training workshop on business opportunity identification at the beginning of the programme and were given a post-test assessment after five weekly surveys were administered. To be fair to those in the control group, they were also provided the same training after the post-test assessment was conducted to ensure that they also benefited from participating in the programme.

Statistical analysis was performed to identify significant relationships between the constructs of interest and various performance indicators. The analyses accounted for possible effects from other factors such as age, gender, education level of the participants. The robustness of the effects was confirmed using appropriate statistical techniques.

The results of the qualitative interview analysis were used either to triangulate the findings of the quantitative analysis performed on the survey data or to further illustrate or supplement the conclusions drawn.

1.4 Report Overview

The rest of the report is organized as follows:

Chapter 2 describes the profile of participants in our study.

Chapter 3 discusses the effectiveness of the training on innovation performance and opportunity identification based on the quantitative analysis of the survey data.

Chapter 4 presents the findings from our surveys and our interviews of how the Covid-19 pandemic has affected firms and how they cope and identify opportunities during a global crisis.

Chapter 5 examines how emotions play a part in the identification and development of business opportunities.

Chapter 6 concludes with implications and policy recommendations based on the insights presented in this report.

2 Participants

Participants signed up via an online registration form created using the Qualtrics platform, which was published on an NTU webpage as well as distributed by our various partners. Registrants were then screened for eligibility, provided a baseline survey, and completed a pre-test interview session before being officially accepted as a participant in the study.

For Phase 1, we conducted two rounds of data collection. In the first round of data collection, we secured 152 participants. Table 2.1 and Figure 2.1 below shows the gender and age distribution of participants in phase 1.

Table 2.1. Gender of Phase 1 Participants

	Round 1		Round 2	
Gender	Treatment	Control	Treatment	Control
Male	21	27	18	28
Female	8	16	21	13
Total	29	43	39	41

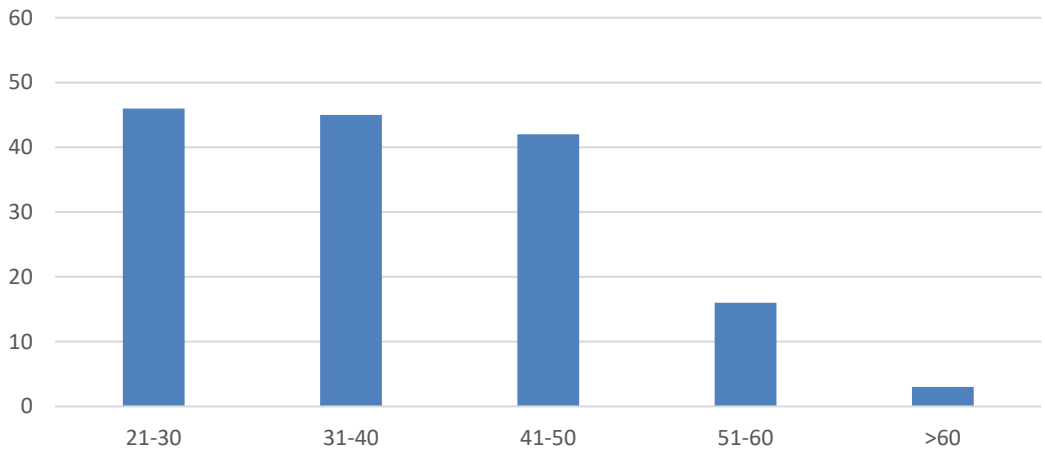

Figure 2.1. Age distribution of participants in Phase 1.

During Phase 2, we ran our programme three rounds. The first two rounds were conducted in 2020, when Singapore implemented its circuit breaker in response to the COVID-19 pandemic. The programme was open to participants who were managers or supervisors working in Singapore-based companies. The third round was conducted in 2021. This time, we extended our recruitment to accept participants from Malaysia-based companies. To ensure that we recruit middle- to high-level corporate managers occupying strategic roles in their respective companies (Ren & Guo, 2011), our online registration form was updated to request for additional screening information such as their job title and number of direct reports in the company.

Table 2.2 below shows the gender of participants in phase 2. Figure 2.2 below shows the age distribution of participants in phase 2.

Table 2.2. Gender of Phase 2 Participants

	Round 1		Round 2		Round 3	
Gender	Treatment	Control	Treatment	Control	Treatment	Control
Male	16	12	20	21	21	0
Female	9	7	12	9	18	0
Total	25	19	32	30	39	0

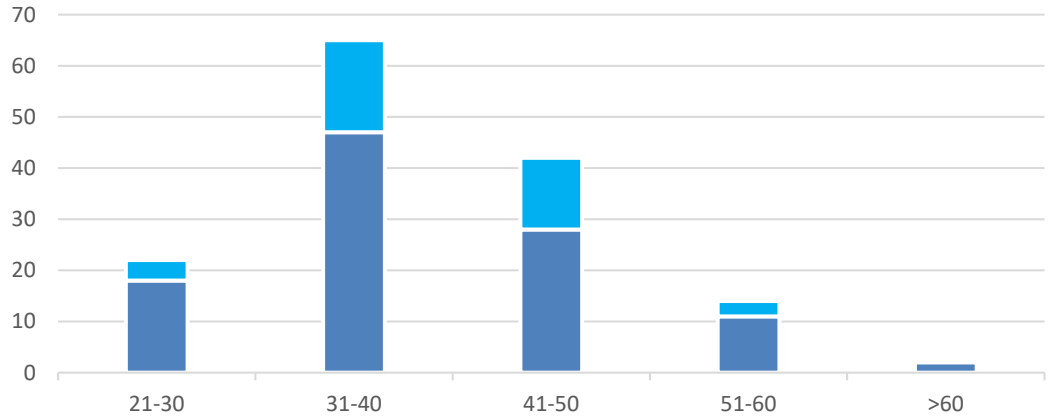

Figure 2.2. Age distribution of participants in Phase 2, with the stacked cluster representing round 3.

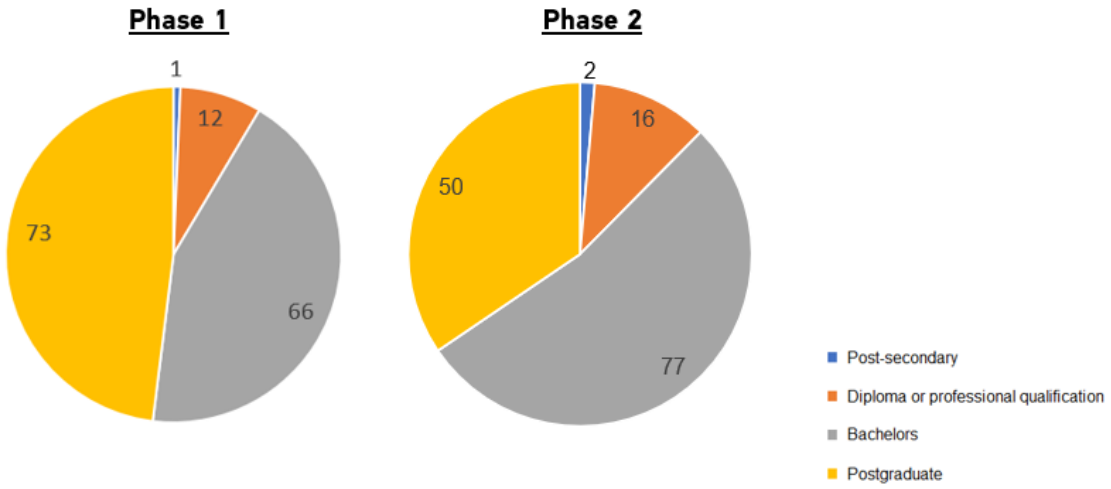

Figure 2.3. Pie charts showing the highest education level of the participants from both phases.

Figure 2.3 shows the education level of the participants from both phases. Participants with a bachelor's degree or higher made up the overall majority (90%).

2.1 Firm Profiles

For phase 2, as our target sample was managers and supervisors, we collected information about their firm. The final sample of managers come from a variety of industry backgrounds and included senior management and small business owners summarized in Figure 2.4 and Figure 2.5.

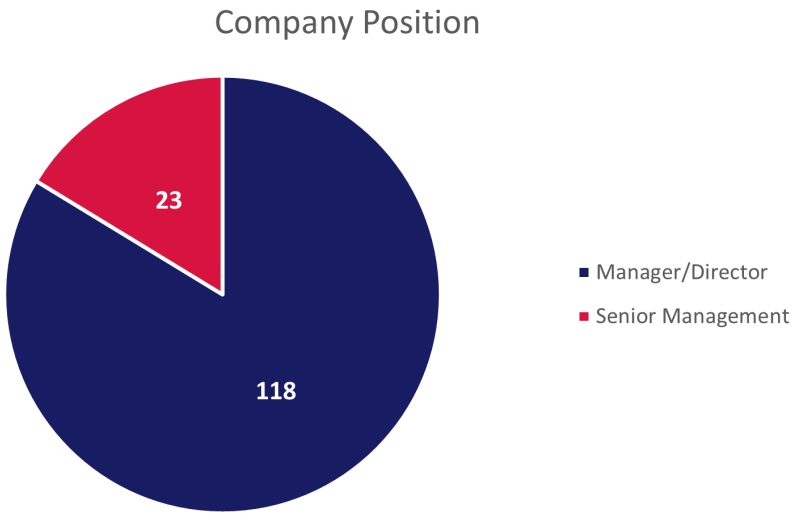

Figure 2.4. Pie chart depicting Phase 2 participants' positions in their companies.

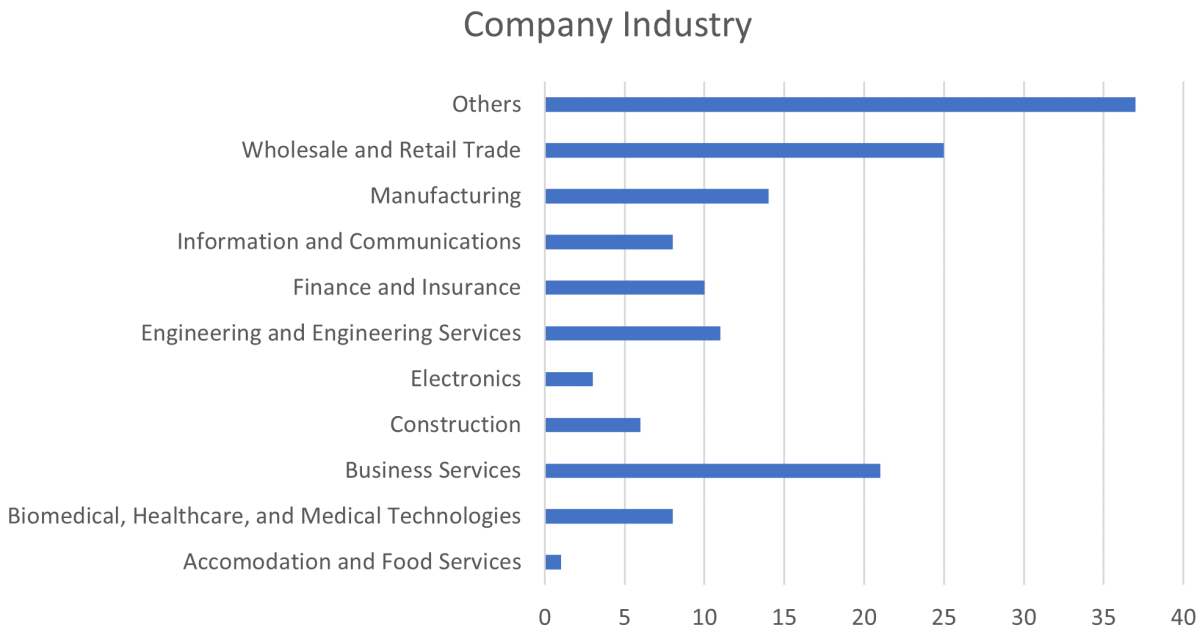

Figure 2.5. Bar graph showing the industry of the participants' firms in Phase 2.

These managers were working in an average team size of 15 members and had an average of three direct reports.

3 Impact of Training on Opportunity Identification Competence

To address the question of whether opportunity identification can be trained and, if so, how, and why, we (1) developed a training program, (2) tested whether participants who underwent the training exhibit improvements in their business ideas before and after training, and (3) explored the mechanisms underlying any training effects.

3.1 Designing the Training Program

We used McMullen and Shepherd (2006)'s attention model of opportunity identification as a framework for the design of the training program. The model suggests that entrepreneurs must pay attention to the environment and find opportunities based on their knowledge and motivation, after which the viability of recognized opportunities must be evaluated. Two attention stages characterize the opportunity identification process. In the initial *transient attention* stage, entrepreneurs allocate short spans of attention to scan for changes in the entrepreneurial environment, switching their focus across multiple observations until an interesting potential opportunity catches their eye. Next, the *sustained attention* stage shifts focus toward understanding the potential opportunity and evaluating the feasibility of acting on the opportunity (Shepherd, McMullen, & Ocasio, 2017). By observing the environment and noting important changes, entrepreneurs are better able to identify potential opportunities and develop ideas to exploit them. Based on this logic, we developed a two-stage training program that focused on transient attention in the first stage and sustained attention in the second.

3.1.1 Training for the Transient Attention Stage

To design the first segment of training to improve people's ability to identify opportunities during the transient attention stage, we drew from research showing that distinct attention allocation approaches differentially influence how people process information (Ocasio, 2011; Shepherd et al., 2017). If individuals use a *deductive approach*, they rely on pre-existing mental models (e.g., their own perceptions, feelings, and knowledge) to make sense of observations and make decisions. However, deductive processes steer attention toward environmental signals that align with and are thus expected or biased by prior mental models, causing environmental signals that are inconsistent with existing knowledge structures to be overlooked. For instance, individuals might miss emerging customer needs and new technological solutions if they are fixated only on information that they are familiar with. In contrast, individuals who use an *inductive approach* are less influenced by preconceived expectations, allow a wider range of environmental signals to capture their attention, and are capable of spotting critical changes in the environment that would otherwise go unnoticed with the deductive approach (Ocasio, 2011). Thus, we utilized the following training methodologies to promote inductive processing, broaden one's capacity to notice environmental changes, and foster greater openness to diverse information, perspectives, and opinions:

Design thinking: Design thinking is a potent and well-established method for developing innovative solutions to complex problems (Brown, 2008) by encouraging iterative and exploratory feedback-gathering processes involving observing, visualizing, experimenting,

creating, and prototyping (Glen, Suciu, & Baughn, 2014). Design thinking also promotes empathy for potential users in the information gathering process (Elsbach & Stigliani, 2018), thus allowing for a deeper understanding of customers' feelings and needs that go beyond the innovator's knowledge limitations (Kurtmollaiev, Pedersen, Fjuk, & Kvale, 2018).

Pattern recognition: Training people to recognize patterns increases their ability to notice unforeseen environmental signals through making novel linkages between stimuli and ideas (Baron & Ensley, 2006). In particular, learning to detect regularities, trends, and insights from large amounts of data enables individuals to process information non-linearly and heightens their sensitivity to higher level signals and patterns. For example, individuals who can recognize the underlying models of different types of businesses are able to understand those businesses in relation to their own personal context while extending them to new and broader contexts, resulting in improved business solutions. Pattern recognition training would thus increase the scope of one's attention, enable a greater array of environmental signals to be observed, and promote idea generation.

3.1.2 Training for the Sustained Attention Stage

At the transient attention stage where a broad range of ideas are noticed, we can say that ideas have been generated but not yet developed into "first-person" beliefs about opportunities (i.e., "this is an idea that I can/will pursue"). As such, entrepreneurs must enter a second stage of sustained attention to narrow down a small number of identified opportunities and generate an understanding of how to exploit them and achieve progress (Shepherd et al., 2017). To assess the desirability and feasibility of acting on potential opportunities, individuals must have the capacity to learn more about them (McMullen & Shepherd, 2006). Thus, a deductive approach of attention allocation is needed to evaluate opportunities based on personal resources, capabilities, and motivations so that initial and rudimentary business ideas are transformed into solutions that are both desirable and personally viable (Mitchell & Shepherd, 2010). Accordingly, the training in this stage was based on two well-established methodologies to enhance the ability to focus on and evaluate opportunities:

Idea evaluation: Training on how to evaluate ideas for business opportunities increases the clarity of relevant concepts such as product value, market size, competition, and profitability (Choi & Shepherd, 2004; Haynie, Shepherd, & McMullen, 2009). With such training, individuals would be sensitized to important features that constitute effective solutions which, in turn, would enable them to assess the viability of shortlisted ideas, identify potential issues, and derive ways to overcome those potential issues or leverage the strengths of their ideas.

Effectual thinking: Training on effectual thinking helps individuals to understand their personal strengths, such as their resources, capabilities, and networks (Sarasvathy, 2001). By offering insights into the initial steps that may be taken based on on-hand resources, individuals have a better sense of the extent to which their personal characteristics and background experiences can contribute to developing their ideas (Shepherd, Williams, & Patzelt, 2015).

Taken together, we anticipated that these various methodologies would instil in participants a set of frameworks to promote structured, systematic thinking processes that allow for greater idea

generation (i.e., an increase in the quantity of ideas) and idea development (i.e., improvement in the progress and development of ideas). We therefore developed a training program that would bring participants from noticing opportunities in the environment to identifying first-person opportunities (Figure 3.1 below shows the model). There were two parts to the training: the first segment was training (part 1) directed at the transient attention stage, which involved design thinking and pattern recognition; the second segment was training (part 2) directed at the sustained attention stage, which involved opportunity evaluation and effectuation. Parts 1 and 2 of the training were conducted 1-2 weeks apart.

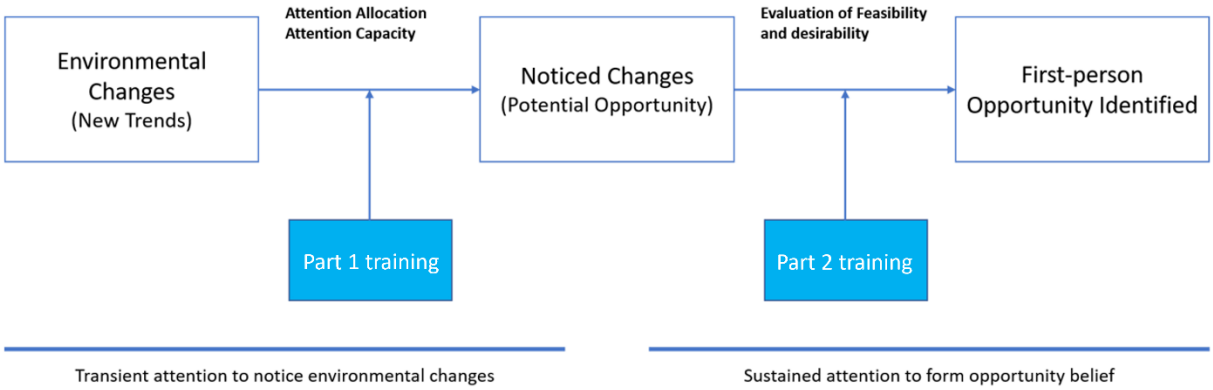

Figure 3.1. Overview of training program to develop opportunity identification competency.

3.2 Measuring the Impact of Training

In line with the frameworks we used to guide the foci and design of the training program, we focused on examining two broad capabilities. First, as expected by training in the transient attention stage aimed at expanding the scope of opportunities observed and idea generation, we predicted that there would be an increase in the number of new opportunities identified. Second, as expected by training in the sustained attention stage aimed at evaluating a shortlisted set of ideas, we predicted that there would be greater progress in the development of identified opportunities (Figure 3.2).

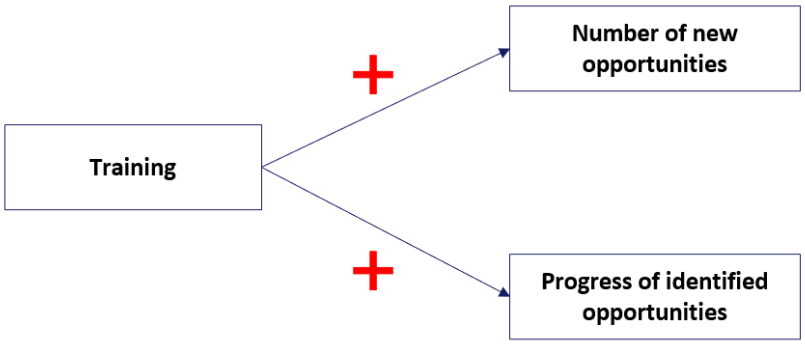

Figure 3.2. Two types of capabilities that training is expected to increase.

To experimentally test the effectiveness of training, we randomly assigned participants to either the *treatment group*, where participants would be assessed on idea generation and idea development *after* undergoing training, or the *control group*, where participants would be assessed on idea generation and idea development *before* undergoing training. This design would ensure that participants benefit equally from enrolment in our study regardless of their assigned condition while allowing us to compare the outcomes of trained versus untrained participants.

3.2.1 Measures

To assess the effects of training on opportunity identification competence, we measured the following variables, mostly using a 5-point Likert scale:

Number of new opportunities: The quantity of ideas generated was operationalized as the number of new business opportunities identified on a weekly basis for 5 weeks. Treatment group participants would begin listing their business ideas only after day 1 of training, whereas control group participants would complete their 5-week reporting of business ideas before undergoing training.

Progress of identified opportunities: One week after commencing the survey (i.e., after day 2 of training for treatment group participants and in the second week for control group participants), participants were presented with a list of the business ideas they had identified in the previous week and asked to rate the amount of progress made on each idea. Ideas that participants did not develop were coded as 0 to indicate that there was no progress. Participants would continue rating their progress in developing ideas weekly for 5 weeks.

In addition, to achieve a deeper understanding of how training affects participants, we measured several variables that may be associated with training and the processes of idea generation and idea evaluation:

Feedback seeking: As it was proposed that inductive processes of attention allocation would increase feedback seeking in service of gaining a broad understanding of the entrepreneurial landscape, we measured participants' tendency to seek feedback using four items adapted from Ashford and Tsui (1991) feedback seeking scale. The items were modified to capture feedback seeking specifically for business ideas. Participants were asked to indicate how often they sought feedback on their business ideas from different stakeholders.

Engagement: As it was proposed that deductive processes of attention allocation would increase focus on evaluating the desirability and feasibility of identified business ideas, we measured participants' engagement with Rich, Lepine, and Crawford (2010) cognitive engagement scale.

Entrepreneurial self-efficacy: Research shows that having high entrepreneurial self-efficacy, or confidence in performing entrepreneurially and creating new ventures, is important for people to start their own business and become successful (Frese & Gielnik, 2014). Thus, we measured participants' entrepreneurial self-efficacy at both the beginning (pre-test) and at the end of our study period (post-test).

Observing behaviour: Observing the environment, including proactively listening and looking out for new things such as new market trends, can trigger new ideas and has been suggested as a behaviour that most successful investors have (Dyer, Gregersen, & Christensen, 2008).

Idea networking behaviour: Idea networking refers to the active creation of networks of people with diverse ideas and perspectives (Dyer et al., 2008), which can help to stimulate the generation of new ideas.

3.3 Primary Findings

The following primary findings shared below are based on data gathered from Phase 1 of the study. Data from Phase 2 will be discussed in the "Second Study" section below.

3.3.1 Impact of Training on Number of New opportunities

Our results show that training helped participants to identify more new business opportunities. After part 1 of training for participants in the treatment group, trained participants identified a higher number of new opportunities than control group participants, reflecting an immediate positive impact of training on idea generation, as shown by Figure 3.3.

Figure 3.3. Number of new opportunities identified immediately after day 1 of training for participants in the treatment group and first day of reporting for participants in the control group.

Over the 5-week study period, trained participants consistently reported a higher number of new opportunities identified than control group participants, as shown by Figure 3.4.

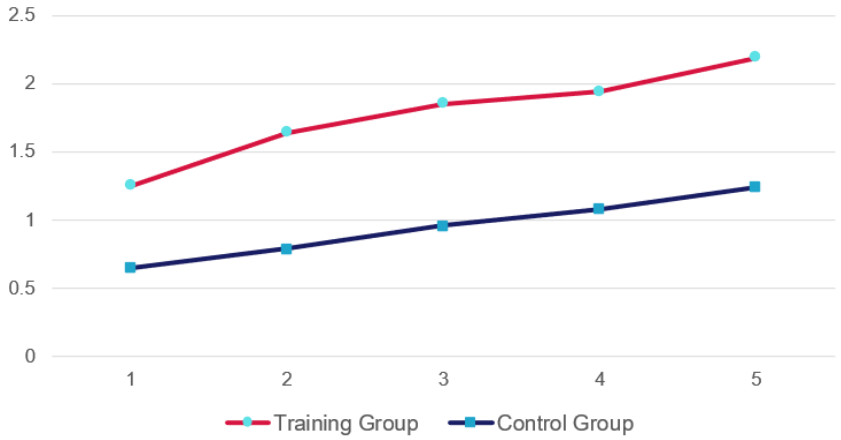

Figure 3.4. Total number of new opportunities identified across 5 weekly surveys.

3.3.2 Impact of Training on Progress of Identified Opportunities

Comparisons between trained and untrained participants' self-ratings of progress in developing identified opportunities demonstrated that training had a positive effect on idea evaluation. After part 2 of training for participants in the treatment group, there was a greater degree of progress in development of opportunities by those in the treatment group than those in the control group, as shown by Figure 3.5.

Figure 3.5. Progress in developing identified opportunities immediately after part 2 of training for participants in the treatment group compared to participants in the control group.

Trained participants also exhibited overall greater progress in developing identified opportunities than those in the control group over the 5-week period, as shown by Figure 3.6.

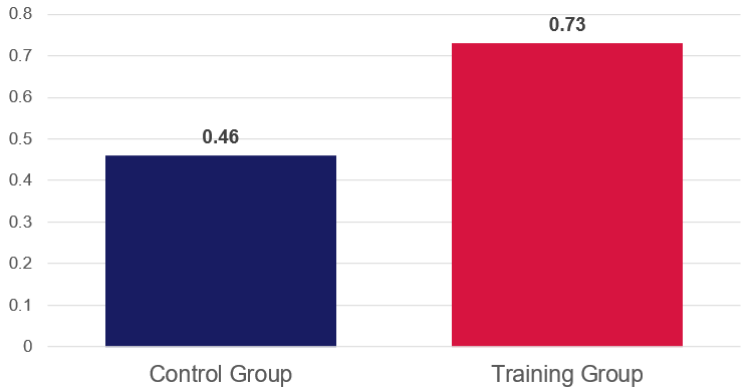

Figure 3.6. Progress in developing identified opportunities of treatment and control groups across 5 weekly surveys.

In sum, we found that trained participants exhibited a greater ability to generate and develop ideas than untrained participants, thus indicating that training can improve people's opportunity identification competence.

3.4 Secondary Findings

To augment our understanding of the effects of training, we compared the treatment and control groups to understand why the training affected the development of opportunity identification capability.

3.4.1 Feedback Seeking

Results showed that participants in the training group engaged more in feedback seeking behaviour than those in the control group, as shown by Figure 3.7. Feedback seeking refers to the extent a person asks others for feedback on their business ideas over the span of one to two weeks.

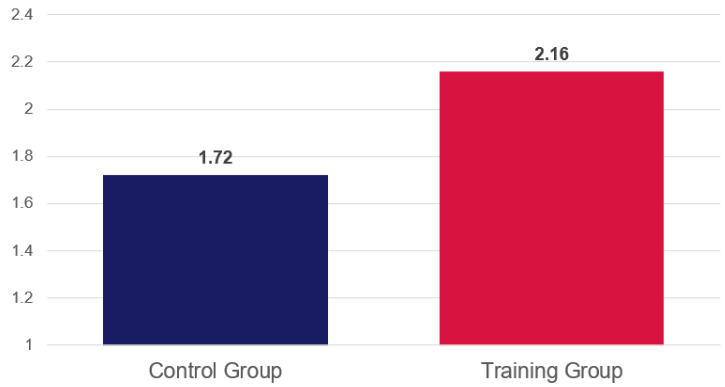

Figure 3.7. Feedback seeking behaviour of treatment and control groups across 5 weekly surveys.

This finding shows that design thinking and pattern recognition methodologies promoting an inductive approach to attention allocation increase participants' gathering of critical feedback

and information. Hence, feedback seeking mediated the effect of part 1 of our training on participants' ability to notice opportunities and generate business ideas, as shown by Figure 3.8.

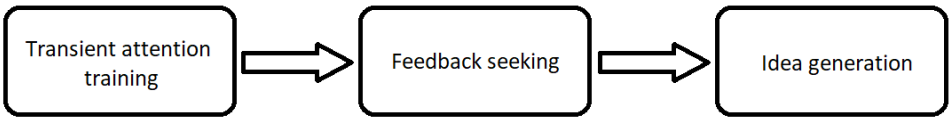

Figure 3.8. The effect of transient attention training on idea generation occurred through feedback seeking.

3.4.2 Engagement

Results showed that participants in the training group reported higher levels of engagement than participants in the control group, as shown by Figure 3.9. Engagement refers to the physical, cognitive and emotional energies that participants invested in developing their business opportunities.

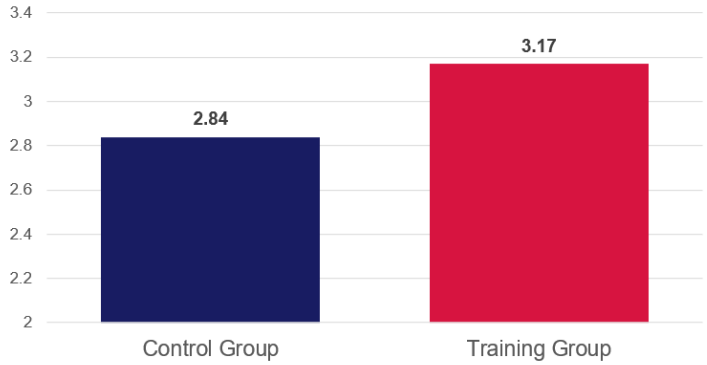

Figure 3.9. Engagement levels of treatment and control groups across 5 weekly surveys.

We also found that feedback seeking also led to a higher level of engagement, as shown by Figure 3.10. This shows that part 1 of the training enhanced participants' ability to develop their ideas serially through increasing feedback seeking, which in turn, increased engagement, thus leading to greater progress in idea development. This shows that engagement underlies the ability to assess the viability of and improve on ideas.

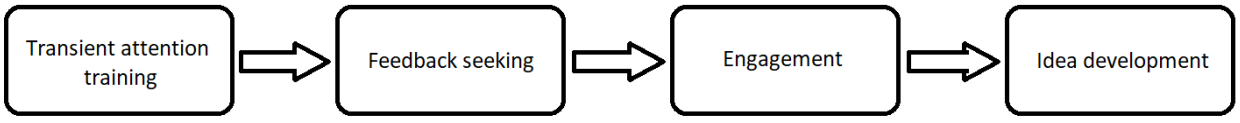

Figure 3.10. The effect of transient attention training on idea development occurred through feedback seeking and engagement.

3.4.3 Entrepreneurial Self-Efficacy

Entrepreneurial self-efficacy refers to one's belief in their competency to perform actions with entrepreneurial outcomes. Results showed that participants in the treatment group experienced an increase in entrepreneurial self-efficacy, but not participants in the control group, as shown by Figure 3.11.

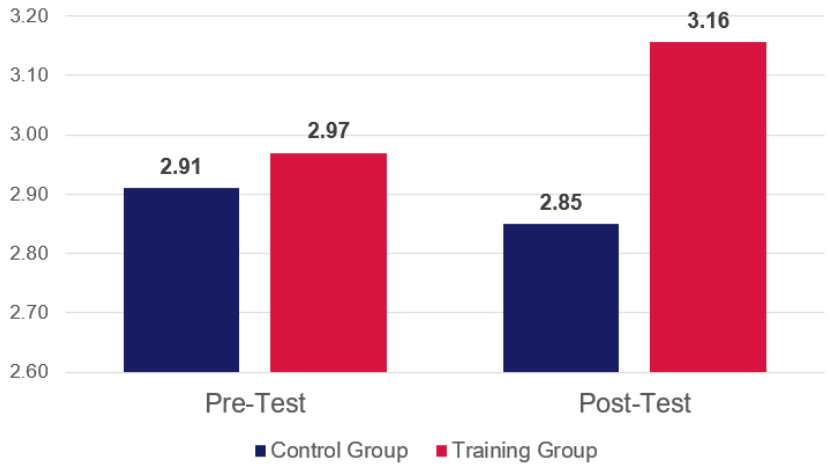

Figure 3.11. Entrepreneurial self-efficacy of treatment and control groups across pre- and post-tests.

3.4.4 Observing Behaviour

Observing behaviour refers to the extent to which participants observed their environment and their customers. Results showed that participants in the training group engaged in more observing behaviour than those in the control group, as shown by Figure 3.12.

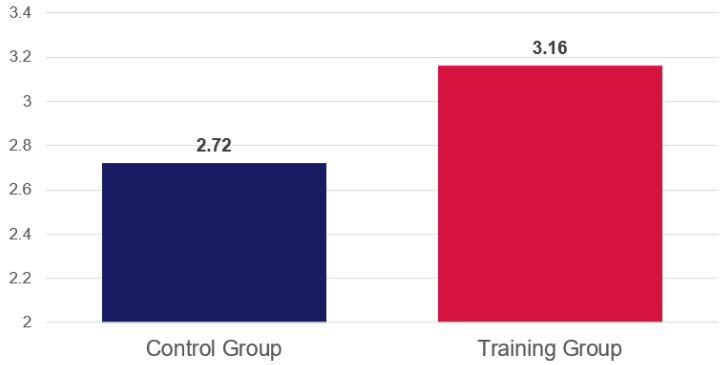

Figure 3.12. Observing behaviour of treatment and control groups across 5 weekly surveys

3.4.5 Idea Networking Behaviour

Idea networking behaviour refers to the active creation of networks of people with diverse ideas and perspectives. Having high idea networking allows for one to tap into their network for new ideas and insights. Results showed that participants in the training group engaged in more idea networking behaviour than those in the control group, as shown by Figure 3.13.

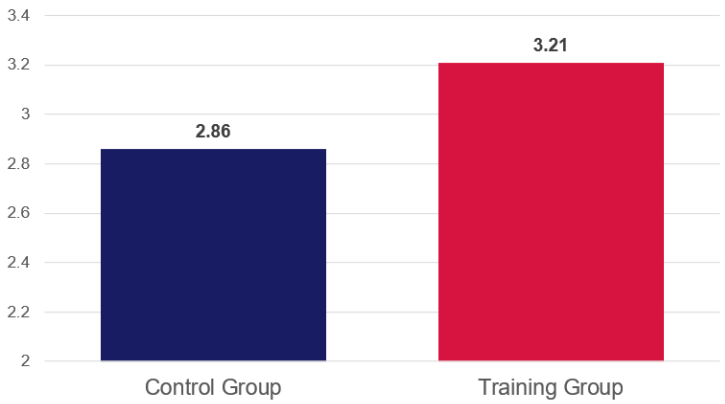

Figure 3.13. Idea networking behaviour of treatment and control groups across 5 weekly surveys.

3.5 Second Study (Phase 2)

To augment the findings of our research, we conducted a second study using data from Phase 2 participants. Trainees targeted for Phase 2 included managers, supervisors, and business owners.

Our comparison analyses showed that, Phase 1 participants identified more new opportunities than Phase 2 participants. Figure 3.14 shows the differences regarding the number of new opportunities identified in each survey corresponding waves.

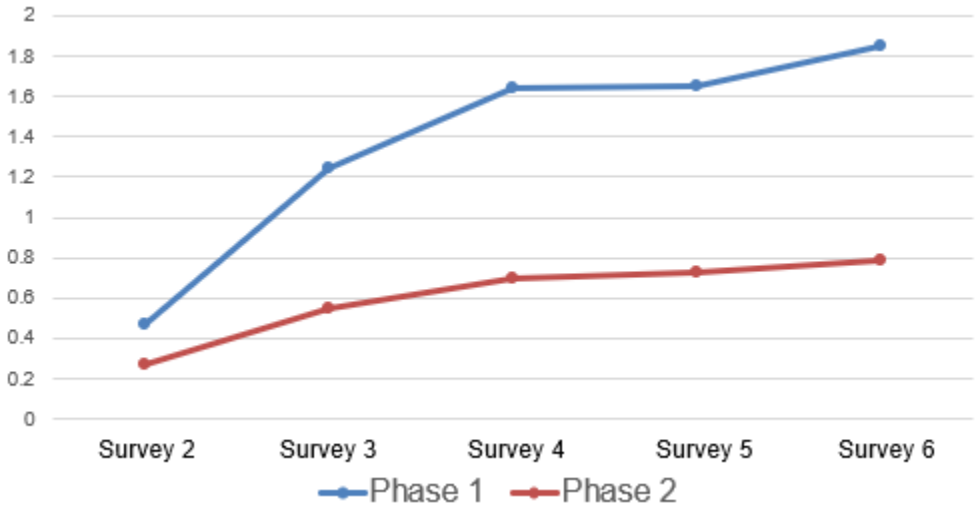

Figure 3.14. Number of new opportunities.

Conversely, Phase 2 participants had more progress in developing business opportunities than Phase 1 participants. Figure 3.15 shows the differences regarding the progress of identified opportunities in each survey corresponding waves. A possible reason for such a difference is that Phase 1 participants are full time employees who mostly work on their own ideas, while Phase 2 involves corporate managers, and the ideas they generated were for their firm/department. Ideas of participants in Phase 2 might be more related to their day-to-day work.

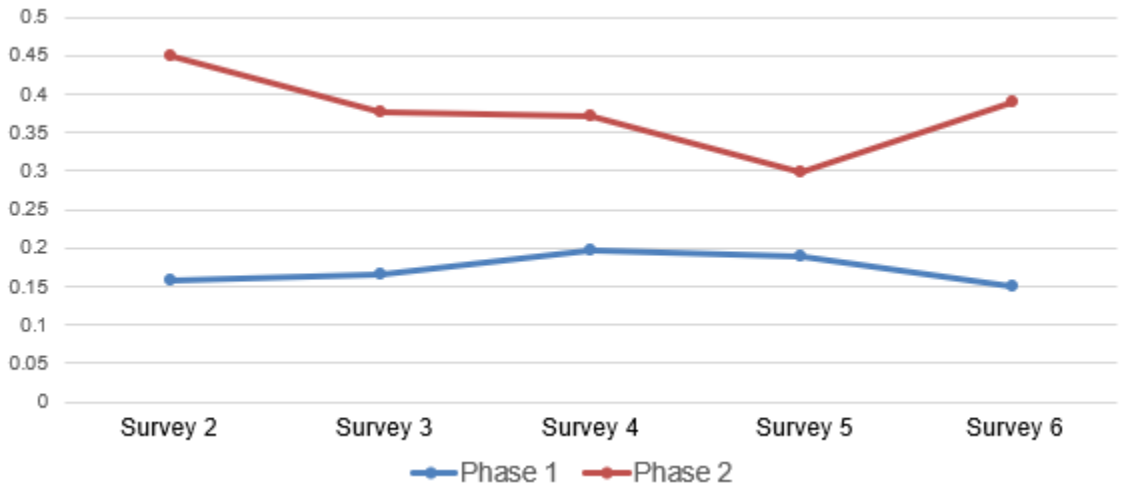

Figure 3.15. Progress in developing business opportunities.

3.6 Implications

Our data demonstrated that training was effective in increasing people's ability to identify opportunities and make progress in the development of those opportunities. These findings are consistent with the frameworks we utilized to guide the design of our training program, which emphasized two attention allocation approaches underlying opportunity identification competency. We found that compared to participants in the control condition, participants who underwent training produced more business ideas and showed more progress on the business ideas.

Further analyses revealed that training had an impact on several other important entrepreneurial factors, namely feedback seeking, engagement, entrepreneurial self-efficacy, observing behaviour, and idea networking. Through additional mediation analyses, we were able to further explain why training was effective. In particular, we found that training our participants in ways that increased their feedback seeking behaviour led to gains in identifying and generating new ideas. On the other hand, training our participants in ways that increased their engagement improved their ability to evaluate ideas and achieve greater progress in idea development. These findings provide a more holistic view on how training might help aspiring entrepreneurs and managers to identify business opportunities and develop innovative solutions while increasing our confidence in the utility and applicability of training in enhancing entrepreneurial competencies.

In summary, this research established that:

1) Opportunity identification competence can be trained;
2) Training criteria should usefully include methodologies aimed at promoting inductive processing in the transient attention stage (e.g., design thinking, pattern recognition) and deductive processing in the sustained attention stage (e.g., idea evaluation, effectual thinking); and
3) Training helps by changing participants' behaviour, including increasing their feedback seeking behaviours and engagement. It also enhances other important entrepreneurial aspects,

such as improving participants' entrepreneurial self-efficacy, observing behaviour, and idea networking.

4 Impact of COVID-19 on Firms and Coping Responses

As Phase 2 was conducted during the COVID-19 pandemic, the study also presented us an opportunity to examine the impact of the pandemic on firms, as well as their coping responses. We analysed the interview data of 152 participants and used the interview content where participants explicitly shared about the COVID-19-related impacts on their business. Participants described difficulties or opportunities that arose due to public health policies and measures aimed at managing the pandemic. As we collected data about business ideas they generated during our data collection period, we also note that most of the business ideas participants proposed were in response to the difficulties and opportunities arising from COVID-19.

We supplemented the qualitative data by administering an additional survey to all Phase 2 participants on the effects of COVID-19 and their firm's coping responses. We received 94 responses in total. This data was used to provide quantitative insights into how different firms might adapt in different ways.

4.1 Impact of COVID-19 on Firms

Through careful coding of the interview data, we identified two main impacts of COVID-19. First, firms may experience an impact on their business offerings, either because their products or services were made *redundant or irrelevant* (e.g., companies servicing the airline services are impacted due to travel restrictions, restaurants being unable operate due to restrictions), or because the business was able to expand or grow due to *new opportunities emerging* (e.g., firms exploiting new markets in health or e-commerce). We noted a slightly higher proportion of instances where the business was made redundant or irrelevant compared to new business opportunities arising, as shown in Figure 4.1 below.

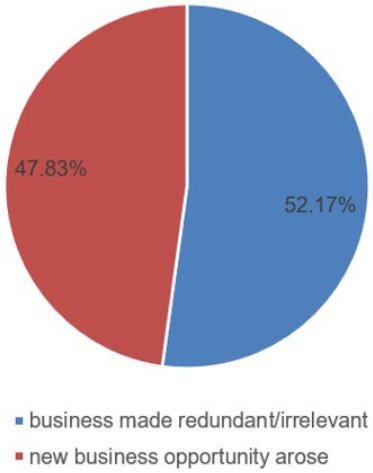

Figure 4.1. Types of business impact of COVID-19.

What specific changes brought about COVID-19 had the biggest impact on the firms? We noted four specific changes resulting from the implementation of public health measures that presented the greatest challenges to the firms. *Social distancing measures* affected the ability of firms to carry out their business that traditionally required people to be at a location for the business to operate, such as lessons, experiential entertainment (e.g., movies, fine dining, nightclubs), and office work. *Movement restrictions* hindered firms whose business involved traveling, such as regional sales representatives whose business-as-usual entailed meeting clients abroad. Some firms also experienced *reduced sales or demand* due to factors such as limited human traffic, reduced footfall, or dining-in restrictions, which impacted the number of customers patronizing physical shops. Finally, there were *disruptions to supply chain or logistics* due to constraints such as travel or border-related restrictions. The below figure shows the number of firms citing the factor most impacting them.

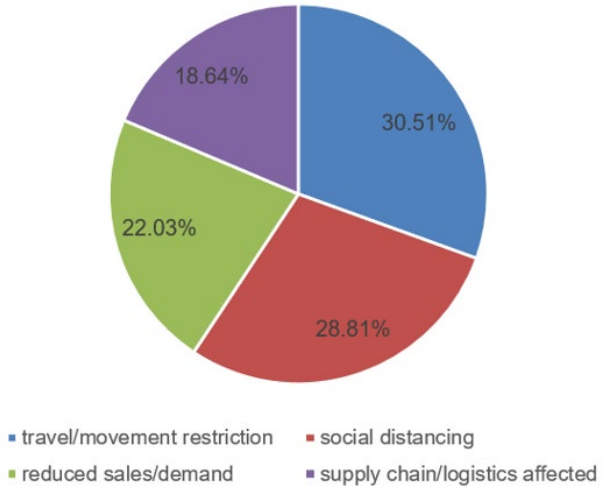

Figure 4.2. Types of process impact of COVID-19.

From participants' interviews, we also examined whether firms were predominantly affected due to demand-side factors affecting the sales of their product and services, or supply-side factors affecting internal business processes. The figure below estimates the proportion of firms facing either one or both types of pandemic-related impacts and found that the majority of firms in our sample faced both types of impact. This shows that demand side factors relating to the sale of products and services are typically intertwined with supply side factors relating to internal business processes that support the delivery or creation of the product or service.

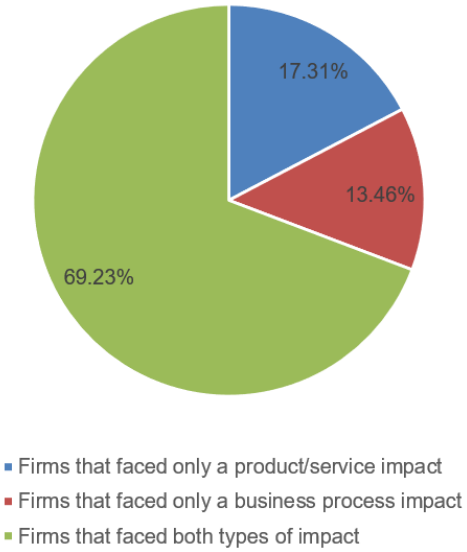

Figure 4.3. Proportion of firms that were affected by one or both types of COVID-19 impact.

4.2 Firm Responses to COVID-19 Impact

As participants faced challenges or opportunities due to COVID-19, they typically generated ideas that revolved around ways to respond to those challenges and opportunities. We surfaced a set of strategic behaviours that firms enact in response to the pandemic. We noted four types of coping responses exhibited by our participants, which are utilized either for survival or expansion.

Survival responses emerged as strategies used by firms to avoid business failure. These behaviours focused on solving immediate problems rather than exploiting potential gains and tended to be enacted by firms that struggled to remain viable due to public health measures undermining demand for their products and services or rendering their processes inoperable.

Expansion responses emerged as strategies aimed at exploiting new opportunities afforded by the pandemic. Firms that engaged in expansion typically encountered increased demand for their products or services. Thus, these firms found themselves doing more than merely coping and were able to grow the business, increase market share, or capture new markets.

4.2.1 Change in Products and Services

Offering alternative products or services: As firms cope with changes in consumers' demand due to a distinctly different environment, firms saw the need to diversify and to come up alternative product or service lines when their original offerings become unviable during the pandemic. For example, a participant who sold coffee beans found his business slowing to a standstill when dining-in restrictions killed the demand for coffee. Thus, he was forced to improvise and thought of allowing customers to use his otherwise idle coffee-making machines for free with purchase of coffee products to incentivize sales. Participants from a video production house shared how they moved away from low-demand projects (e.g., wedding

videos) and used their competencies to provide live webinar services or to produce videos for traditional companies (e.g., hawkers, real estate agents) that wanted to create digital content as they enter the social media space.

Creating new products or services: The pandemic enabled some firms to develop and sell new products or services on top of current offerings. For example, a participant whose company specialized in producing cleaning solutions was presented with a market opportunity to create disinfectants for COVID-19. Another participant with a manufacturing and logistics business saw an opportunity to use his existing materials, factories, and retail channels to produce and sell face masks. One participant shared that he had an idea to utilize a facial recognition feature in the company's security ecosystem to create new products to facilitate study or work at home arrangements, such as detecting whether someone is cheating during an exam or if a worker is really doing a task. While companies were grappling with the pandemic, some participants saw market gaps that they could fill with new services. For instance, a participant who ran a printing and packaging company thought of leveraging its retail networks in China to provide a service that would streamline consumer decisions for people who are not comfortable with online shopping, while another participant with an accounting software business considered helping clients modernize their accounting processes and automate workflow.

Modifying current products or services: Another way that firms sought to exploit new opportunities was to streamline current product or service offerings. For instance, several participants mentioned expanding the range of their products, such as increasing the number of available flavours for snacks to include poppadom, hummus, and quinoa, or the number of types of fragrance oils with different aromas. A participant from a training and consultancy firm shared the idea of converting their training methodology, which used to involve physical interactions, into an online package that could be downloaded by paid subscribers, while another participant with a similar business suggested incorporating virtual simulations or augmented reality features to increase the richness of students' experience. Some participants raised the idea of creating automated machines, such as robot cleaners, cashiers, and waiters, not only to reduce human exposure during the pandemic but also to cut costs on human labour. Finally, one participant whose business was in retail shared how they pivoted to focus on the gift market as gift-giving increased when people could not meet their loved ones during COVID-19.

4.2.2 Change in Target Market

Focusing on new market segments: In many cases, companies saw a need to change the target market as their usual customers have reduced or stopped using their products and services. For example, a business owner of a digital signage company who usually provided indoor digital signs for hotels and shopping malls found his business severely affected when his clients did not require any digital signage during the pandemic. As a result, he pivoted to outdoor digital signage and identified a new target market: SMEs such as those operating in shop lots, which are abundant in Malaysia.

Switching from B2B to B2C: There were a few participants that used to focus on B2B sales decided to venture into the B2C market, given that consumers are increasingly buying products from original sources online.

4.2.3 Change in Marketing

In addition to changing their products and markets, firms also developed new ways of conducting, organizing, or marketing the business in order to stay afloat.

Developing social media and online channels: For example, many participants whose firms did not have a virtual presence were forced to consider running their business online, such as developing a website or social media page, in order to hop on to the rapidly growing digitalization bandwagon.

Focus on marketing in-demand products: As resources are limited and consumer tastes have changed as a result of the pandemic, companies need to ensure that their marketing budget is spent on products that are currently in-demand. In one example, a manager in a packing company shared that they focused on promoting their gift packaging services as the market for gift-giving increased when people could not meet their loved ones.

4.2.4 Change in Distribution Channels

As public health measures restrict people's ability to go out, travel, or congregate, many firms were forced to change how the business operates or how their products or services are delivered.

Using online methods to operate or deliver: For many of these firms, going online was the first and easiest option to take. In one example, a manager in an auditing firm was unable to visit their clients in-person to complete their work. While his firm already had an existing digital solution, he proposed using a new digital collaboration software that was cheaper and had better functionality.

Providing delivery or takeaway service: Many participants from food and beverage businesses expressed that they had to focus more attention on providing delivery and takeaway services. Another common example is educational centres moving their lessons online to overcome the problem of being unable to hold in-person classes. Some participants also shared that they would have to educate potential clients, particularly those who are older and more resistant to new technologies, on how to use their virtual products. Other participants considered the use of artificial intelligence programming and automation to facilitate the need to reduce human presence or involvement, such as devices that allow for physical maintenance checking of ships out at sea or robots that could do cleaning. Finally, participants whose firms grappled with the requirement for work-from-home arrangements had to think of ways to maintain performance, such as productivity tracking, training managers to lead virtual teams, and managing employees' psychological issues that may result from working from home, such as reduced work-life balance or interference from family members.

4.3 Firm Traits and Coping Responses

While all the strategies stated above are valid, not all companies adapted to COVID-19 by rapidly identifying new business opportunities and changing their products and processes to cope

with the fluid environment. Based on our analysis, we found that four key company traits predicted which firms were more likely to show greater adaptivity to the rapidly changing environment. The four characteristics include: environmental dynamism, discretionary slack, climate for psychological safety and climate for personal initiative.

Environmental dynamism: Environmental dynamism is defined as the frequency and intensity of changes and innovation in the industry, which includes the unpredictability of consumer behaviour (Miller & Friesen, 1983). Managers in companies that regularly face a rapidly changing environment are more likely to implement changes in their products or services (see Figure 4.4). This can be attributed to them already being accustomed to the need for frequent pivots and for adapting to a fluid and dynamic environment even during non-pandemic times. This suggests that companies can build their "resilience muscles" by learning the skill of opportunities identification and practicing these skills regularly.

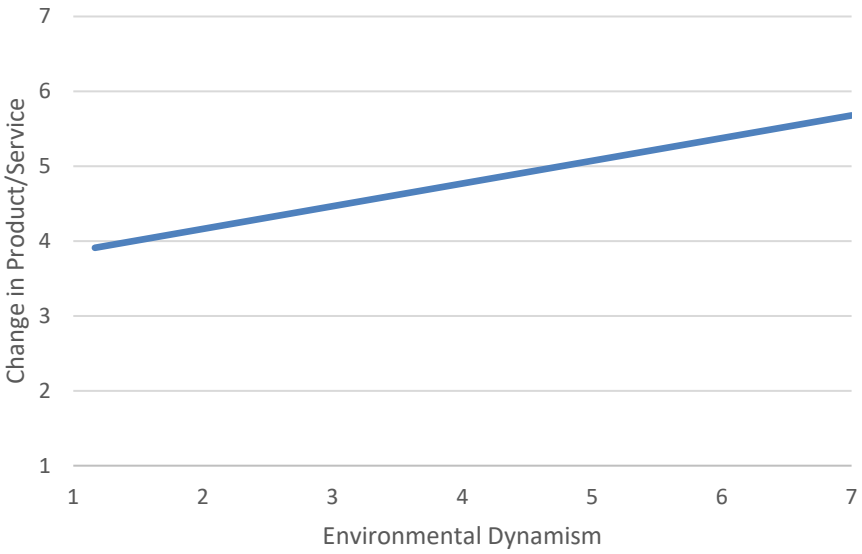

Figure 4.4. The relationship between environmental dynamism and changes in products and services.

Discretionary slack: Managers in companies with more available resources have the capacity and are more likely to implement changes in their firms, as shown in Figure 4.5. This is in line with previous research showing the importance of slack in affecting innovation in firms.

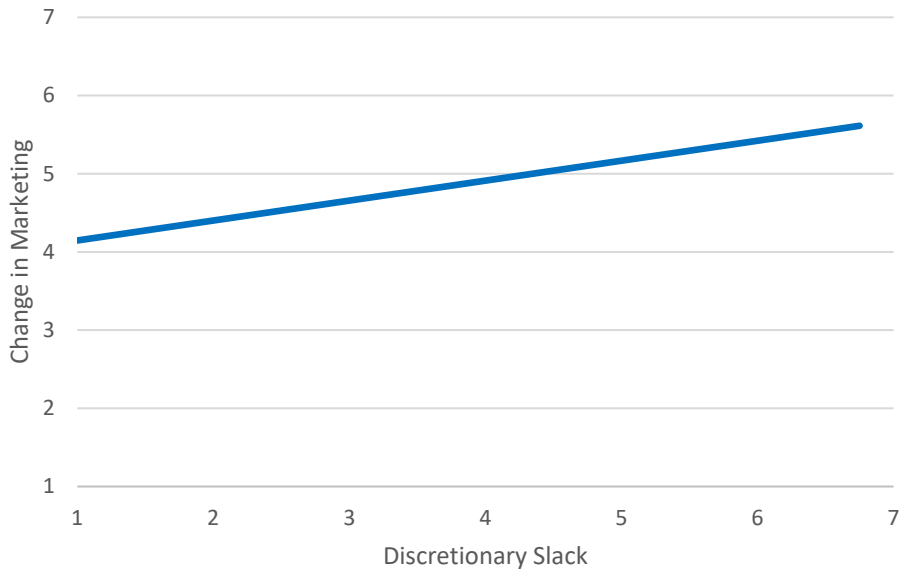

Figure 4.5. The relationship between discretionary slack and changes in marketing.

Climate for psychological safety: When managers perceive that they are safe from negative consequences of risk-taking at work, they are more likely to implement changes to products or services, and marketing, as depicted in Figure 4.6. This is consistent with prior research that shows the importance of creating a psychological safe climate for employees to encourage innovation.

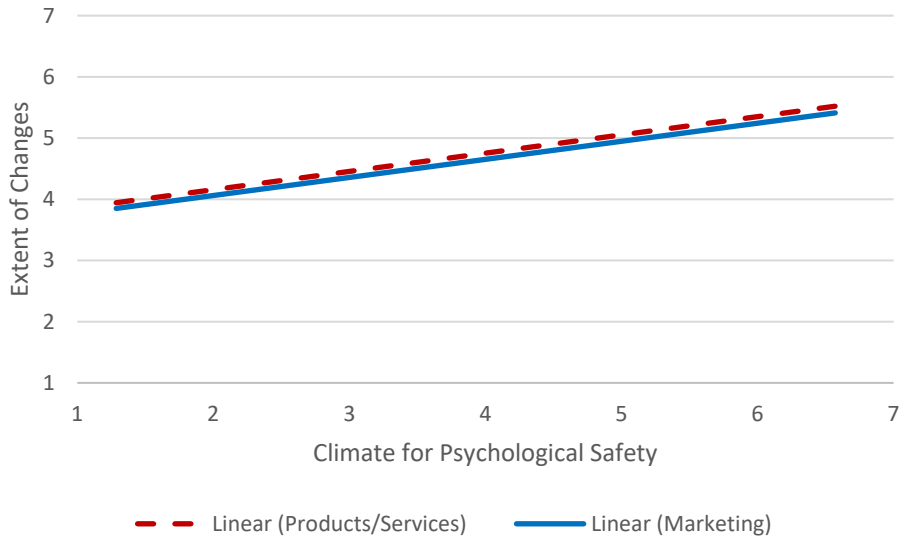

Figure 4.6. The relationship between climate for psychological safety and changes in products and services, and marketing.

Climate for personal initiative: Companies that promote personal initiative in their managers are more likely to implement changes (see Figure 4.7). A climate for personal initiative refers to an

organisational culture that promotes and encourages a proactive and persistent approach toward work (Baer & Frese, 2003).

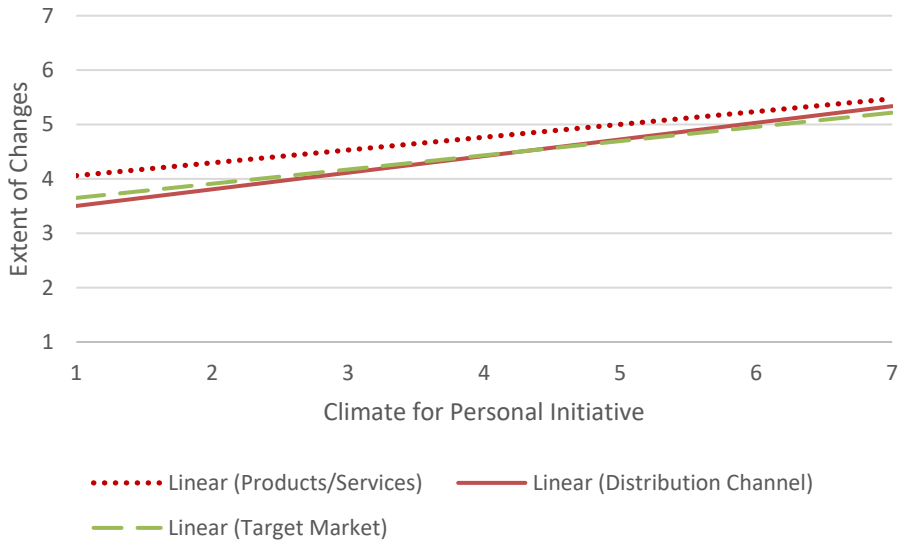

Figure 4.7. The relationship between climate for personal initiative and reported extent of changes in products and services, distribution channels, and target market.

4.4 Summary

Our analysis of the interviews shows that COVID 19 posed a significant external shock to participants' business. The impacts could be either demand-side shocks affecting firms' sales on their product or service offerings, where firms encountered either loss of demand, increased demand, or new business opportunities. Firms also faced supply-side shocks, affecting the processes necessary for the business to function, such as the acquisition or transport of materials, the delivery of products or services, or other business operations. Most participants reported experiencing both types of impacts.

Subsequently, participants proposed ideas that fell into four types of strategic responses: changes in products and services, changes in the target market, changes in marketing strategies, and changes in distribution channels. Across all types of responses, we observed that digitalization and automation were among the most popular means to respond to challenges and opportunities presented by the pandemic.

In summary, these findings revealed a wide range of effects of COVID-19 on firms in Singapore and elucidated the diverse strategies that firms undertook and the business opportunities they identified either to manage the negative impact or capitalize on the opportunities created by the pandemic, underscoring the dynamic ways by which firms cope with crises.

5 Impact of Positive Emotions on Resilience and Innovativeness

During the time of the pandemic, many organizations face situations where their operations have been compromised or worse, their existence has been threatened. Such situations present challenges where it becomes crucial for managers to adapt and innovate by developing new business opportunities amid market turmoil and environmental shifts. We suggest that positive emotions broaden people's momentary thought-action repertoire and help build personal resources to propose that managers' positive emotions would spur opportunity development in the pandemic context. We consider whether pandemic control, or the condition indicating that the virus transmission has been brought under control, would increase managers' positive emotions which would, in turn, foster opportunity development. Because the impact of the pandemic varies across industry sectors, we examine how the severity of the COVID-19 industry impact serves as a boundary condition that shapes the strength of the indirect relationship between pandemic control and managers' opportunity development through their positive emotions.

By conducting an eight-wave longitudinal study involving 65 managers who provided 365 valid reports during the third quarter of 2020, we found that managers' weekly positive emotions is positively related to opportunity development in the subsequent week. Specifically, we found that weekly pandemic control, or the weekly status of the extent to which the virus spread has been contained, increased managers' weekly positive emotions, in turn enhancing their subsequent week's opportunity development. Moreover, we find that this mediation linkage was stronger for managers working in industries that the pandemic has severely impacted. Therefore, by introducing positive emotions as the micro-level mechanism that connects pandemic control to managers' opportunity-development efforts and demonstrating that this linkage is more evident among managers working in industry sectors that the pandemic has more adversely impacted, our study emphasizes the need for government and businesses to work together to manage the crisis and emerge successfully from it.

6 Policy Implications and Recommendations

The research findings reported in the earlier sections have implications for entrepreneurs, intrapreneurs, and policymakers alike. The following sections discuss these implications to make appropriate recommendations that would help guide adjustments to current policies as well as suggest new policies aimed at fostering a better environment to promote and cultivating innovators. We hope that these results would contribute towards a more conducive context for entrepreneurship and innovation to flourish in Singapore.

6.1 Effectiveness of Training

Training of attention allocation: Based on our results, training is a useful way to boost one's identification of new opportunities and ability to make progress on identified opportunities. Training that directs participants' attention on the external environment – using design thinking, pattern identification and creativity tools - can increase many entrepreneurial behaviours such as

feedback-seeking behaviours and engagement. Training that directs participants' attention on sustaining attention on the identified opportunities help them to make progress on the ideas identified. We propose the following framework when designing training programmes for opportunity identification:

- The training can encourage participants to gather feedback on their ideas. This can be introduced by the education of design thinking and idea evaluation, for example.
- Engagement levels are crucial for opportunity identification. Some established ways to increase learner engagement is to encourage interaction, and to use relatable simulations with real-life examples.

6.2 Innovation in Times of Crisis

We found that opportunity identification and development play a pivotal role in helping firms to cope with the external shock posed by COVID-19. This shows the important role that opportunity identification plays in helping firms stay resilient and adaptive in the face of such huge shocks and environmental changes. The coping strategies used by firms, as noted in our qualitative study, showed the adaptiveness of individuals and firms.

We also found that corporate managers' positive emotions affect their opportunity development in the face of an external shock like the COVID-19. Indeed, we found that the influence of positive emotions is even greater when participants were in industry more severely impacted by the COVID-19. Hence, our study offers compelling evidence that positive emotions are of paramount importance especially for corporate managers in industries that have suffered tremendously from the pandemic. We also found that pandemic control has a positive influence on managers' positive emotions.

The main practical implications of these findings are simple yet powerful. First, our research sends a profound message to policymakers that pandemic control is necessary not just for saving lives; it also carries significant business implications. We found evidence that pandemic control fosters corporate managers' positive emotions, which in turn empower them to carry out business opportunity development efforts encompassing revolutionizing business models and accelerating digital transformation initiatives, among others. Our finding that this relationship is more evident for corporate managers working in severely hit industries highlights the that rapid curbing of the COVID-19 transmission during a highly uncertain time was instrumental in creating positive emotions amongst employees, which can be critical as a resource for helping organizations to cope with the rapid changes in the environment.

The importance of employee's emotions also underscores the importance of putting in place practices to help employees feel safer while at work. While many of the pandemic restrictions are enforced by the government, companies can do their part to help by adhering to the restrictions put in place and start considering ways to restructure their business operations to be able to adapt to similar crises in the future (e.g., hybrid work arrangements, workplace hygiene, etc.).

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