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Dynamic Managerial Capability Portfolios in Early Internationalising Firms

Citation: Vuorio, A. & Torkkeli, L. (2022). *Dynamic Managerial Capability Portfolios in Early Internationalising Firms*. International Business Review. <https://doi.org/10.1016/j.ibusrev.2022.102049>

Abstract

It is acknowledged that dynamic capabilities can underlie internationalisation of firms, yet extant research has tended to examine the role of capabilities in international entrepreneurship in separate studies, neglecting that international enterprises tend to develop different bundles or portfolios of capabilities that may have differing impacts on their internationalisation. Applying the concept of dynamic managerial capabilities, this study illustrates how different capability portfolios of entrepreneurial decision-making and network capabilities explain early internationalisation of small and medium-sized enterprises. Employing a machine learning method through artificial neural network (ANN) analysis, the findings show how early internationalisation is predicted by a portfolio of different dynamic managerial capabilities. This study thus contributes to the international entrepreneurship literature 1) by outlining the capability portfolios necessary for early internationalisation and by proposing a taxonomy for capability portfolios for early internationalising firms 2) by clarifying the role of dynamic managerial capabilities in early and successful entrepreneurial internationalisation, and; 3) by introducing the ANN methodology as a useful tool in the research corpus of the international entrepreneurship domain.

Keywords: Early Internationalisation, SME Internationalisation, Dynamic Managerial Capabilities, Cognition, Decision-making Logic, Effectuation, Bricolage, Network Capability

1 Introduction

Research on early internationalising firms has for the last twenty years been a main staple of the international entrepreneurship research domain (e.g., Martin & Javalgi, 2018; Reuber et al., 2018; Zander et al., 2015). This focus on early and rapid internationalisation has been warranted since early internationalising enterprises face not only challenges and risks related to new venture creation but also those related to internationalisation (Knight & Cavusgil, 2004), challenges that arise from liabilities of newness, smallness and foreignness (Shepherd & Patzelt, 2018, p. 18). Yet, it is also the case that early internationalisation can lead to performance advantages (Zhou & Wu, 2014). These characteristics make early internationalising firms different from the more gradually internationalising firms (Ferguson et al., 2019; Moen & Servais, 2002).

The distinct characteristics of early internationalising firms suggest that they possess specific capabilities that enable them to internationalise early (Cavusgil & Knight, 2015; Knight & Cavusgil, 2004). Dynamic managerial capabilities, defined as "*the capabilities with which managers build, integrate, and reconfigure organizational resources and competences*" (Adner et al., 2003, p. 1012), can determine differences in the performance and strategy of firms under conditions of change (Helfat & Peteraf, 2015), and successful entrepreneurial internationalisation¹ has long been noted to require strategic changes (e.g., McDougall & Oviatt, 1996). Recent research (Razmdoost et al., 2020) has indicated that instead of a specific capability, it is the configuration of interrelated capabilities that determines the formation of new ventures and recognition of opportunities among entrepreneurs. The present study seeks to illustrate how configurations of dynamic managerial capabilities are linked to early internationalisation of firms.

Among different dynamic managerial capabilities, effectuation (Sarasvathy et al., 2014), bricolage (Ding et al., 2021), and network capabilities (Mort & Weerawardena, 2006) have been found to be important in the domain of international entrepreneurship. However, as An et al. (2020) recently pointed out, we still have little knowledge on the ways in which the main entrepreneurial decision-

¹ entrepreneurial internationalisation is defined as "a firm level manifestation of international entrepreneurship" (Jones & Coviello, 2005, p.)

making logics effectuation, causation, and bricolage² capabilities are related to each other and how their combinations impact firms. Furthermore, network capabilities are not only crucial for internationalising SMEs in general (Torkkeli et al., 2012; Weerawardena et al., 2007; Yoon et al., 2018), but also because recent empirical studies and literature reviews (e.g., Gil-Barragan et al., 2020; Paul et al., 2019) have proposed that networks and the decision-making process in the internationalisation of small firms are intertwined. The prior research has tended to focus on one or two dynamic managerial capabilities at the time, which is an issue since such situations where a number of explanatory factors combine to provide multiple alternative ways to outcomes are causally complex (Furnari et al., 2021). Therefore, an approach accounting for the fact that firms develop different configurations of capabilities, when supplemented with suitable empirical analysis methods, allows us to illustrate the interrelated impacts of decision-making logics and network capabilities jointly.

In order to be able to delineate the impact of different capability portfolios on internationalisation, we adopt the capability configurations approach following Razmdoost et al. (2020) and, by applying artificial neural network (ANN) analysis on a sample of small and medium-sized enterprises (SMEs), we examine which portfolios of the dynamic managerial capabilities related to decision-making and networks are associated with early internationalisation and international performance. The results obtained from a sample of internationalising SMEs originating from Finland indicate that the capability portfolios associated with early internationalisation are different from those associated with later, slower internationalisation, and that different capability portfolios also explain the level of international performance in the firms. The study hence contributes to the international entrepreneurship literature by illustrating how capability portfolios of dynamic managerial capabilities are linked to early and successful internationalisation. The study also shows the potential of the ANN methodology for empirical inquiry into the international entrepreneurship domain and responds to the recent call by Paul et al. (2019) for more diversity in methods and techniques in research on early internationalising firms, which is an important extension to the few earlier studies suggesting that neural network methodologies can have a role

² Bricolage refers to *'making do by applying combinations of the resources at hand to new problems and opportunities'* (Baker & Nelson, 2005, p. 333)

in international entrepreneurship research in general (Fernández et al., 2021) as well as on studying causalities related to internationalisation (Garbe & Richter, 2009).

The rest of the paper is structured as follows: The next sections discuss the key literature underlying the dynamic managerial capabilities from the perspective of international entrepreneurship while outlining the reasons for the focus on decision-making logic capabilities and network capabilities. The review of the literature is then followed by a description of the research methods and data, after which we present the findings of the empirical inquiry. We conclude by discussing the theoretical contribution and managerial implications of the findings while considering the limitations of the study and the potential future research avenues rising from them.

2 Dynamic managerial capabilities in international entrepreneurship

International entrepreneurship is defined as including the *'discovery, enactment, evaluation and exploitation of opportunities across national borders to create future goods and services'* (Oviatt & McDougall, 2005). An important part of the domain ontology of international entrepreneurship (Jones et al., 2011) has for long been studies on entrepreneurial firms that internationalise soon after their inception. These early internationalising firms have been conceptualised through a host of terms such as born globals (Rennie, 1993), but when referring to early internationalisation, we adhere to the recent definition of early internationalising firms as *"a label that generally defines companies that begin international activities soon after their foundation"* (Romanello & Chiarvesio, 2019, p. 174). Zahra et al. (2005) proposed that early internationalising companies might be better at coping with ambiguity, which is associated with exploiting uncertain international opportunities within a limited window of opportunity. However, due to the liabilities of newness, smallness and foreignness, early internationalising companies, those that internationalise at a young age (De Clercq et al., 2012), need to rely on more unconventional ways when recognising international opportunities due to limited access to resources and lack of governance mechanisms (Morse et al., 2007). Studies have found that developing proper dynamic capabilities and competences are hence important for early internationalising firms especially

(Jiang et al., 2020; Mort & Weerawardena, 2006; Torkkeli et al., 2015), and capabilities perspective is a suitable lens through which to study early internationalising firms (Sapienza et al., 2006; Jie et al., 2021).

Dynamic capabilities were originally defined as “*the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments*” (Teece, Pisano & Shuen 1997, p.516), and the study by Knudsen and Madsen (2002) was among the first studies to argue for the role of dynamic capabilities manifest in international entrepreneurship. Indeed, early internationalisation of entrepreneurial firms is shaped by dynamic capabilities such as learning, marketing and networking capabilities (Torkkeli et al., 2012; Weerawardana et al., 2007), as well as capabilities related to international opportunity identification, institutional bridging and the ability and willingness to build cross-cultural collaboration (Karra et al., 2008).

A specific type of dynamic capabilities are dynamic managerial capabilities, which include capabilities through which managers ‘*create, extend and modify ways in which firms make a living*’ (Helfat & Martin, 2015). Thus, dynamic managerial capabilities enable the managerial construction, integration and reconfiguration of competences and resources (Adner & Helfat, 2003). Dynamic managerial capabilities consist of capabilities on managerial cognition, human capital, and social capital (Helfat & Martin, 2015). They are important for international entrepreneurship due to the fact that managerial cognition can enable recognition of international opportunities (e.g., Andersson & Evers, 2015). Indeed, the cognitive processes of individual managers and entrepreneurs can be crucial microfoundations through which to explain firm-level internationalisation strategies and performance (Maitland & Sammartino, 2015). Mainela et al. (2014) proposed that the cognitive processes and cognitive framing of international opportunities should receive attention from scholars. Therefore, the cognitive nature of dynamic managerial capabilities is relevant for international entrepreneurship, yet much of the internationalisation research has tended to view decision-makers as rational (Niittymies & Pajunen, 2020),

Dynamic managerial capabilities include effectuation, causation and bricolage as well as networking capability, which are described as ways to make decisions. Firms that internationalise

early can apply effectuation, improvisation and networking bricolage (Evers & O’Gorman, 2011). However, it has been suggested that, for example, causation and effectuation are complementary rather than substitutes; Jiang and Tornikoski (2019) have shown that new ventures rely on different decision-making frames (causation and effectuation) depending on the type of uncertainty faced. The results of Ciravegna et al. (2018) also suggest that early internationalising companies seem to use both rational and irrational approaches, hence suggesting that early internationalising companies may use multiple decision-making frames. It is therefore important to assess the impact of both bricolage and effectuation/causation when explaining early and rapid internationalisation.

Therefore, in this paper we focus on these four types as the main dynamic managerial capabilities for the capability portfolio in early internationalisation, which will be each discussed next in the following sections of the paper. The resulting framework for the study is illustrated in figure 1 below.

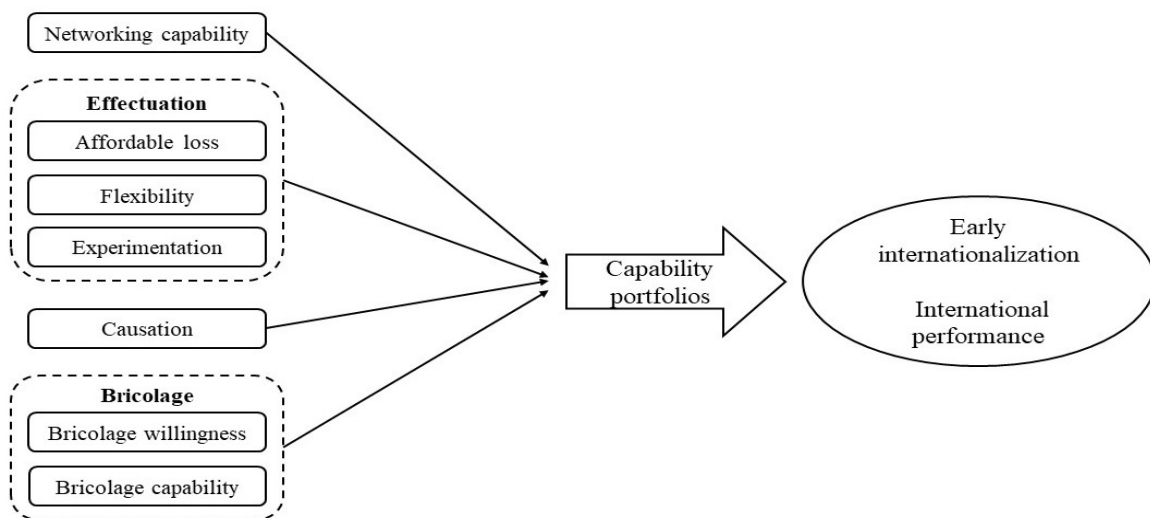


Figure 1: Cognitive capabilities, speed of internationalisation and international performance

To test the model requires a distinct approach, since early internationalisation and international performance are complex phenomena, shaped by multiple factors and by causal complexity, i.e. a situation in which a specific outcome is generated by multiple different and sometimes contradicting causal conditions (Ragin, 2008; Misangyi et al., 2017). Causal complexity bases on equifinality, conjunction, and asymmetry. According to equifinality, several different

configurations consisting of different causal conditions can result in the same outcome, while conjunction describes how and why a configuration of different causal conditions (input variables) generate the outcome (Furnari et al., 2020). Asymmetry suggests that those configurations that produce the presence of an outcome differ from those that produce the absence of an outcome (Fiss, 2011; Ragin, 2008). In study of early internationalisation, causal complexity appears through three main issues: 1) different dynamic managerial capability portfolios can result in early internationalisation (equifinality), 2) early internationalisation can result from a different combinations of effectuation, causation, bricolage and networking capability (conjunction), and 3) early internationalisation is likely to result from different dynamic managerial capability portfolios than not-early internationalisation (asymmetry). We next describe the key literature underlying the role of these different types of capabilities in early internationalising firms, after which we apply suitable empirical methodology which allows us to account for the causal complexity.

2.1 Internationalisation and effectuation/causation capabilities

Effectuation is a means-driven logic aimed at controlling future uncertainties as opposed to seeking to predict them through causal logic (Sarasvathy, 2001). Effectuation includes a series of principles, namely affordable loss, flexibility, experimentation, and alliances and pre-commitments. From conceptual perspective, these effectuation principles are defined as 1) generating new opportunities from available means (experimentation), 2) leveraging unexpected contingencies (flexibility), and emphasising affordable loss as a selection criterion (Palmié et al., 2019). Affordable loss is a key concept in understanding effectuation, as '*effectuation predetermines how much loss is affordable*' (Sarasvathy, 2001, p. 252). Such investments (or experiments, when referring to effectual terminology) whose loss would incur bigger losses to the entrepreneur than he/she can afford are by effectual logic forgone in favour of affordable experiments (Chandler et al., 2011). Flexibility then refers to the extent to which entrepreneurs remain flexible when making decisions, for instance their willingness to let their business evolve based on emerging opportunities, adapting their actions to match their resources, and avoiding any courses of action that would restrict their ability to adapt to changes in general (Chandler et al., 2011). Experimentation is another key principle in effectuation and it refers to an entrepreneur's ability to utilise unexpected environmental contingencies by remaining flexible, which enables the entrepreneur to turn these unexpected events into profitable opportunities (Chandler et al., 2011;

Fisher, 2012). Lastly, entrepreneurs build alliances and pre-commitments to diminish uncertainty by building entry barriers and accessing new resources (Sarasvathy, 2001; Chandler et al., 2011; Fisher, 2012).

The literature on entrepreneurial internationalisation has received a notable contribution from effectuation theory over the past decade (e.g., Andersson, 2011; Galkina & Chetty, 2015; Harms & Schiele, 2012; Prashantham et al., 2018) as studies have sought to apply the concepts of effectuation and causation to explain why the expansion of international activities by entrepreneurial firms does not fit neatly into the main international business theories. In brief, the proposed logic is that effectuation outperforms the impact of causation in uncertain environments (Sarasvathy, 2001; Welter & Kim, 2018) and that, regardless of the type of uncertainty, effectuation becomes more prominent when uncertainty is present during the first phases of starting a venture, whereas in lower uncertainty causal logic tends to dominate (Jiang & Tornikoski, 2019). Since internationalisation is inherently an uncertain process (Alimadadi et al., 2018), effectual logic underlies it especially in SMEs and for individual entrepreneurs.

Furthermore, entrepreneurial decision-making is context specific by default in that effectuation and causation are associated with different decision-making contexts and actions, and hence they, to an extent, overlap and can exist simultaneously (Sarasvathy, 2001). Studies seeking to operationalise effectual and causal logic (e.g., Chandler et al., 2011) have had to decide upon positing effectuation and causation as parallel, intertwined constructs rather than opposite ends of the same spectrum as most studies have tended to focus solely on effectuation (e.g., Galkina & Chetty, 2015; Prashantham et al., 2019) rather than both types of logic simultaneously. However, applying both of the two decision-making logics simultaneously can generate better performance results (Reymen et al., 2015; Smolka et al., 2018; Welter & Kim, 2018).

2.2 Internationalisation and bricolage capabilities

Bricolage is defined as *'making do by applying combinations of the resources at hand to new problems and opportunities'* (Baker & Nelson, 2005, p. 333). The use of bricolage can be

influenced by several factors, such as funding and external resources (Desa & Basu, 2013), as well as by individual-level antecedents (Stenholm & Renko, 2016).

In resource-constrained environments, entrepreneurs can apply bricolage in five domains, as follows: inputs (physical, labour and skill inputs), institutional and regulatory environments, and customers and markets (Fisher, 2012; Nelson & Baker, 2005). Physical inputs account for *'forgotten, discarded, worn, or presumed single-application materials with new use-value'*, while labour and skill inputs include broad skills that are self-taught and possessed by stakeholders, including suppliers, customers, employees and not actively engaged individuals involved in project work (Fisher, 2012, p. 1027). Bricolage in institutional and regulatory environments is used to deviate away from standards of operating and regulations, to test these standards and regulations and to construct new ones in areas where rules, standards and regulations are not in place, hence exploring the degree to which these standards and regulations constrain them (Nelson & Baker, 2005). Customers and markets may be used in bricolage to enable access to products and services which would normally be out of the entrepreneur's reach (Fisher, 2012).

Bricolage may be applied in a parallel manner or selectively, with selective bricolage generating growth and parallel bricolage additional limitations (Fisher, 2012; Nelson & Baker, 2005). Bricolage is linked to increased innovative performance (e.g., Senyard et al., 2014), to increased growth (Nelson & Baker, 2005) and to a greater chance of entrepreneurial survival (Stenholm & Renko, 2016). Bricolage behaviour can be determined by the extent of passion for inventing and developing (Stenholm & Renko, 2016), while lack of institutional support may hinder its usage. Scholars should further examine the connection of environment and mind as a source of entrepreneurial behaviour and more specifically bricolage (Gregoire et al., 2015).

2.3 Internationalisation and network capabilities

Several of the main models of internationalisation, such as the revised 'Uppsala' model (Johanson & Vahlne, 2009; Vahlne & Johanson, 2017) and the network approach to internationalisation (Johanson & Mattsson, 1988, 2017), have established that the internationalisation process of firms

develops by learning through network relationships. Similarly, while the research in international entrepreneurship has partly arisen from critiques of these models (e.g., Bell, 1995), it is also the case that the internationalisation of small entrepreneurial firms has long been considered network-driven (Coviello & McAuley, 1999; Oviatt & McDougall, 1994, 2005). The ability to develop networks is argued to constitute dynamic network capabilities (e.g., Chen et al., 2009; Mitrega et al., 2012; Ritter et al., 2002), which are crucial for international success among SMEs in general (Torkkeli et al., 2012) as well as for rapidly and early internationalising firms in particular (Mort & Weerawardena, 2006; Sharma & Blomstermo, 2003).

Chen et al. (2009, p. 295) define network capability as *'the capacity of new ventures to identify, establish, coordinate and develop relationships with different players in the market'* – that is, the dynamic capability related to developing and managing network relationships between firms. Prior research has shown that internal international market knowledge and collaboration intensity substitute for one another as contributors of high international performance among early and rapidly internationalising firms (Hughes et al., 2019). Moreover, their knowledge-intensiveness further necessitates the leverage of network relationships as they internationalise (Coviello & Cox, 2006). Network relationships are key drivers for early internationalisation (Cannone & Ughetto, 2014). Therefore, we argue that network capability is also a crucial element in the capability portfolios of early internationalising firms.

3 Method

This study applies a quantitative research approach as the analysis was conducted using a machine learning approach, namely ANN, to study the connection between dynamic managerial capabilities (bricolage, effectuation, causation and network capabilities) and how these shape SME's internationalisation. We illustrate how the capabilities are linked to the speed of internationalisation and complement this view by also including international performance as an outcome measure in the empirical sample of 144 internationally operating SMEs. The data were collected between November 2017 and February 2018 from Finnish internationally operating SMEs. The initial sample of firms was drawn from the Bisnode Selector and Amadeus online

databases. The cross-industrial sample includes SMEs from multiple industries, such as the metal and software industry sectors, among others. In drawing the sample of firms to be contacted, we followed the European Commission definition of SMEs as firms 1) employing fewer than 250 people, with 2) turnover less than €50 million or a balance sheet total less than €43 million (European Commission, 2003). This enabled us to concentrate especially on SMEs with international operations while excluding micro-enterprises (1–10 employees) as well as non-independent SME-sized organisations (e.g., subsidiaries of larger multinationals).

The survey questionnaire items were translated from English to Finnish and then were back-translated with the help of a professional language editing service, hence ensuring linguistic accuracy. The questionnaire was also piloted with managers from different fields to ensure that the survey items were understandable (and understood similarly) by potential respondents. To mitigate any common method bias issues, we sought to follow the guidelines set forth by Podsakoff (2003) as well as by MacKenzie et al. (2012). The precautions taken included, for instance, placing the central constructs of the study in different parts of the questionnaire, including negatively worded items in the survey and considering the low likelihood that the respondents would be able to ascertain the intended conceptual model used in this study.

A total of 2029 firms were contacted and asked to respond to the online survey questionnaire. For the companies that were found eligible and that agreed to participate, the link to the online questionnaire was then sent to the corresponding entrepreneur via email, followed by two reminders in two-week intervals as necessary. T-tests were conducted with the key variables in the sample to mitigate any potential issues regarding early versus late respondents and between respondents with differing managerial titles. By the end of the data collection, we had reached a total of 1821 of the firms, of which 1387 firms fitted the criteria of the research and 1032 of which agreed to participate in the research. The data collection process yielded 365 responses in total, for a 26% response rate. From that sample, of the SMEs that had responded fully to the central questionnaire items examined here, we retained a final sample of 144 firms for the study.

3.1 Measures

All the measures used in this research were adopted from the prior literature and have been applied to different entrepreneurship contexts. Bricolage was measured by applying the scale by Senyard et al. (2014) and further validated by Davidsson et al. (2017), which bases on the study by Baker and Nelson (2005). Effectuation and causation were measured using the scale by Chandler et al. (2011), while a scale by Chen et al. (2009) was utilised to measure network capabilities. International performance was measured by asking the respondents to evaluate the following three dimensions of their international performance: profitability, image improvement and know-how. Having a separate measure for network capabilities, we excluded the alliances and pre-commitments dimension from the effectuation scale since these two measure the same matter and hence would be highly correlated. Other dimensions of effectuation were included. We applied factor analysis to form the summated scales for the scales utilised in the study.

The bricolage scale is aimed to provide a holistic representation of bricolage behaviour; however, Davidsson et al. (2017) found two-dimensions bricolage in some of their samples. In this study, bricolage consisted of two dimensions – bricolage capability (consisting of items 1, 5 and 7) and bricolage willingness (2, 6 and 8). Items 1, 5 and 7 describe finding “workable solutions to a problem”, while items 6 and 8 describe “resource combinations” and item 2 “resources at hand” and “taking on a broader set of challenges” (Davidsson et al., 2017, p. 120). Two items (3: “We use any existing resources that seems useful to responding to a new problem or opportunity”; 4: “We deal with new challenges by applying a combination of our existing resources and other resources inexpensively available for us”.) were omitted due to a poor fit to the factor structure. Both dimensions were measured via a 7-point Likert scale ranging from completely disagree (1) to completely (7).

Similarly to the Chandler et al. (2011) study, causation forms a single factor, while effectuation is multidimensional in nature. In our case, effectuation consisted of three factors, namely affordable loss, experimentation and flexibility. Affordable loss describes the degree to which a person is focusing on affordable losses, when making decisions and it consists of three items ranging from one to seven (1=completely disagree, 7=completely agree). Experimentation describes the degree to which a person is testing different approaches in the market, i.e. experimenting, before choosing a business concept (Sarasvathy, 2001). Experimentation comprises four items (ranging from

completely disagree (1) to completely agree (7)), but item 2 (“The product/ service that we now provide is essentially the same as originally conceptualised.”) was omitted due to a poor fit to the factor solution (reversed item). Flexibility consists of three items (ranging from completely disagree (1) to completely agree (7)) and it describes an entrepreneurs’ ability to utilise emerging opportunities. Similarly to causation, networking capability consists of a single factor. The summated scales were formed based on factor analysis and dichotomised using the average scores. Omitted items and factor loadings are presented in Appendix 1.

All the measures were dichotomised based on their averages to account for any potential skewness of the data. The descriptive statistics, outlined in Table 1, indicated that both networking capability and distinct types of bricolage capability were positively and statistically significantly correlated with international performance. In addition, causal logic had a positive and significant (0.31, $p < 0.05$) correlation with the international performance measure. Internationalisation speed, on the other hand, did not exhibit statistically significant correlations with the central variables.

Table 1: Descriptive statistics

	Mean	St.d.	CrA.	1	2	3	4	5	6	7	8
1. Int. speed	10.62	14.70	-	-							
2. Int. Perf.	4.29	1.13	-	0.08	-						
3. NetC	5.25	0.97	0.84	0.08	0.20*	-					
4. AL	4.79	1.28	0.84	0.11	-0.04	0.12	-				
5. Experim.	4.41	1.22	0.77	-0.01	0.13	0.32*	-0.20*	-			
6. Flexibil.	5.25	0.90	0.66	-0.04	0.08	0.45*	0.35*	0.08	-		
7. Causation	5.18	0.97	0.87	0.08	0.31*	0.56*	0.11	0.30*	0.31*	-	
8. BricC	5.44	0.79	0.71	0.07	0.24*	0.51*	0.19*	0.18*	0.45*	0.45*	-
9. BricW	5.00	1.07	0.77	0.04	0.26*	0.38*	-0.17*	0.27*	0.21*	0.40*	0.50*

Notes: St.d.=standard deviation, CrA. = Cronbach's Alpha, Int. speed = speed of internationalisation (years), Int. perf. = subjective international performance, NetC. = networking capability, AL = affordable loss, Experim = experimentation, Flexibil. = flexibility, BricC. = bricolage capability, BricW. = bricolage willingness
*=p<.05

3.2 ANN

ANN, which is inspired by the nervous system, was used to analyse the data. There are two main characteristics of ANN that may provide advantages when examining novel and complex topics. First, ANN is a semi-parametric or non-parametric model, which means that coefficients cannot be used in an equivalent manner as in, for example, logistic regression (Dreiseitl & Ohno-Machado, 2002). However, compared to linear models, ANN can provide extremely high prediction accuracy, which may in some cases even outperform more traditional statistical methods, such as structural equation modelling (SEM), multiple regression analysis (MRA) and the like, especially in cases when assumptions of normality and linearity may not apply, such as in social science data (Garson, 1998; Leong et al., 2020). Second, through ANN, complex and nonlinear relationships between attribute set X and the outcome can be modelled (Chan & Chong, 2012; Kotu & Despande, 2015), which enables the examination of complex, multifaceted phenomenon, such as human decision-making (Leong et al., 2020). Additionally, since the output models in ANN models depend on patterns of input variables, they are not considerably affected by the value of a single output variable (Garson, 1998). A set of attributes X can be described as follows:

$$X = \{X_1, X_2, X_3, \dots, X_n\} \quad (1)$$

The aim of ANN is to create predictions through backpropagation, which enables the model to learn the relationship between an attribute set and an outcome (Kotu & Despande, 2015). The backpropagation occurs through using hidden layers, which are constituted from multiple nodes inside each hidden layer. A hidden layer comprises nodes that connect nodes from an input layer by applying an activation function, which defines the input–output relationship. These types of neural networks are called multilayer perceptron neural networks, which comprise at least three layers, namely the input, the hidden and the output layer (Leong et al., 2020). In a perceptron, input is one-directional and hence there are no loops (Kotu & Despande, 2015). The feed-forward and

backpropagation multilayer perceptron neural network model used in the study is presented below in Figure 2.

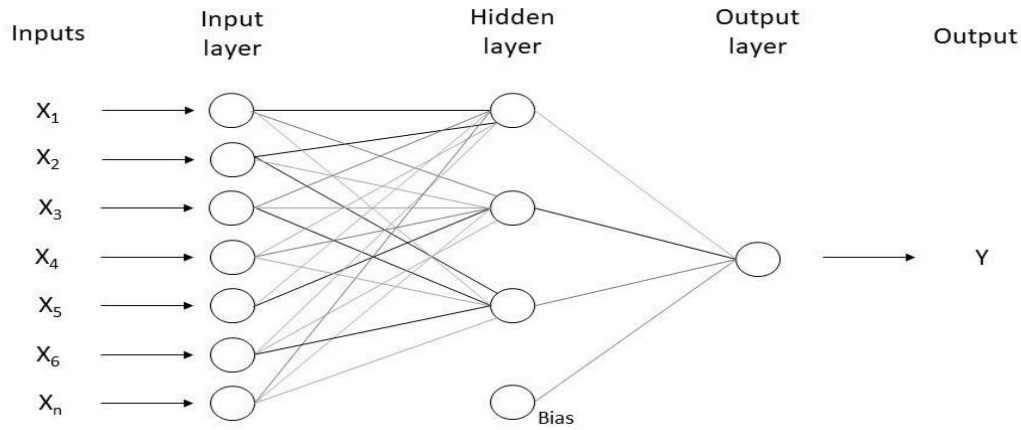


Figure 2: Multilayer perceptron ANN model

Information about the attribute set is assigned to nodes inside the hidden layer by using weights. It can be described as a linear function between the inputs and hidden layer as well as the hidden layer and the outputs (Dreiseitl & Ohno-Machado, 2002). *'Weights describe the relative strength of the connection from an input neuron to the neuron under consideration'* (Garson, 1998, p. 26). In equation 2, any given hidden layer node j (H_j) is a sum of input variables (X_i) contributing to the node j multiplied by their weight (w_{ij}) and the bias term (ϵ). In equation 3, the output variable (Y) is a sum of hidden layer node j multiplied by its weight (v_j) and the bias term (ϵ). The equations are presented below:

$$H_j = \sum_{i=1}^n w_{ij}X_i + \epsilon \quad (2)$$

$$Y = \sum_{j=1}^n v_jH_j + \epsilon \quad (3)$$

According to Garson (1998), when the connection between an input node and a hidden layer node is excitatory, a weight is positive. Conversely, when the connection between an input node and a hidden layer node is inhibitory, a weight is negative. As a part of ANN learning, weights are

adjusted (Kotu & Despande, 2015). The use of a hidden layer in the model transforms the model into a nonlinear one since there is no linear relationship between inputs and outputs (Dreiseitl & Ohno-Machado, 2002), which is the activation. An output (usually value 1) will be generated when an activation value exceeds a threshold value (Garson, 1998). Furthermore, the ANN model's weights are optimised using maximum likelihood estimation. ANN models are flexible, which may create overfitting. The flexibility can be increased by adding hidden layers and hidden nodes. To mitigate the potential overfitting problem, a 10-fold ANN was used. This means that 10% of the data were used for testing, while the remaining data were used in the training process.

The goodness of an ANN model can be evaluated through four key indicators, namely accuracy, precision, recall and the Matthews correlation coefficient (MCC). MCC utilises actual and predicted values in an ANN with a categorical outcome variable (Zhu, 2020). It uses true positive (TP) cases, true negative (TN) cases, false positive (FP) cases and false negative (FN) cases for calculation. TPs are those cases, which were predicted as positive and are also positive, while TNs include those cases that were predicted as negative and are negative. Conversely, FPs include those cases that were predicted as positive but are negative, while FNs cover cases that were predicted as negative but are positive. MCC varies between -1 and 1. Extreme value 1 denotes that the model was able to perfectly predict the outcome variable, while -1 denotes that the model perfectly misclassifies the outcome variable. An MCC value of 0 means that the model can predict the outcome as well as random selection. Accuracy describes the percentage of cases that are correctly classified (Kotu & Despande, 2015). Precision shows the percentage of positive cases that are correctly classified out of all positive cases classified, while recall describes the percentage of correctly classified positive cases out of all positive cases, that is, those that are correctly and incorrectly classified (Flach & Kull, 2015). The equation for four evaluation criteria for ANN is presented below:

$$MCC = \frac{TPTN - FPF}{\sqrt{(TP+FP)(TP+FN)(TN+FP)(TN+FN)}} \quad (4)$$

$$Accuracy = \frac{TP+}{(TP+TN+FP+FN)} \quad (5)$$

$$Precision = \frac{TP}{(TP+F)} \quad (6)$$

$$Recall = \frac{TP}{(TP+FN)} \quad (7)$$

The Connection Weight Approach (a.k.a. the Olden algorithm) was utilised to evaluate the importance of the input variables in speed of internationalisation and international performance (Olden et al., 2004). In the Connection weights approach, two steps need to be taken: 1) input-hidden connection weights are multiplied by hidden-output connection weights to generate input-hidden-output connection weights, and 2) all input-hidden-output connection weights are summated for each input variable to generate overall connection weight (Olden & Jackson, 2002). The input-hidden-output weights describe the indirect effect of each input variable to a given outcome through a hidden node, while the overall connection weight reflects the overall importance of a given input variable to the existence of the outcome (). It should be noted that the Connection Weight Approach is not the only approach to evaluating the importance of input variables in ANN; however it has been found provide the most accurate results for calculating the overall importance of input variables for ANN (Olden et al., 2004; Greenwell et al., 2018).

4 Findings

The first model (Model 1) has an accuracy of 57.58, which means that the model predicts 58% of those who internationalise early (True EARLY-Predicted EARLY) or late (True LATE-Predicted LATE) out of the total cases predicted. Precision varies between 49.39 and 68.47, while the average is 58.93%. This suggests that the model predicts correctly around 59% of those internationalising early out of those who are predicted as internationalising early. Recall for the model varies between 64.49% and 90.79%, while the average is 77.64%. This suggests that the model predicts correctly around 78% of those internationalising early out of those who are

internationalising early (TP + FN). MCC is 13%, suggesting that the model can predict the outcome better than a random model.

The second model (Model 2) has an accuracy of 55.81%. This means that ca. 56% of those who have high (True HIGH-Predicted HIGH) or low (True LOW-predicted LOW) international performance are correctly predicted out of the total cases predicted. The average precision is 56.75% with a confidence interval of 12.24%. This in turn suggests correct predictions on ca. 57% of the firms that have high international performance out of those who are predicted to have high international performance. The average recall for the model is 58.75%, ranging between 40.90% and 76.60%. Therefore, the model predicts correctly around 59% of those who have high international performance out of those who have high international performance (TP + FN). The MCC is 11%, suggesting that the model can predict the outcome better than a random model. A model is said to be better than a random model when three indicators (accuracy, recall and precision) are higher than 50%. Both models meet these criteria, suggesting that they are better at predicting the outcome than a random model. However, for accuracy and precision in Model 1 and accuracy, precision and recall in Model 2, the lower level for these criteria is below the threshold value of 50%. Still, the MCC supports the notion that both models are better than a random model since the value of the MCC is higher than 0.

Table 2: Accuracy of ANN analysis

Model 1	True EARLY	True LATE	Class precision
Predicted EARLY	24	19	55.81 %
Predicted LATE	47	66	58.41 %
Class recall	33.80 %	67.06 %	
Accuracy	57.58 % (+/-11.91%)		
Precision	58.93 % (+/- 9.54 %)		

Recall	77.64 % (+/- 13.15 %)		
MCC	0.13		
Model 2	True HIGH	True LOW	Class precision
Predicted HIGH	37	31	54.41 %
Predicted LOW	33	43	56.58 %
Class recall	52.86 %	58.11 %	
Accuracy	55.81 % (+/-14.13 %)		
Precision	56.75 % (+/-12.24 %)		
Recall	58.75 % (+/- 17.85 %)		
MCC	0.11		

5.1 Labelling of the hidden nodes

The results of the ANN analysis show that the model examining the speed on internationalisation (Model 1) comprises a single hidden layer that contains three nodes (see Table 3). The first node is depicted as a *resource accumulator*. Networking capability (0.636) and bricolage capability (0.246) contribute positively to this node; however, their contribution is at the medium level. The largest negative contribution is created by flexibility (-1.936), followed by bricolage willingness (-1.695), experimentation (-1.207), causation (-1.124) and affordable loss (-0.979). Their inhibition is at a high level.

The second node is labelled *balancer* since the highest contributions in node 2 are generated by flexibility (1.527), networking capability (1.185) and causation (0.861). Experimentation (-1.609) and bricolage willingness (-1.523) have the highest negative contribution to node 2, followed by affordable loss (-0.637). Their inhibition to the node is at the high and medium levels, respectively. Bricolage capability does not seem to contribute to node 2 since it has an extremely low positive contribution (0.085).

The third node is labelled *cautious* since networking capability (2.658), affordable loss (2.035), causation (1.942) and flexibility (1.160) contribute positively to node 3, and their contribution is at the high level. The highest contribution is generated by networking capability, followed by affordable loss and causation. Bricolage willingness (-1.523), experimentation (-1.084) and bricolage capability (-0.403) act as inhibitors to node 3. *Balancer* (node 2) contributes positively (1.384) to early internationalisation, while *resource accumulator* (node 2) and *cautious* (node 3) inhibit early internationalization., thus they contribute to late internationalisation.

In sum, networking capability has a positive contribution to all three nodes, while experimentation and bricolage willingness contribute negatively to all three nodes. Conversely, other input variables' contribution varies across the three nodes in the hidden layer. *Cautions* capability portfolio has a slightly larger negative contribution to early internationalisation than *balancer* capability portfolio. Additionally, all hidden nodes contain both positive and negative connection weights from the input variables, thus suggesting interactions between input variables (Olden & Jackson, 2002)

Table 3: Effects on hidden layer

	Model 1			Model 2		
	Speed of internationalisation			International performance		
Input layer -> hidden layer						
	Node 1	Node 2	Node 3	Node 1	Node 2	Node 3
	Resource accumulator	Balancer	Cautious	Experimenting strategizer	Slack utilizer	Experiment er
Early intern.	-	-	-	-1.890	-0.260	-2.742
Networking capability	0.636	1.185	2.658	0.432	-0.141	-0.951
Affordable loss	-0.979	-0.637	2.035	-2.382	-1.571	-0.454

Experimentation	-1.207	-1.609	-1.084	1.850	-2.204	3.241
Flexibility	-1.936	1.527	1.160	-0.452	1.634	0.234
Causation	-1.124	0.861	1.942	0.351	-1.467	-1.183
Bricolage capab.	0.246	0.085	-0.403	0.685	3.601	-2.600
Bricolage willing.	-1.695	-1.523	-1.643	-0.073	0.229	-1.239
(Bias)	-3.613	-0.300	2.868	-0.338	-0.260	-1.414

Hidden layer -> output layer

	Early int.	High perf.
Node 1	-2.660	1.780
Node 2	1.384	-2.664
Node 3	-2.538	-3.691
	1.538	1.572
(Bias)		

Notes: intern. = internationalisation capab. = capability, willing. = willingness, perf. = performance

For the international performance model (Model 2), the results show that there is one hidden layer that contains three nodes. Node 1 is labelled *experimenting strategizer*. The highest contributing factor in the node is experimentation (1.850), followed by bricolage capability (0.685) and networking capability (0.432). These input variables' contribution varies from high to medium. The highest inhibiting factor is affordable loss (-2.382), followed by speed of internationalisation (-1.890) and flexibility (-0.452). Bricolage willingness does not seem to contribute to the node since it only has a small negative contribution (-0.073) to the node.

Node 2 is labelled *slack utilizer*. The highest contributors to the node are bricolage capability (3.601) and flexibility (1.634), followed by bricolage willingness (0.685). Experimentation (-2.204), affordable loss (-1.571) and causation (-1.467) have a high negative contribution to the

node, while networking capability (-0.141) and speed of internationalisation (-0.260) have a low negative contribution to the node. The third node is labelled an *experimenter*. The highest contributors to the node are generated by experimentation (3.241) and flexibility (0.234). However, experimentation has high contribution, while flexibility has low contribution. Speed of internationalisation (-2.742) and bricolage capability (-2.600) have the highest negative contribution to node 3, followed by bricolage willingness (-1.239), causation (-1.183), networking capability (-0.951) and affordable loss (-0.454). As mentioned above, early internationalisation and affordable loss act as inhibitors in all three nodes, while all other input variables' contribution varies across nodes. The *networking experimenter bricoleur node* contributes (1.780) to high international performance, while the *slack utilizer* (-2.664) capability portfolio and the *experimenter* (-3.691) capability portfolio contribute to low international performance.

In sum, the results showed two types of capability portfolios connected to late internationalisation – *resource accumulators* and *cautious*. Both capability portfolios include networking capability, but in the case of *cautious* capability portfolio, it is combined with flexibility, causation and affordable loss, while in the case of *resource accumulator*, networking capability is combined with bricolage capability. Conversely, the results show only one capability portfolio, which is connected to early internationalisation, which is a *balancer*, which includes networking capability, affordable loss, causation and flexibility. Similarly, the results showed two types of capability portfolios of low international performers – *slack utilizer* and *experimenter*. Both capability portfolios include flexibility, but in the case of *slack utilizer* capability portfolio, it is combined with bricolage capability and willingness, while in the case of *experimenter*, flexibility is combined with experimentation. Conversely, the results show only one capability portfolio of high-performing internationaliser, *experimenting strategizer*, which can be described by experimentation, bricolage capability, networking capability and causation. It should be noted that none of the international performer capability portfolios include early internationalisation as a contributing input variable.

5.2 Importance of each input variable to the outcome

To further examine the importance of each input variable to the existence of outcome, the Olden algorithm was utilised. The results show that the highest total contributor to early internationalisation is bricolage willingness (6.571), followed by flexibility (4.319) and

experimentation (3.735). The highest inhibitor to early internationalisation is networking capability (-6.798), followed by affordable loss (-3.442). Conversely, for high international performance, the highest total contributor is causation (8.899), followed by early internationalisation (7.449) and networking capability (4.655). The only two inhibitors are experimentation (-2.798) and flexibility (-5.973).

Table 4: Olden algorithm for the relative importance of dynamic managerial capabilities and to early internationalisation and high international performance.

	Early internationalisation	High international performance
Early internationalisation	-	7.449
Networking capability	-6.798	4.655
Affordable loss	-3.442	1.620
Experimentation	3.735	-2.798
Flexibility	4.319	-5.973
Causation	-0.747	8.899
Bricolage capability	0.486	1.223
Bricolage willingness	6.571	3.833

5.3 Post-hoc analysis of indirect effects

To examine the indirect effect of the input variables of the outcome, total connection weight for each input variable was calculated by multiplying input-hidden node connection weights with hidden node-output connection weights. The total connection weights are presented in figure 3 below; the solid lines in the figure represent a positive contribution to the output variable through the hidden node, while the dotted lines describe a negative contribution (inhibition) to the output variable through the hidden node. The light grey lines and text represent neutral contribution, meaning a small positive or negative contribution to the outcome variable through the hidden node. Darker grey boxes surrounding the input factors reflect the hidden nodes.

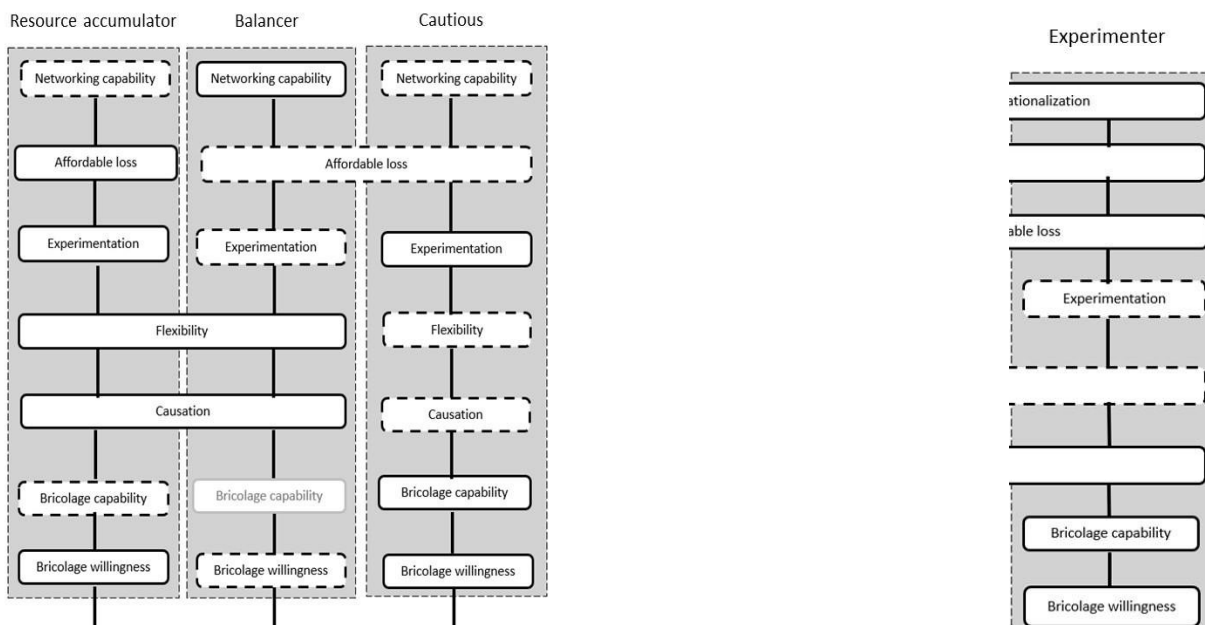


Figure 3: Indirect effect of dynamic managerial capabilities and speed of internationalisation of the outcome variables.

For early internationalisation, when examining the indirect effect of the input variables on the outcome, some similarities and differences may be noted across different capability portfolios. First, bricolage willingness and networking capability seem to have opposite roles: when networking capability enhances (acts as contributor) early internationalisation, bricolage willingness diminishes early internationalisation (acts as inhibitor), and vice versa. Second, flexibility and causation seem to complement one another: when flexibility enhances early internationalisation, so does causation, and vice versa. These notions provide further support for the interaction effects across different dynamic managerial capabilities.

For high international performance, when examining the indirect effect of the input variables on the outcome, some similarities and differences may be noted across different capability portfolios. First, early internationalisation and affordable loss seem complementary: when early internationalisation hinders international performance, so does affordable loss, and vice versa. Second, networking capability and causation seem to contradict with flexibility across all capability portfolios. Third, experimentation and bricolage willingness seem to contradict with each other: when experimentation enhances international performance, bricolage willingness seems to inhibit it. These findings suggest that early internationalisation may generate positive international performance implications, when combined with an appropriate combination of dynamic managerial capabilities. We next move to develop a taxonomy of capability portfolios for early internationalising firms while discussing the findings in more detail in light of literature.

6 Discussion

Based on the findings in the previous section, we next propose a taxonomy for six main capability portfolios consisting of different dynamic managerial capabilities, which are connected to speed of internationalisation and international performance. The taxonomies are presented in detail in table 5 below.

Table 5: Taxonomy for capability portfolios

Capability portfolios	Description
Earliness of internationalisation	
<i>Resource accumulator</i>	Managers who possess networking capabilities combined with bricolage capability. These managers seem to accumulate resources through their slack resources and building network connections to internationalise, but as a result of the resource-based focus, this slows down internationalisation.
<i>Balancer</i>	Managers who possess networking capabilities, and rely on flexibility and causation. These managers seem to have a plan on how to develop the company, but by embedding flexibility into company structures and utilising and building network connections enable reacting to raising opportunities. This combination of dynamic managerial capabilities seems to enhance internationalisation through promotion focus.
<i>Cautious</i>	Managers who possess networking capabilities and rely on causation, flexibility, and affordable loss. These managers seem to plan carefully, but at the same time remain adaptive by relying on networking capabilities to build connections and embedding flexibility into company structures. Despite the ability to adapt to situations, these companies seem to approach business development cautiously, which

	slows down their internationalisation as they combine promotion and prevention focus on their internationalisation.
<i>International performance</i>	
<i>Experimenting strategizer</i>	Managers who possess networking and bricolage capabilities, and rely on experimentation and causation. As a result of planning and experimenting, these managers seem to be able to utilise company slack resources and build connections through their networking capability. This capability portfolio combined with slower internationalisation seems to result in better international performance by combining resources-based and promotion focus.
<i>Slack utilizer</i>	Managers who possess bricolage capabilities and rely on bricolage willingness and flexibility. Thus these managers focus on utilising resources at hand and combine that with flexible approaches and company structures, thus showing promotion focus This capability portfolio combined with slower internationalisation does not seem to result in better international performance.
<i>Experimenter</i>	Managers who rely on experimentation and flexibility. This suggests that these managers focus on maintaining the adaptive nature of new ventures in their operations. This capability portfolio combined with slower internationalisation does not seem to result in better international performance. Thus, it seems that only utilising promotion-focused effectuation principles does not generate positive international performance outcomes.

Resource accumulator capability portfolio relies on resource-based focus, which aligns with the resource-based view of entrepreneurial internationalisation (Westhead et al., 2001; Rialp & Rialp, 2007). Managers with *resource accumulator* portfolio possess both networking and bricolage capabilities, which both enable accumulation and utilisation of different resources. While networking capabilities enable internationalising firms access to new resources (e.g., Mort &

Weerawardena, 2006), bricolage capability focuses on identifying and utilising existing excess resources, which are not used effectively (Baker & Nelson, 2005).

Conversely, *balancer* capability portfolio relies on promotion focused decision-making heuristics by combining flexibility and causation, while *cautious* capability portfolio combines prevention and promotion focused decision-making heuristics by relying on causation, affordable loss and causation. Earlier research has also referred to portfolios of heuristics, where heuristics can act as rationalities for capability creation (Bingham & Eisenhardt, 2011). Where organisational heuristics relate to capability development in firms (Bingham et al., 2007), our findings imply that heuristics of individual managers may also be related to both capability development and subsequent behaviour of their firms.

Moreover, effectuation principles have been suggested to be promotion or prevention focused: Promotion focus highlights the potential gains to pursue growth goals, which also do experimentation and flexibility principles of effectuation as well as causation (Palmie et al., 2019). Similarly, bricolage could be seen as promotion focused decision-making heuristics. Prevention focus highlights losses and making correct predictions by applying precaution; Affordable loss, and alliances and pre-commitments principles of effectuation also focus on these (Palmie et al., 2019). Hence, networking capability could be viewed as prevention focused.

Experimenting strategizer capability portfolio combines resources-based and promotion focus by relying on networking and bricolage capabilities as well as causation and experimentation. Similarly to *resource accumulator* capability portfolio, managers with this type of capability portfolio seem to accumulate new resources through their connections enabled by their network capabilities as well as better utilise existing resources via bricolage capability. This vast resource base combined with planning and experimentation enable these managers to generate positive international performance implications. This portfolio type to an extent echoes the recent findings by Demir et al. (2021) of strategic agility and earliness of internationalisation being “inseparable” when aiming for successful internationalisation. However, as this type is only one of the several capability portfolios we found in our analysis, our results suggest that the inseparability may only be one possible combination of a larger set of dynamic managerial capabilities that entrepreneurial

internationalisation requires, and that in fact there can be several ways to international success through different combinations of capabilities through the portfolios.

Slack utilizer portfolio combines bricolage with flexibility, thus relying on promotion focus. These managers could be also described as bricolouers, who tackle new opportunities by utilising their existing resource base better (Nelson & Barker, 2005). *Experimenter* capability portfolio relies on promotion focused decision-making heuristics by combining experimentation and flexibility. As suggested by prior literature, solely relying on a single behavioural logic does not seem to benefit companies (An et al., 2020; Sarasvathy, 2005).

Based on the proposed taxonomy and the findings of the study, we posit three main implications. First, from the empirical findings and the resulting taxonomy, we propose that bricolage, principles of effectuation and causation are interconnected with network capability through interaction effects. Recent research has indicated that causal and effectual networking behaviour are intertwined in entrepreneurial opportunity development (Galkina & Jack, 2021), and that capabilities underlie effectual logic in internationalising SMEs especially (Tolstoy et al., 2021). The findings of our analysis relate to those studies by explaining how the different dynamic managerial capabilities across different dynamic managerial capability portfolios seems to be complimentary or opposites as their indirect effect varies. For example, in the case of earliness of internationalisation, bricolage willingness and networking capability have opposite roles, while flexibility and causation complement one another.

Second, the findings of the empirical analysis suggest that neither effectuation, causation, bricolage nor networking capability alone but instead their combinations predict early internationalisation of firms. As the review study on early internationalising firms by Romanello and Chiarvesio (2019) noted, both causation and effectuation are recognized as factors influencing early internationalisation, and networks have been extensively linked to international growth of early internationalising firms. They also pointed to studies exploring different types of dynamic capabilities in early internationalising firms. The taxonomy in the present study relates to that by showing that none of the dynamic capabilities alone predict earliness of internationalisation, but rather at least two different capabilities are needed. More precisely, the results of the present study

show that managers who possess networking capabilities, and rely on flexibility and causation tend to internationalise early.

Third, the findings indicate that the magnitude and direction of effectuation, causation, bricolage and networking capability shape the earliness of internationalisation and international performance depending on which combinations of the behavioural logics a manager applies. While effectuation and causation have received substantially more attention in international entrepreneurship literature compared to bricolage, they can all impact international performance and internationalisation strategy of firms (Coudounaris & Arvidsson, 2021). Similarly, network capabilities are important for international performance of SMEs in particular (e.g., Asemokha et al., 2020). Our findings outline the impact of these jointly and indicate that the direction is towards balancing networking capabilities, flexibility and causation in the case of earliness in internationalisation and experimenting in strategising (i.e. combining networking and bricolage capabilities with experimentation and causation).

6.1 Theoretical contribution

The findings contribute to the literature on international entrepreneurship in several ways. First, the present study helps clarify the role of dynamic managerial capabilities in the early internationalisation and international performance of SMEs. Jones et al. (2011) and Tsang (2013) have called for more research applying the configuration approach in internationalisation research. The present study answers these calls by shedding light on which bundles of capabilities can determine early and successful entrepreneurial internationalisation. More precisely, the results highlight two specific bundles of capabilities, out of which one predicts early internationalisation (*Balancer*), and the other (*Experimenting strategizer*) predicts better international performance. However, contrary to extant studies on early internationalisation (e.g., Musteen et al., 2014), the results of the present study suggest that networking capabilities, along with bricolage, have dual roles as promoter and inhibitor of early internationalisation. We suggest that the underlying reason may be a trade-off between capability development and rapid internationalisation, which was previously hinted at in the study by Torkkeli et al. (2015). By complementing the examination of decision-making logics with the inclusion of network capability in the analysis, this study

contributes to the microfoundations of the decision-making discussion (cf. Felin et al., 2015) and to the microfoundations of international entrepreneurship by showing the combination of dynamic managerial capabilities in internationalisation and international success.

Second, the present study contributes to the literature by showing that different decision-making logics have different impacts on early internationalisation and international performance of SMEs. The findings indicating that early internationalisation requires both flexibility and experimentation, while high international performance is connected to causation and networking capability, are to our knowledge, novel in international entrepreneurship literature on decision-making logic and capabilities. The findings also describe the role of bricolage as an enabler of both early internationalisation and better international performance, a finding further evident through the indirect effects. Hence, we extend the findings of the prior research by showing the different impacts of dynamic managerial capabilities, which prior research has tended to look at separately (An et al., 2020). Simultaneously, our results support the findings of prior literature that has proposed that these logics co-exist. Fisher et al. (2012) show that bricolage and effectuation co-existed across all their studied cases, and in none of the cases, causation was the only decision-making logic used. Similarly, the findings of An et al. (2020) highlight the simultaneous use of different decision-making logics; however they show differences between early-stage and late-stage small and large firms. We extend these studies by including network capability, which has been found to be important for internationalising SMEs in general (Torkkeli et al., 2012; Weerawardena et al., 2007; Yoon et al., 2018). However, our results support the notion that both networks and the decision-making process in the internationalisation of small firms are intertwined (cf. Gil-Barragan et al., 2020; Paul et al., 2019).

Third, by having outlined the ways in which different bundles or ‘portfolios’ of dynamic managerial capabilities together help explain the earliness and performance in internationalisation, the study helps incorporate the concept of capability portfolios (Razmdoost et al., 2020) in the international entrepreneurship domain, where capabilities related to entrepreneurial internationalisation have traditionally been examined separately rather than as bundles. Earlier studies on dynamic managerial capabilities have tended to examine the separate impacts of few capabilities, neglecting the causal complexity (Furnari et al., 2021) and ambiguity of dynamic

capabilities (e.g., Blyler & Goff, 2003). The present study thus contributes by helping fill that omission in the international entrepreneurship domain of research, suggesting that none of the dynamic managerial capabilities alone are enough to predict the earliness and performance in internationalisation, but rather a portfolio of dynamic managerial capabilities is needed. Moreover, the present study proposes three distinct capability portfolios that are connected to the earliness of internationalisation and three distinct capability portfolios that are connected to international performance. This is a notable contribution, since research has found that early internationalising companies may use multiple decision-making frames (Ciravegna et al., 2018), yet prior research has mostly (with few exceptions, e.g., An et al. (2020)) tended to examine effectuation, causation and bricolage separately (see Coudounaris & Arvidsson, 2021), focusing mostly on the first two types. This study extends the prior research by applying a non-linear model (Peng et al., 2020) and the use of multiple behavioural logics in international firm performance (Coudounaris & Arvidsson, 2021). Hence, the present study supports and extends these findings by applying a configuration approach, which enables the development of taxonomy for dynamic managerial capability portfolios. We posit that presenting the capability portfolios necessary for early internationalisation through a taxonomy with which those portfolios can be categorised presents a notable contribution to literature; Developing taxonomies when researching internationalisation of small firms in particular is considered important due to both their ability to describe patterns or types within this relatively complex phenomenon, as well as the promise of taxonomies to provide increasingly better explanations for outcomes and other phenomena relevant for internationalising SMEs (Hagen et al., 2017). As Costa et al. (2022) have recently noted, taxonomy approaches enable increasingly detailed understanding of internationalisation behavior without the constraints otherwise provided by predefined labels. The taxonomy provided by the present study extends these notions to develop a taxonomy incorporating the key dynamic managerial capabilities for early internationalising firms in effectuation, causation, bricolage and networking.

Fourth, the present study is to our knowledge the first in international entrepreneurship to apply the ANN methodology. Machine learning approaches, constituting a subset of artificial intelligence wherein a computer program applies algorithms and statistical models to construct patterns of inference within data, are useful for testing and further developing theory while also being a useful tool with which expanding the explanatory spectrum of theory can be made (Leavitt

et al., 2021). In addition to its inherent prediction accuracy compared to some of the more traditionally used quantitative methods (such as logistic regression), a major advantage of ANN is its ability to allow the shedding of light onto complex phenomena, such as the construction and impact of different capability portfolios on internationalisation and performance outcomes. Machine learning approaches have been recently applied to different entrepreneurship contexts (e.g., Santos et al., 2020; Vuorio & Puumalainen, 2020), and a call for research applying different methods and techniques, including neural network methodologies (Fernández et al., 2021), in the study of early internationalising firms has been set forward (Paul et al., 2019). ANN methodology is starting to gain a foothold in international business research (Yang et al., 2020), but until now its use has been restricted to study large multinationals (e.g., Tsionas & Tzeremes, 2021). The present study extends the promise of ANN to the international entrepreneurship domain of research.

This study also helps to provide evidence of the joint roles of effectuation, causation and bricolage as determinants of entrepreneurial internationalisation and international performance. It is only recently that the research on international entrepreneurship has started to shed light on the differential impacts of effectuation and causation on internationalisation (Shirokova et al., 2020; Shirokova et al., 2021), yet bricolage is a crucial capability in international entrepreneurship (Evers & O’Gorman, 2011; Kollman et al., 2018). Effectuation and causation have also been noted as important concepts underlying entrepreneurial internationalisation (Ciszewska-Mlinaric et al., 2016; Galkina & Chetty, 2015; Harms & Schiele, 2012), but the studies have tended to focus only on bricolage or effectuation/causation. This has been an omission in the literature as research in the entrepreneurship domain has worked to integrate bricolage and effectuation for some time (e.g., Archer et al., 2009; Fisher, 2012; Welter et al., 2016). The results of the present study show that better international performance results from combining all four dynamic managerial capabilities, namely networking and bricolage capabilities, and experimentation and causation. Hence, the present study contributes to the international entrepreneurship domain also by outlining the joint dynamics of bricolage and effectuation/causation in the literature on the earliness of internationalisation and international performance (cf. Schwens et al., 2018).

Finally, the study contributes by problematizing (cf. Alvesson & Sandberg, 2011) the prevailing application of dynamic capabilities theory in explaining international entrepreneurship phenomena. Extant studies have predominantly tended to apply the theory of dynamic capabilities through mediation or moderation effects of specific capabilities when explaining entrepreneurial internationalisation and internationalisation of SMEs (e.g., Villar et al., 2014; Gölgeci et al., 2019; Hernández-Linares et al., 2021). The present study indirectly challenges that view, by describing how different portfolios of capabilities can lead to different types of internationalisation depending on the prevalence of each different type of capability.

6.2 Managerial and policy implications

The study also gives rise to several practical implications for entrepreneurs and managers as well as for policy-making. The found differences between the different capability portfolios depending on the resulting speed and performance in internationalisation outcomes highlight for international entrepreneurs the importance of aligning decision-making styles with the strategic goals of the firm. Specifically, since speedier entry to foreign markets was predicted by the *flexibly planning networker* capability portfolio, which is described by causation, flexibility and networking capability, we recommend that SMEs seeking early internationalisation prioritise developing their networking capability while making plans and predictions and simultaneously developing their ability to react to unexpected events. This suggests that having a plan for internationalisation is beneficial for internationalising SMEs, but they also need to remain open to opportunities.

Conversely, for SMEs and entrepreneurs who prioritise performance outcomes over rapid foreign market entry, the findings of this study suggest combining networking and bricolage capability with experimentation and causation, hence applying the *networking experimenter bricoleur* capability portfolio, and combining this with late internationalisation. The main implication here is that companies aiming to achieve their international performance outcomes should take their time in planning their internationalisation by experimenting as well as investing in developing their networking and bricolage capabilities, as doing so enables SMEs to overcome their limited resources as well as to avoid committing too many resources to trying out different internationalisation activities, hence resulting in better performance.

Policymakers should also take heed from these results that encouraging internationalisation among start-ups and small firms may require incentives to develop their dynamic and networking capabilities. While such policy recommendation as such is not entirely new in international entrepreneurship research, the added insight from the present study on such implications is that policymakers should also be aware of the complementary nature of these capabilities and how their combinations may result in different outcomes. If policies are targeted to increase the speed of internationalisation, then it seems that the best course of action to support SMEs is to provide resources for networking capability development and encourage both planning and the ability to deter from those plans when opportunities emerge. However, if policies are targeted to improve the international performance in SMEs, then the results suggest that policies should support SMEs' networking and bricolage capability development as well as encourage planning and experimenting in addition to limiting the speed of internationalisation. This is a worthy endeavour as in most cases growth-seeking enterprises are considered the best use of public funding and assistance. Export assistance should be aligned with networking and bricolage capability development as well as lean approaches to internationalisation combining experimentation and planning.

6.3 Limitations and future research

We acknowledge several limitations of the study, some of which also open avenues for future research. First, this study was conducted in a single-country context. While we would expect the results to be generalisable across highly similar small, open economies, future studies could extend to different countries in order to examine national-level differences in the use of dynamic managerial capabilities in early and late internationalisation and international performance.

We also note that the models used to predict the speed of internationalisation and international performance are limited in their ability to predict the outcome variable with full certainty, which is also reflected in the level of the MCC. Therefore, we recommend future studies to adopt larger, multi-country datasets to provide further comparative evidence on an even larger scale. We also note that, although ANN has an advantage over regression-based models since it is able to model both linear and non-linear relationships (Chan & Chong, 2012; Kotu & Deshpande, 2015; Leong et al., 2020), ANN should not be applied to testing hypotheses – it is more suited for prediction

because of its ‘black box’ operations (Leong et al., 2020) – hence more conventional models could be applied for formal hypotheses testing. As the data include only dichotomous variables, which may also partially explain the limited prediction capacity of the model, future studies could apply ANN models with continuous variables. We also acknowledge that cognition as a concept is closely linked to a host of other concepts and processes and the present study is only able to account for some of them. For instance, learning is also one of the main determinants of internationalisation speed of SMEs (e.g., Pellegrino & McNaughton, 2017) and similarly closely linked to heuristics (e.g., Bingham & Davis, 2012). Therefore, future research could also account for learning capabilities as part of the capability portfolio of successful internationalisation among SMEs.

Finally, we note that Mainela et al. (2014) proposed more attention be paid to cognition in the research on international opportunities. Future research should look at the dynamic managerial capabilities related to cognition when seeking to explain international opportunity recognition, as the extant literature includes scales (e.g., Faroque et al., 2021; Kuckertz et al., 2017) for doing so. The taxonomy for capability portfolios proposed in the present study should prove an applicable basis for future research seeking to describe which capability portfolios are linked to other key phenomena in international entrepreneurship.

7 Conclusion

Studies seeking to explain early internationalisation by now constitute an established stream of research within the international entrepreneurship domain ontology (Jones et al., 2011), and early internationalisation research has drawn significantly from entrepreneurship, international business and network studies (Dzikowski, 2018). This study aimed at examining the combination of dynamic managerial capabilities and how these shape internationalisation and its outcomes. By examining Finnish internationally operating SMEs through ANN, this paper has presented one of the first attempts to shed light on the capability portfolios necessary for early and successful entrepreneurial internationalisation. We consider it likely that, going forward, research on international entrepreneurship can benefit from applying the portfolio view onto international entrepreneurial capabilities and will stand to benefit from ANN as a research method

complementing the case-based and regression-based approaches the field has tended to traditionally rely on in its empirical inquiry.

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APPENDIX 1: Measurement scales

Table 6: Items and factor loadings

Items	NetC	BricC	Bric W	Exp	AL	Flex	Caus	Int Pef
1. We analyze what we would like to achieve with which collaborators.	0.72							
2. We rely on close individual relationships to secure personnel and financial resources	0.66							
3. We judge in advance which possible partners to talk to about building relationships	0.87							
4. We appoint coordinators who are responsible for the relationships with our collaborators.	0.52							
5. We discuss with collaborators regularly on how to support each other to achieve success.	0.75							
6. We can deal flexibly without collaborators.	-							

7. We almost always solve problems constructively with our collaborators.	-
1. We are confident of our ability to find workable solutions to new challenges by using our existing resources.	0.51
5. When dealing with new problems or opportunities, we take actions by assuming that we will find a workable solution.	0.74
7. When we face new challenges, we put together workable solutions from our existing resources.	0.76
2. We gladly take on a broader range of challenges than others with our resources would be able to.	0.71
6. By combining our existing resources, we take on a surprising variety of new challenges.	0.82

8. We combine resources to accomplish new challenges that the resources were not originally intended to accomplish.	0.73
3. We use any existing resources that seems useful to responding to a new problem or opportunity.	-
4. We deal with new challenges by applying a combination of our existing resources and other resources inexpensively available for us	-
1. We experimented with different products and/or business models.	0.75
2. The product/ service that we now provide is essentially the same as originally conceptualized.	-
3. The product/ service that we now provide is substantially different that we first imagined.	0.69
4. We tried a number of different approaches until we found a business model that worked.	0.60

5. We were careful not to commit more resources than we could afford to lose.	0.78
6. We were careful not to risk more money that we were willing to lose with our initial idea.	0.86
7. We were careful not to risk so much money that the company would be in real trouble financially if things didn't work out.	0.50
8. We allowed the business to evolve as opportunities emerged.	-
9. We adapted what we were doing to the resources we had.	0.62
10. We were flexible and took advantage for opportunities as they arose.	0.74
11. We avoided courses of action that restricted our flexibility and adaptability.	0.85
1. We analyzed long-run opportunities and selected what we thought would provide the best return.	0.63

2. We developed a strategy to best take advantage of resources and capabilities.	0.77
3. We designed and planned business strategies.	0.60
4. We organized and implemented control processes to make sure we met objectives.	0.69
5. We researched and selected target markets and did meaningful competitive analysis.	0.70
6. We had a clear and consistent vision for where we wanted to end up.	0.73
7. We designed and planned production and marketing efforts	0.75
1. Internationalisation has had a positive effect on the profitability of our company.	0.66
2. Internationalisation has had a positive effect on the image of our company.	0.92

3. Internationalisation has had a positive effect on the development of our know-how.	0.85
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Notes: NetC = networking capability, BricC = bricolage capability, BricW = bricolage willingness, Exp = experimentation, AL = affordable loss, Flex = flexibility, Caus = causation, Int Perf = international performance