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Abstract

There has been limited attention to the internationalization of SMEs as a decision, and how the application of contrasting decision modes is associated with different information use and patterns of network attachment. This paper offers a new and systematic analysis of the likely associations between decision modes, information use, and network attachment among internationalizing SMEs. The analysis is applied to three categories of SME, identified in terms of their knowledge domain. By focusing on the relation between a relatively neglected subject – decision modes – and other issues that have been more centre-field, the paper contributes to an analytic synthesis in the field of SME research.

Keywords

decision-making, information, SME knowledge domain, network attachment, internationalization.

1. Introduction

The internationalization of small and medium-sized enterprises [SMEs], namely their expansion into foreign markets, has attracted growing attention both as a subject of academic inquiry and a goal of public policy. However, while there is now a voluminous literature on SME internationalization (see reviews by Harris & Li, 2005; Jones, Coviello, & Tang, 2011), there has been only limited analysis of how SMEs decide to internationalize (Schweizer, 2012) – what may be termed their ‘decision mode’. To some extent this reflects a neglect of managerial decision-making in international business research as a whole (Aharoni, Tihanyi, & Connelly, 2011). As with other aspects of SME internationalization, there is reason to expect that the decision modes found in SMEs may differ from the goal-driven, planned and ‘rational’ decision-making commonly associated with large firms (Wilson & Nutt, 2010). One factor relevant to this difference is the greater information scarcity that SMEs tend to face in the course of internationalization (Buckley, 1989). Another is that SMEs tend to be characterized by an individualized leadership (Oviatt & McDougall, 1994). The significant role played by individual decision-makers in SMEs means that their personal characteristics and interpretations are highly likely to affect their strategic decisions, including those on internationalization (Hsu, Chen, & Cheng, 2013; Nielsen & Nielsen, 2011; Nordman & Melén, 2008).

The combination of individualized leadership with informational constraints suggests that SME decisions may tend to be based on personal hunch and be a response to unplanned developments to a greater extent than those made in multinational enterprises [MNEs], despite the growing recognition that intuition can inform the strategic decision making of larger firms as well (Elbanna, 2006). The scarcity of information, and other resources, frequently confronting SMEs may also mean that their internationalization decisions reflect resource availability rather than a ‘rational’ pursuit of clear goals (Evers & O’Gorman, 2011).

It has been found that SMEs often make use of networks to reduce information asymmetry and facilitate their internationalization (Lu & Beamish, 2001; Zhou, Wu, & Luo, 2007), and that

this is likely to be particularly true of rapidly internationalizing new ventures (Coviello, 2006). Networking plays an important role for accessing and acquiring information relevant to SME international growth (e.g. Andersen; 2006; Ellis, 2011; Manolova, Manev, & Gyoshev, 2010; Yli-Renko, Autio, & Tontti, 2002). Indeed, Johanson and Vahlne (2009) argue that ‘insidership’ in relevant networks is a prerequisite for successful internationalization. However, there has been little attention to how networking, and the information it may provide, may be associated with how SME leaders decide on initiating and implementing internationalization. Potential configurations among decision modes, types of information and associated networking still await systematic analysis, as does the way such configurations may vary with different categories of SME. Given the central role of decision-making, the decision modes followed by SME leaders, the information used to inform them, and the sources of that information, are highly relevant to understanding the internationalization of their firms (Knight & Liesch, 2002).

This paper has been motivated by these gaps in our understanding and by an expectation that in addressing them the analysis required for SMEs will differ from that appropriate to MNEs. Its objective is therefore to offer a new and systematic analysis of the likely associations between decision modes, information use, and networking among internationalizing SMEs. This analysis will be sensitive to the presence of distinct types of SME, which constitutes a significant contingency. By focusing on the relation between a relatively neglected subject – decision modes – and other issues that have been more centre-field, we hope to contribute towards the analytic synthesis that has been called for (Jones et al, 2011). In order to pursue this aim, we address four related questions. The first concerns the ‘decision mode’ that SME leaders adopt. Here the analytical task is to make clear distinctions between different decision modes in order to identify a range of possibilities. Our second question is how contrasting decision modes are associated with variations in information use, as well as with ties to external networks. Any decision requires an input of information, if only to trigger it, and this input has a source or sources from which it flows to the decision maker through either personal or impersonal network

channels. Insofar as decision modes contrast in features such as level of prior planning and comparison of alternatives, it is likely that they involve corresponding variations both in the information used and in the attachments to networks that provide it. We shall use the term 'network attachment' to refer to the set of social and business links or 'ties' that the key SME actors access, connect and orchestrate in relation to their perceived needs associated with internationalization. In referring to the links that an SME establishes to networks, the term network attachment therefore has a somewhat more focused meaning than 'networking'.

The premise that decision modes, information use and network attachment are linked leads to the third question, namely whether the links between them form identifiable configurations. The systemic and holistic character of a configurational perspective (Academy of Management, 1993; Miller, 1996; Fiss, 2007) encourages the search for distinct SME profiles with respect to the internationalization process such as Raymond and St-Pierre (2013) found when examining strategic capability configurations. The presence of different configurations associated with decision-making would be consistent with the recognition that there is considerable heterogeneity among internationalizing SMEs (Aspelund & Moen, 2005).

The possibility of heterogeneity raises our fourth question: do certain contingencies tend to differentiate between decision-information-network attachment configurations among internationalizing SMEs? Previous research suggests that the approach adopted by SME leaders toward internationalization and their network ties may depend on a number of factors, including firm characteristics, such as size, age, human and financial resources, their links with sources of technology/scientific knowledge, their prior international experience and knowledge, and the extent of their pre-existing contact networks - see Jones et al. (2011). Within this wide range of factors, a knowledge-based view of internationalization (Bell, McNaughton, Young, & Crick, 2003; Casillas, Moreno, Acedo, Gallego, & Ramos, 2009; Gassmann & Keupp, 2007; Musteen, Francis, & Datta, 2010) suggests one particularly important differentiator among SMEs on which we shall focus because it is likely to provide analytical leverage and policy relevance.

This differentiator is the extent to which scientific knowledge and advanced technology are intrinsic to an SME's outputs and processes. We maintain that insufficient attention has so far been paid to the internationalization concomitants of a systematic differentiation between types of SME.

To address the above questions, we proceed as follows. We first identify four decision-making modes that SMEs may pursue. We then discuss how each mode implies a different character of information used and pattern of attachment to networks. This is followed by an analysis of how configurations of decision mode, information, and network attachment vary according to the knowledge domain of an SME. Because our aim is to develop a theoretical perspective rather than to test one, our 'methodology' uses two categories of resource. The first category is available conceptual frameworks for analyzing the three main components of our analysis: decision modes, information use and network attachment. The second resource is empirical case study evidence which is used both to suggest correspondence between the analytical components and to provide clarifying illustrations of our argument.

2. Modes of decision-making on internationalization

Previous empirical studies of SMEs suggest several dimensions that differentiate decision-making on internationalization. The first and most evident dimension is whether or not the export or other internationalization behavior of SMEs is planned in advance, is an improvisation, or is an unplanned response to chance opportunities (Bilkey & Teser, 1977; Bell, Crick & Young, 2004; Collinson & Houlden, 2005; Crick & Spence, 2005; Spence & Crick, 2006; Walters, 1993). Another dimension is whether rational calculation is performed in advance of making a commitment as opposed to, say, relying on imitating the decisions of other SMEs or on intuition (Child & Rodrigues, 2008; Chandra, Styles, & Wilkinson, 2009; Dimitratos, Petrou, Plakoyiannaki, & Johnson, 2011). Rational calculation may range from a simple estimate of cost and risk to a more extensive weighing up of alternatives. A third dimension mentioned less often

is whether internationalization decisions are incremental and path-dependent (Evers & O’Gorman, 2011; Hashai, 2011). In other words, do such decisions follow previously taken lines of internationalization or those familiar to the firm through the actions of other similar firms?

Sarasvathy (2001; 2008) developed the concepts of causation and effectuation in order to describe entrepreneurial decision processes. Causation is a decision mode directed by goals or identifiable effects and which is therefore concerned with selecting the means to reach the goal or to create the effect. It is consistent with an ex ante planned and rational approach. By contrast, effectuation as a decision mode starts by taking a set of means or resources as given and then works toward the outcomes that can be created with those means. It is consistent with an emergent strategy (Mintzberg, 1978).

This binary distinction between causation and effectuation may not be adequate for identifying intermediate or mixed decision modes. Thus Harms and Schiele (2012) concluded from their study of rapidly growing German SMEs that causation and effectuation need not be opposed and mutually exclusive decision modes, therefore suggesting that a somewhat more refined categorization of decision modes would be appropriate. Although oriented primarily to large organizations, existing models of strategic decision-making in firms and public authorities in fact offer a more extensive categorization that can readily subsume the underlying dimensions already mentioned (Lieberman-Yaconi, Hooper, & Hutchings, 2010; Wilson & Nutt, 2010). These decision-making models serve to identify four modes that SME leaders may follow, which range from a low level of planning and rationality to a high level. They are respectively reactivity, incrementalism, bounded rationality and real options reasoning.¹ They offer a more nuanced classification of SME decision-making on internationalization beyond binary distinctions such as

¹A fifth frequently cited decision mode is the ‘garbage can’ model (Cohen, March, & Olsen, 1972). This turns the rational model on its head by postulating that there is a stream of choices (or preferred outcomes) looking for issues to which they might be the answer. The choices reflect the preferences of multiple organizational actors whose involvement in decision making varies. The model does not therefore fit well to the individualistic decision-making that characterizes many SMEs. It should also be noted that for purposes of analysis we are using the term ‘rational’ in the sense commonly understood in decision theory, namely aligning a decision to ex ante goals through a systematic evaluation of all alternatives. This contrasts with the interpretation that a rational approach would be to align the decision-making process to what suits, or is feasible in, given circumstances.

planned vs. unplanned or causation and effectuation. The key elements of each decision mode are summarized in Table 1.

Table 1. Comparison of key features of four decision modes

Decision mode \ Feature	Planned?	Goal driven?	Decision rules?	Comparison of alternatives?
Reactivity	X	X	X	X
Incrementalism	Limited	X	limited	limited
Bounded rationality	√	√	√	partial
Real options Reasoning	√	√	√	√

2.1. Reactivity

Firms in a reactive mode tend to be more conservative (Covin, 1991) and lack a consistent strategy (Miles & Snow, 1978). They are driven by responding to immediate situational demands or environmental changes which encourage them to take decisions (Ansoff, 2007). This decision mode is often found in the first step of international expansion of family-owned firms with a competitive traditional product (Kontinen & Ojala, 2011). Applied to SMEs and their internationalization, reactivity denotes an approach to making decisions that is unplanned but at the same time may be responsive to unexpected opportunities – serendipity (Crick & Spence, 2005). Another type of reactivity occurs when an existing domestic customer suddenly internationalizes and the SME follows it into new markets (Bell et al., 2003, p. 345).

Recent studies have noted the part played by serendipity among a substantial number of SMEs (Child & Rodrigues, 2008; Crick & Spence, 2005). Given the limitations that lack of experience, unfamiliarity with foreign markets, and resource constraints can impose on a small

firm, reliance on, or at least receptivity to, chance opportunities for developing international business may have a positive role to play. Although decisions to proceed with international business transactions triggered by serendipity are far removed from the protocols of the rational decision model, the fact that chance events often take the form of personal meetings can provide for a sound business relationship that adds appreciably to the success of new market entry and indeed can bring about a change in the firm's strategy (Crick & Spence, 2005).

A reactive approach can be compatible with successful opportunity recognition so long as the decision maker is open-minded and ready to be surprised. Schweizer, Vahlne, and Johanson (2010) note that a leading decision maker can both actively pursue new opportunities and also "discover them, almost fortuitously", through his wide network (p. 362). Child and Rodrigues (2008) found that among 32 SMEs that were engaged in business with Brazil, 10 had had their interest in that market triggered by serendipitous events. These included unanticipated approaches from Brazilian business people seeking to trade, encouragement from major international customers, or chance meetings. Although unplanned, such events generated an awareness of the possibilities for exporting to Brazil and, significantly, often laid the basis for a trust-based personal relationship to support that business.

Nevertheless, one may expect that a substantial number of SMEs adopting a reactive decision mode are what Seifert has called 'occasional exporters' who respond to opportunities as they arise rather than engaging in international business on a sustained regular basis (Seifert, 2010).

2.2. Incrementalism

Lindblom (1959, 1979) described the underlying mode of public administrators' decision processes as one of making successive limited comparisons of action possibilities, a process intended to avoid negative consequences. This incremental approach is often referred to as 'muddling through'. It is path dependent and conservative insofar as only limited changes or

increments from existing conditions are made. It has some similarities to bounded rationality, except that, according to Lindblom, incrementalism is often guided by vague goals rather than by clear satisficing criteria and rules reflecting those criteria. In fact, objectives and goals are typically defined in retrospect, after actions have been taken in pursuing them. There is a similarity here with Sarasvathy's concept of effectuation. In contrast to reactivity, an incremental mode involves some comparison of alternatives that may be advanced by different parties such as the leading members of an SME or members of its external network. But it is quite far removed from the comprehensive and systematic comparison of alternatives, some of which involving a radical departure from the past, which characterizes a highly rational decision-making approach. The 'stages' model, which proposes that firms proceed along the internationalization path in the form of discrete steps based on the gradual acquisition and use of information from foreign markets and operations, is consistent with an incremental decision mode (Johanson & Vahlne, 1977).

Applied to SME internationalization, the incremental mode signifies that due to a combination of perceived high risk with limits to understanding and availability of information, decision-makers limit their consideration of alternative ways to internationalize by adopting possibilities that are similar or related to those with which they are already familiar. Schweizer (2012) offers an analysis of incrementalism in SME internationalization, based on the case of a small Swedish developer and producer of high-tech medical instruments. Several of the firm's moves to enter new foreign markets were made without pre-identified objectives, with goals being identified as a result of the decision rather than vice versa, and they relied also on limited analysis and comparison of alternatives. Where a more rational means-end process was followed, Schweizer ascribes this to the characteristics of a new CEO who had clear objectives and who encouraged the application of a systematic analysis. He concludes that in attempting to understand conditions under which an incremental approach to decision-making is adopted, attention has to be given to the context, including the decision-maker's personal traits and

experience. Moreover, he suggests from the case study that, through a learning process, over time decision-makers increasingly move up the rationality curve and adopt a more comprehensive comparative approach. Hashai (2011) found that high-tech early-internationalizing SMEs in Israel sequenced their expansions of geographic scope and foreign operations by sticking to a specific internationalization path for several subsequent short-term periods. They turned to an alternate path once expansion opportunities along the first path were exhausted.

2.3. Bounded rationality

Compared to incrementalism, bounded rationality is both goal directed and more rational in the sense of being guided by assessments of whether a potential course of action satisfies aspiration levels. The notion that decision-makers are often boundedly rational is associated with the recognition that they seek to meet goals, but face severe limitations in their ability to secure and process relevant information (Cyert & March, 1963; March & Simon, 1958). Simon (1955) had previously laid the ground for the notion of bounded rationality by modeling constraints on the ability of managers to follow highly rational decision-making procedures. He recognized that limitations on ‘the state of information may as well be regarded as a characteristic of the decision-maker as a characteristic of his environment’ (1955, p.100). Thus while decision-makers may intend to be rational, their cognitive limits, uncertainties, limitations of time, and the cost of securing further information can prevent them from achieving this. Consequently, they undertake a limited search among alternatives, engage in sequential evaluation of alternatives and then ‘satisfice’ by choosing the option that meets, or comes closest to meeting, their aspiration level. They tend to develop criteria or rules to guide this selective search and for evaluating what constitutes a satisfactory outcome.

Nooteboom’s (1993) analysis of the informational and resource limitations faced by small firms implies that they are more likely to adopt a bounded rationality mode compared with large

firms. When contemplating internationalization, decision-makers tend to follow certain satisficing principle in international business, such as profit-satisficing, efficiency-satisficing or volume-satisficing (Huang & Sternquist, 2007; Piercy, 1983). From a survey of the CEOs of 215 Norwegian SMEs, Kyvik (2006) found some indication that they applied the mode of bounded rationality to decisions relating to internationalization. He concluded that ‘satisfactory domestic performance causes the small firm to focus its attention on the home market rather than positively influencing the global mindset – i.e. what appears to be a case of ‘satisficing’ and playing it safe rather than venturing towards relatively more risky business projects abroad’ (p. 95).

2.4. Real options reasoning

Real options reasoning [ROR] is a highly rational decision-making mode which recognizes the unreality of the assumption embodied in the traditional rational model of decision-making, namely that there is full knowledge of alternatives (Adner & Levinthal, 2004). This assumption is likely to apply even less to SMEs than to large firms. ROR is a calculative approach to decision-making on internationalization which aims to provide a rational way of reducing the risk associated with incomplete information and uncertainty while at the same time permitting comparison between alternatives. Real options confer on those who take them up an ability to postpone decision-making until additional information is available and then, if necessary, partly to reverse their commitment (Driouchi & Bennett, 2012). An option can be defined as the right to access attractive resources and/or opportunities on a provisional basis. The benefits of applying the real options approach to internationalization decision-making lie in the cumulative effects of learning about a new market prior to full commitment to entry and minimizing an SME’s exposure to downside risk (Barnett, 2008; Brighthouse, Brighthouse, & Werner, 2008; Li, 2007). In following ROR, SMEs make initial small investments to gain strategic flexibility and to learn about market prospects. By doing so, they can broaden the range of alternative potential

market locations and opportunities.

The real options approach postulates a more rational explanation for the decision process of incremental internationalization than does ‘muddling through’. Rather than assuming that the decision taken at each stage of SME internationalization is mainly shaped by previous decisions, real options reasoning posits a more rational process that involves an identification of one or several market opportunities and deciding to follow these until their full potential and fit to the firm’s capabilities can be more clearly ascertained. It is located at the high rationality end of the range of decision modes and offers a powerful metaphor for understanding how SME decision makers contemplate expanding their business internationally in a systematic way.

A Taiwanese SME specializing in fingerprint recognition technology provides an approximation of the real-options decision mode. The company is one of the very few approved vendors for FIPS 201 (Federal Information Processing Standard 201) in Asia and has won a series of prizes and awards worldwide, which in turn contributes to the reputation of the company’s products. It has been pursuing export options in a number of countries simultaneously and has a sales office in Japan, together with agents or partners in the USA, Australia, South Africa, UAE and India. The company decides which countries to enter according to their market attractiveness in terms of the size of their population and government initiatives to introduce biometric ID cards. It relies for this information on official sources, but then approaches agents in such countries to help it make contact with the local governments that are launching projects involving fingerprint recognition. At the beginning of each project, client has to pay an upfront non-recurring engineering charge, which allows the vendor to mitigate risk and to recover some cost of design and planning if a project fails. If a particular market turns out to be disappointing, the company will withdraw from it.

3. Decision mode, information use and network attachment

3.1. Decision mode and information use

The capability of SME owner-managers or entrepreneurs to obtain inputs for information processing through network attachment can impact on the implementation and effectiveness of their strategic decision-making (Jansen, Curseu, Vermeulen, Geurts, & Gibcus, 2013). The extent to which new information conditions the choice of decision-making mode rather than a preferred decision mode conditioning the information that is sought, remains an empirical question. What is not in doubt is the relationship between the two (Lieberman-Yaconi et al., 2010).

Although the two terms are often employed interchangeably, it is analytically relevant to distinguish between information and knowledge. Information may be defined as data that are structured and understood in a way so as to become a useful input into knowledge. Information is thus 'an extraction from data' (Boisot & Canals, 2004, p.47) that may include figures (e.g. prices, accounting data), axiomatic propositions, facts and symbols (Kogut & Zander, 1992). Knowledge comprises information that has become validated in a person's perception or expectation as a basis for taking action (Nonaka & Takeuchi, 1995). New information can serve to communicate action opportunities, while actors' accumulated knowledge can in turn inform their recognition and evaluation of those opportunities. In networks, information can serve as a base for judging whom to contact, who has what, and how much of it is relevant to a decision that is being faced by actors. Moreover, knowledge is an asset that is socially constructed and commonly generated and shared within a community of practice (Brown & Duguid, 1991). This implies that the knowledge domain of an SME will be associated with the nature of its network, and we argue later that this association is relevant to the decision mode-information nexus.

However, while decision-making always involves the use of some information, that information can vary greatly both in form and scope. The pursuit of a more rational process of decision-making will require information of greater explicitness and scope in order to compare

and assess alternatives and options. Explicitness refers to the precision and specificity of information and is a function of its codification (Boisot, 1986). Scope refers to the range of information categories and sources that are accessed in the course of the decision making process. Whereas non-explicit (tacit) information can be intrinsically valuable and valid, its use for comparing alternatives is problematic. If informed judgments are to be made as against either satisficing criteria or between a range of options, then the information required has not only to be valid but also sufficiently explicit. The greater the range of alternatives being considered, the wider must be the scope of information that is accessed. The mode of decision-making being followed therefore has implications for the information required. The reverse is also true. If information of greater explicitness and scope becomes available, this allows for the use of a more rational decision-making mode.

Figure 1 postulates schematically how the character of the information used is likely to vary according to the decision mode followed. The figure is framed in terms of information explicitness and scope. It builds on the assumption just articulated, namely that as the degree of rationality in decision-making increases, there is a corresponding rise in both the explicitness and scope of information used. The positive relationship shown in Figure 1 between information explicitness and scope is consistent with the information codification-diffusion [CD] curve articulated by Boisot (1986, 2002). Relatively explicit information is today widely available from a large range of sources and it is amenable to use in the comparative analyses of action alternatives which are intrinsic to rational approaches such as ROR and bounded rationality. By contrast, in reactive decision-making a limited scope of information is accessed and this is often relatively uncodified and tacit in nature, especially when serendipity is involved. However, compared to indigenous firms, it can be problematic for foreign firms to obtain relatively explicit market information, and low information transparency in certain emerging economies can increase the difficulty of accessing reliable sources. Additionally, some areas of information relevant to internationalization decisions may intrinsically be relatively inexplicit, such as the

nature of corruption among foreign officials, which may exacerbate information asymmetry, thus making rational analysis and choice difficult.

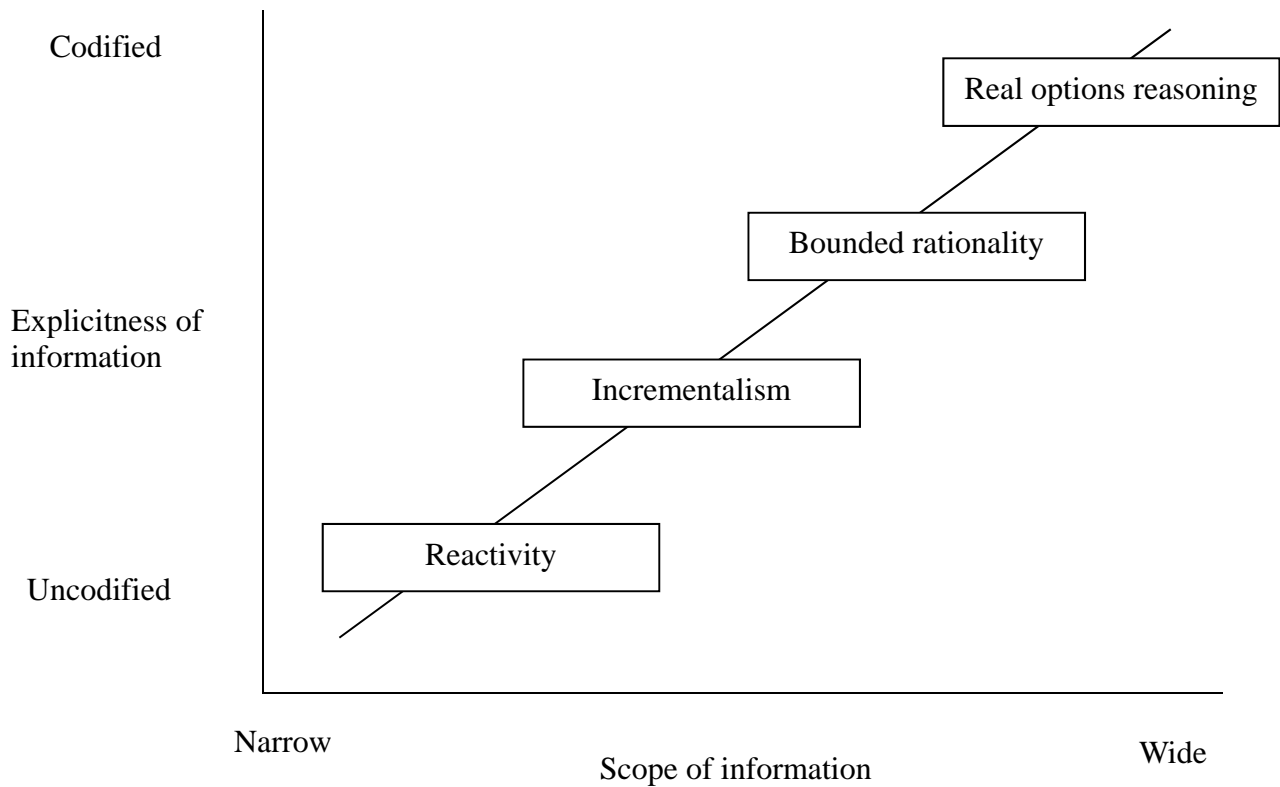


Figure 1. The relation between degree of decision rationality and character of information used

3.2. Decision mode and network attachment

Network ties provide channels of information to decision-makers, including the triggers for decision-making (Zhou et al., 2007). Network attachment may include relations with other firms (e.g. large customers), institutional agencies, consultants, and with other SMEs including those owned by extended family members. These relations can be social in nature such as those with family and friends, with a marked personal quality. These contrast with business ties which are arms-length links characterized by their commercial and non-social nature (Larson & Star, 1993). Social ties enable the access and exchange of more ‘fine-grained’ and high quality

information (Uzzi 1997), whereas business ties helps bridge structural holes and provide less redundant information (Burt, 1992; Granovetter, 1983).

It is widely recognized that links to external networks can support the international development of SMEs (Andersen; 2006; Ellis, 2011; Coviello, 2006; Manolova et al., 2010; Ojala, 2009). As Bell et al. state (2003, p.341), the relationship between networks and SME internationalization is such that 'internationalization is seen as an entrepreneurial process that is embedded in an institutional and social web which supports the firm in terms of access to information, human capital, finance, and so on'. An SME that can secure relevant information from its network should thereby be able to strengthen its competitive position and to make a success of diversifying into international markets (Johanson & Vahlne, 2009). Relationships with his network can play an important role in enabling an SME entrepreneur to acquire new information, for example, about opportunities (Schweizer et al., 2010).

However, less attention has been paid to differences in the pattern of network attachment by SMEs in the process of internationalization (Tang, 2011). Differences in the form and scope of information imply corresponding variations in its sources. In other words, the informational concomitants of different decision modes are also likely to be associated with particular patterns of network attachment that SMEs create and use for purposes of assisting their internationalization. This bears some comparison with the analysis advanced by Freeman and Cavusgil (2007) from their case studies of 12 Australian small born-global firms. These scholars identify four entrepreneurial approaches to internationalization with reference to the strategic mind-sets of decision-makers. Their classification parallels the contrast we have drawn between reactive and option-seeking decision modes. They conclude that each of the four approaches implies a different networking practice. The most proactive approach – that of 'the strategist' – is the most active in developing network links to target markets, with entrepreneurs building trust and reciprocity through a high level of personal and direct interaction with key partners.

The postulated associations between each decision mode, information use and network attachment are set out in Table 2. Network attachment is described in terms of commonly identified dimensions of external ties (Ellis, 2011; Han, 2006). These associations are deduced partly from the key features of each decision mode that were presented in Table 1, and partly from available research which is now briefly discussed. They imply that among internationalizing SMEs there may be identifiable distinct configurations of decision mode, information use and network attachment.

Table 2. Decision modes, character of information used, and network attachment

	Decision mode			
	Reactivity	Incrementalism	Bounded rationality	Real options reasoning
Information used				
Degree of codification	Largely uncodified, often artistic or tacit	Some codification of precedents as guide to decisions	Codified	Codified
Scope	Relatively narrow	Range limited to what is required for assessment against precedents	Bounded	Wide
Network attachment				
Few/many links	Few	Mid-range	Mid-range	Many
Approach	Reactive	Path-dependent and incremental extension	Deliberate but satisficing	Strategically proactive
Scope	Primarily domestic	Mixed	Mixed	Primarily international
Tie basis	Primarily social	Mixed	Business	Business

Reactivity. SMEs adopting a reactive mode of decision-making on internationalization do not plan their actions in advance, do not judge them by reference to clear goals, do not follow formal decision rules, and do not compare alternatives to the one that is presented to them (Bilkey & Tesar, 1997; Child & Rodrigues, 2008; Evers & O’Gorman, 2011). This implies that they are likely to have few network ties relevant to entering or sustaining international business, and that their available network ties will be primarily domestic-based. Without prior relevant experience or knowledge, SME entrepreneurs may trust the information collected from personal sources and contacts more than impersonal sources (Simon & Houghton, 2002). It can be anticipated that they will resort to the contacts they trust for advice, and the connections of such SMEs will tend to be strong and primarily social-based, such as long-standing friendships. An example is the furniture maker studied by Harris and Wheeler (2005) who looked to long-standing personal contacts, people who understood the business, to provide specific information about overseas markets.

The information flow between such close personal ties tends to be tacit in nature and justified by trust rather than analysis. Operating in a relatively closed network mode has consequences for the decision mode such firms apply to internationalization. It means that they may be constrained in their sensitivity to sources of new information on internationalization opportunities, and not stimulated to search for such information by peer example. Peer example may, however, provoke decisions based on imitation (Bonaccorsi, 1992). The stimulus to export is likely to come from an unsolicited order, an unsolicited offer to partner with a business abroad, or a fortuitous suggestion by a member of their network (Zain & Ng, 2006). Judgments as to whether to react positively to the stimulus are made largely on the basis of intuition, including feelings about the reliability and trustworthiness of the trading partner or agent. Where calculations are performed, these are likely to refer primarily to the acceptability of the cost and risk of one course of action, rather than to a comparison of alternatives.

Incrementalism. The main difference in their use of networks between SMEs adopting an incremental rather than a reactive decision mode is likely to be that the former will utilize a larger number of ties and that some of these will be business based. The path dependent and sequential nature of incrementalism suggests that the network attachments used for consultation and information in connection with an internationalization decision will mostly be the same as those used in previous decisions, but combined with securing a limited amount of new information from fresh sources. For instance, an SME applying an incremental approach to internationalization might start by entering a particular national market and then extend its reach in that market either in terms of expanding its regional coverage there and/or in terms of adding product lines to its portfolio of exports to that country. The implications for the use of network connections by the firm's decision makers is that they would continue to rely on those utilized to assist with the initial market entry and then perhaps access some additional contacts who are in a position to provide the additional specific information or assistance required to expand on a step-by-step basis within that market (e.g. Schweizer, 2012). The approach to network attachment of such SME entrepreneurs will tend to build on existing ties rather than just maintaining the status quo as in the reactive decision mode.

A small British SME known to the authors provides an example of the network attachments used by a firm following an incremental decision mode. The firm offers logistical solutions and focuses on markets in Europe and Brazil. The choice of these markets was primarily determined by the experience and connections that the firm's CEO had developed in a previous role before founding the SME. He perceived that Brazil would provide the company's main opportunities for future growth. He was endeavoring to expand the company's business in Brazil by adding to his contacts there with the assistance of his existing network connections which were long-established and strong. These contacts were limited in number and consisted principally of a British trade promotion agency, a British expert on exporting to Brazil, an expert academic who had been the CEO's tutor, and an existing large customer which offered the prospect of being a

vehicle for the SME to expand its overseas business. The company was pursuing a policy of incremental expansion in Brazil and elsewhere, and it was certainly doing more than just reacting to events. To support this expansion, the CEO was largely relying on his existing network ties, but he has used some of these to introduce him to new contacts such as the person who became his principal partner in Brazil. While over the course of time this SME varied in the extent to which it activated its network ties and even discarded some that were of no further value, it retained its core links and continued to rely heavily on them.

Bounded rationality. SMEs adopting a bounded rationality mode for reaching decisions on internationalization engage in a degree of prior planning that is guided by goals (aspirations) and decision rules. The main decision rule is that a potential course of action should satisfy the firm's aspiration level. Alternatives are compared sequentially until one is found that satisfies the aspiration level. In order to compare alternatives and to assess them against the aspiration criteria, a bounded rationality mode implies that the information used will be both more explicit and wider in scope than in the case of incrementalism.

New information on unfamiliar internationalization possibilities will be required. This means that new ties have to be established with persons or organizations outside the boundaries of the SME's existing network. The new ties will tend to be mediated through agencies such as export promotion bodies or through existing network contacts. Since the new network ties will not normally be based on existing family or social relationships, they are likely to be of a business rather than social character, at least for a period of time.

A Taiwanese SME selling blood glucose monitoring systems known to the authors provides an example of bounded rationality network attachment. Since 2006, it has focused on going to trade shows and proactively looking for new links to the US market. Without scanning a full range of potential local distributors/agents in the US, it initially satisfied by working with a mail order company that seemed to have the potential to meet its volume requirement. Unfortunately, the distribution agreement failed after just 18 months' collaboration. The SME

had also managed to develop links to another three medium-sized mail order companies in the US, with whom it has been working to secure regular source of overseas sales income. The firm's network attachment to the US agents is business rather than socially based.

Real options. This is the most rational of the decision modes we have been considering. As such it relies on explicit information of broad scope in order that comparisons between options can be made over time. This implies that a wide range of network ties will be used to provide such information. The ties involved are likely to be relatively weak, and indeed some may be purely formal and business-based, such as memberships of industry associations which provide access to survey or other information in statistical form. Additional links are likely to arise through third-party references or even sources such as the internet.

An example of real options mode networking studied by the authors is that of a UK small molecule drug discovery company, established in 2005. The management team has extensive experience in pre-clinical research. The number of network contacts brought together by the management team from their previous employment in biotech and pharmaceutical sectors and the scientific advisory board are considerable. The company's goal is to develop basic ideas to the stage of a proof of concept for cancer treatment. It has six concurrent ongoing projects, but is prepared to drop those that turn out to be less promising. The competitive advantage of the firm lies in the structure of its target synergy compound. The SME mainly receives management fees for licensed projects. It outsources many of its projects (from making to testing compounds) to collaborators in the US, Canada, Italy, China and India. In the first year, the CEO had engaged with about 20 different outsource companies through signing three or six month contracts. The firm also has been actively seeking and working with best academics to continue building up its oncology pipeline. It is one of the few companies that fully outsource and utilize this business model well. In the words of the CEO: 'we map out pretty carefully what we need...we are a very, very concise company when it comes to the outsourcing process'.

4. SME knowledge domain as a contingency

SMEs can be classified according to their knowledge domain, which refers to the base of knowledge from which their products or services are developed. We select the knowledge domain of SMEs as a significant contingency for configurations of decision mode, information use and network attachment for reasons that are informed by both resource-based and risk-oriented perspectives. The resource-based view draws attention to the extent to which a firm's knowledge domain is highly accessible and widely diffused rather than being restricted and inimitable (Barney, 1991). Boter and Holmquist (1996) point out that the technologies applied to products and methods of production in traditional industries are common knowledge, whereas in innovative/high tech industries, the technology consists of specialized knowledge and competencies. They argue that this distinction explains why high-tech firms behave very differently in comparison to traditional firms. The originality of their technology provides greater strategic choice to innovative firms, implying that they can adopt a planned and more systematic approach to internationalization. We argue that although the relevance of knowledge domain to internationalization has been acknowledged, the details of how it is relevant and associated with network and decision-making remain largely unexplored.

Secondly, a risk-oriented perspective draws attention to the relevance of a firm's investment in innovation under conditions of uncertainty. The risk attached to such innovation tends to be greater the more a firm's knowledge domain is science or technology-based. Not only is there uncertainty regarding the protection of intellectual property and the returns to be gained from it, but sunk costs are also higher. Internationalization generally adds to this uncertainty and it could be difficult for an SME to recover from the negative consequences of a decision to internationalize that turns out to be a failure. Higher innovation risk is therefore likely to encourage the firm to adopt a more rational decision mode, keeping several options in play until their pay-offs can be ascertained (Verdu, Tamayo, & Ruiz-Moreno, 2012).

These considerations warrant attention to the knowledge domain of SMEs as a contingent factor. Asheim, Boschma & Cooke (2011) distinguish three categories of knowledge domain. One is the 'analytical' where 'scientific knowledge based on formal models and codification is highly important' (p.896). The second category is the 'synthetic' referring to 'economic activities where innovation takes place mainly through the application or novel combinations of existing knowledge' (p.897). The third category is the 'symbolic' which characterizes firms whose outputs attract because of their aesthetic qualities through artistic designs, images and symbols. Fashion clothing would come into this third category (Centre for Fashion Enterprise, 2012).

Bell et al. (2003, p.349) make a similar threefold distinction between traditional, knowledge-intensive and knowledge-based SMEs with reference to the role that knowledge plays in their activities. In traditional firms, they suggest that 'the knowledge-based element of offerings need not necessarily be high, although some quite sophisticated processes may be involved. Typically however, neither products nor processes are particularly advanced'. Knowledge-intensive firms use scientific knowledge 'to develop new offerings, improve productivity, introduce new methods of production, and/or improve service delivery, but are not inherently knowledge-based'. In contrast, knowledge-based firms 'will either have developed proprietary knowledge or acquired knowledge, without which they would not exist'. They go beyond creating new alternatives and 'seek markets which have never been served, human needs which have not yet been filled, new juxtapositions of needs and technologies' (Ansoff, 2007, p.82). Knowledge-based firms, therefore, can be considered as 'first-movers' in niche markets and new knowledge is intrinsic to their market offering. The distinction between knowledge-intensive and knowledge-based firms parallels that drawn by March (1991) between knowledge exploitation and knowledge exploration. The former involves the application of existing knowledge, whereas the latter refers to developing new knowledge either in-house or through spinning-off from a research facility.

Their empirical studies led Bell et al. (2003, 2004) to conclude that there were differences in the patterns of internationalization between traditional SMEs and those that relied more on advanced knowledge. The former ‘tended to adopt a more *ad hoc*, reactive and opportunistic approach to internationalization’, which was likely to occur incrementally over a longer period of time (2003, p.344). The latter were more ‘proactive’ and ‘structured’ in their approach to internationalization, more flexible in their choice of foreign market entry modes, and they internationalized more rapidly. These findings suggest that traditional SMEs are likely to adopt a reactive or incremental decision mode, whereas SMEs whose products or services are more innovative or incorporate a higher level of technical knowledge, are likely to incorporate more planning and assessment of alternatives in their decision-making. Bell et al. (2003) found that knowledge-based SMEs were the most likely to internationalize rapidly and into several ‘lead’ markets simultaneously, suggesting a tendency towards a real options decision mode. Their studies and the previous literature led them to conclude that traditional SMEs make only limited use of networks, while the strongest use of networks was made by technologically-based early-internationalizing firms.

In addition, high-tech small firms, compared to low-tech ones, have been found to rely more on formal structured planning when making growth-seeking strategies (Covin, Slevin, & Covin, 1990). Differences have also emerged between high-tech and low-tech/traditional firms regarding their knowledge sources and links to them (Tödtling, Lehner, & Trippel, 2006) and in the level of specification of the technical knowledge used (Walters, 1993). Taken together, these empirical findings are consistent with the associations between decision modes, information and network attachment expressed in formal terms by Figure 1 and Tables 1 and 2. They lend credence to the proposition that the knowledge domain of SMEs will predict systematic variations in their decision mode, information use and network attachment.

Table3. Configurations of internationalization decision mode, information use and network attachment for three types of SME

Feature	‘Traditional’ SMEs	‘Knowledge intensive’ SMEs	‘Knowledge-based’ SMEs
<i>Definition of SME type and illustrative sector</i>	The knowledge intrinsic to these firms’ outputs and processes is well-known and not necessarily advanced. Example: clothing manufacture	These firms <i>exploit</i> scientific knowledge to develop product enhancements and modifications or to improve processes. However, they are not inherently knowledge-based’. Example: application software ²	These firms have developed proprietary knowledge or acquired knowledge, through <i>exploration</i> . They would not exist without such knowledge. Example: development stage biosciences ³
<i>Decision mode concerning internationalization</i>	Reactivity. If triggered by a crisis (‘critical incident’ Bell et al. 2003: 345), then incremental. Unlikely that many, if any, alternative products or services will be considered. However, some market alternatives may be considered	Incremental or bounded rationality. Limited search prompted by specific need or opportunity awareness	Bounded rationality or real options reasoning. Early awareness of international opportunities. Comparative assessment of alternatives, especially if the firm’s proprietary knowledge can be developed along several alternative paths
<i>Information use in connection with internationalization</i>	Little information search outside the SME’s traditional domain. Information used tends to be tacit and limited in scope.	Some access to explicit information applicable outside their current sphere of activity which enables a limited range of alternatives to be assessed	Wide scope of explicit information on technically-based market opportunities (e.g. different applications of proprietary technology)
<i>Network attachment</i>	Limited in scope and generally based on long-established relationships. Internationalization depends heavily on links created through serendipity and/or assistance from export promoting agencies in providing foreign contacts and market knowledge	Primarily market oriented and often based on partnerships via license agreements, alliances or established role in MNE supply chain. Limited involvement with the scientific/technology community for purposes of updating.	Heavily oriented to the scientific and technical community. Market often derives from that community via scientific meetings, conferences, etc.

² Primarily ‘product solution providers’, ‘service solution providers’, ‘highly specialized component suppliers’ and ‘specialized sub-contractor firms’ in the Libaers et al (2010) taxonomy.

³ Primarily ‘development stage biosciences’ and ‘R&D organization or contractor’ in the Libaers et al (2010) taxonomy.

Table 3 draws these insights together to suggest configurations of decision mode, information and network attachment that are associated with the three types of SME identified by Bell et al. (2003). Clothing manufacture is a sector in which *traditional SMEs* are found. Clothing manufacturers may use sophisticated tools in their processes, such as computer-aided design in cutting shapes, but the technology intrinsic to their products or services is conventional. It is informed by design aesthetics rather than by technical knowledge. For instance, clothing SMEs rarely undertake ‘original’ creative design and they tend to imitate the work of leading designers or recycle ideas from the fashion of past eras. Their innovation risk is therefore low. Although mass media makes accessing overseas fashion information easier, the structuring of information in clothing industry is still largely uncodified because it is difficult to ‘turn this information into a garment that sells’ (Asper, 2010, p.197). Moreover, competition between clothing firms offering similar styles or ‘occupying a similar aesthetic space’ is very tense (Weller, 2007, p.58). In view of this, it could be argued that small firms without novel aesthetic knowledge have no monopoly power within the market environment, which in turn leaves them very little scope for proactivity. Such SMEs are likely to adopt a reactive approach to decisions on internationalization, although they may move forward incrementally if prompted by need. This need may be generated by a ‘critical incident’ such as the decision by a major customer to internationalize, a move they may feel obliged to follow. Traditional SMEs are likely to engage in little information search outside their existing domains. Their network attachment is highly social, being based on long-established relationships and incorporating personal links that arise through serendipitous events.

While SMEs using less scientific or technical knowledge tend to be reactive in their decision-making, some may nevertheless be innovative and opportunity creating. There are, for instance, some clothing firms that intentionally create new design concepts and brand identities and/or make creative use of the internet, an example being ‘Case A’ the string bikini company

studied by Mort, Weerawardena and Liesch (2012). SMEs using symbolic (e.g. artistic) knowledge can therefore undertake explorative behavior.

Application software is a sector in which *knowledge-intensive SMEs* are found. Due to resource constraints, small and young software developers tend to adopt an open-source-software-based strategy by exploiting already existing code to develop software rather than writing software from scratch (Haris

on & Koski, 2010; Lamastra, 2009). Although software codes are relatively explicit, exploitation of existing knowledge in developing and installing new software may require more than code reuse (Haefliger, Von Krogh, & Spaeth, 2008). Software developers therefore tend to face some innovation risk, especially if they are producing bespoke programs only suited to particular customers. Software SMEs that specialize in customized projects, in particular, often need to adapt existing codes to clients' requirements, implying close linkages with clients that increase the specificity of their knowledge assets. Accordingly, we anticipate that they tend to adopt an incremental or bounded rationality approach to decisions on internationalization, which may involve some limited search and assessment of alternatives that is prompted by the occurrence of a specific need or opportunity. For instance, SMEs may suddenly discover a market of users requiring similar customized software once developed for a particular client. The customized software then can be incrementally developed into an enterprise solution to be adapted to the needs of potential clients (Segelod & Jordan, 2004). To achieve this, knowledge-intensive SMEs are likely to engage in some information search outside their current sphere of activity, such as information on hardware suppliers and different configuration options. Their network attachment is based on a mix of social and business links which are primarily market-oriented. These SMEs are also likely to have limited involvement with the scientific and technological community for purposes of updating.

Knowledge-based SMEs are found in a sector such as development-stage bioscience. They create basic new knowledge or have direct access to it through spinning-off from a research

facility such as a university laboratory, and they codify such knowledge for commercial application. Progress towards codification can be lengthy and costly, without any guarantee of success. This creates high innovation risk. However, if the creation of new products is successful, the generic base of the new knowledge they incorporate very often offers a choice of paths along which it can be commercialized. The pursuit of these several paths may require close collaboration or alliances with complementary partners and/or customers. The primary network of these SMEs is their scientific community, which is typically international and broad in its scope. The SMEs' customers may well be located within that community and be accessible through the publication of scientific papers and attendance at scientific meetings. This prior attachment to a scientific network means that knowledge-based SMEs are typically in a position to internationalize early in their life – to become ‘born globals – and to be aware of different internationalization options in terms of products and markets which they can pursue simultaneously. The immediacy and scope of information relevant to export opportunities possessed by these SMEs allow them to quickly exploit multiple internationalization opportunities (Oviatt & McDougall, 2005). They are in a position to apply a bounded rationality or real options mode to making internationalization decisions.

Another factor that may encourage knowledge-based SMEs to adopt a real options mode of decision-making is the ‘paradox of value’ (Boisot, 2002). This arises when an information good has maximum value because of its high degree of abstraction and codification (as in a newly developed genetic or pharmaceutical formulation), but when at the same point of development that value is at risk because of the inherent ease with which structured information can be copied and diffused. The parallel pursuit of alternative applications and markets for the new knowledge may be seen as a way to mitigate this risk (Verdu et al., 2012).

5. Discussion

5.1. Contributions

The aim of this paper has been to analyze the conditions under which SME decision makers are likely to employ particular decision modes, and display an associated character of information use and pattern of network attachment. It has put forward a classification of four decision modes (namely reactivity, incrementalism, bounded rationality and real options reasoning) that fall along a continuum from being less rational to highly rational. It has also addressed the need for greater specificity in commonly used terms by proposing a precise conceptualization both of information and network attachment.

The analysis we have developed contributes to the existing literature on SME internationalization in several ways. First, it extends the platform for research on strategic decision-making in internationalizing SMEs. This paper responds to the call for research to explore configurational approaches to decision-making in SMEs (Jansen et al., 2013). It pioneers a systematic analysis of how the interrelationships between network attachment, information used, and decision mode will vary with the type of SME categorized according to the knowledge intrinsic to its activities. In so doing, it goes further than most analyses of SME networking by analyzing how different types of SME vary in their networking behavior in the course of internationalization. Additionally, we advance the work of Bell et al. (2003, 2004) by advancing a synthesis that is based upon the mental models employed by SME decision makers in terms of how they use information and access networks in the course of planning and implementing internationalization.

Second, despite the contingency element in our analysis, a focus on decision-making serves to emphasize the exercise of strategic choice. Past research has tended to neglect the relevance of entrepreneurial strategic choice (Autio, Sapienza, & Almeida, 2000) and the fact that decision-makers can exercise some choice about how they decide on internationalization and the network ties they foster (Tang, 2011). Our analysis is consistent with a recognition that SME decision

makers can choose between less rational and more rational modes, and to move away from a particular internationalization pattern by reconfiguring their networking activities. A shift from being reactive and inertial towards more actively seeking information through a wider range of network ties is a strategic choice which may well be informed by learning through experience. The leaders of SMEs play an important role in creating the conditions for learning and enhancing 'dynamic capabilities' for their organizations (Zahra, Sapienza, & Davidsson, 2006) through their social and business networking activities (De Clercq, Sapienza, Yavuz, & Zhou, 2012). However, such learning depends on the approach taken by decision makers to elicit and process relevant knowledge, their ability to change their mindset or convert the experience of specific internationalization to general knowledge that is more applicable in the light of new foreign market situations.

Third, a consideration of the knowledge domain of SMEs jointly with other factors that have been identified as potentially shaping their decision-making, offers a promising path for future research. Existing evidence (e.g. Groves, Vance, & Choi, 2011) suggests that years of formal education are linked to entrepreneurs' cognitive styles (intuitive vs. analytical and rational), which in turn affect strategic decision-making practices. Knowledge-based SMEs are often established by scientists who had years of training in scientific methods and may be more likely to possess stronger analytical and rational thinking. By contrast, the founders of traditional SMEs may well tend to have fewer years of formal education and may for that reason be inclined to use more intuitive or non-linear thinking (i.e. varying case by case) in decision-making. This distinction implies that entrepreneurs' learning and thinking styles vary with the type of SME. In general, there has been a lack of systematic analysis on the relationship between decision makers' cognitive styles and decision-making modes in the context of SME internationalization.

Finally, our development of a systematic and more comprehensive analysis helps to identify a range of parameters for survey-type research aimed at testing for causality and generalizability.

Of necessity given the complexity and unfamiliarity of the subject, much research into SME internationalization has been of a case study nature. While this has valuably promoted theoretical development, much of this theory remains to be synthesized and tested.

5.2. Limitations and avenues for further inquiry

There are inevitably limits to the scope of the analysis we have developed. Perhaps the most important is that it does not explicitly take account of learning through experience. Decision makers' mental models tend to evolve with subsequent internationalization (Collinson & Houlden, 2005) because SME decision-makers learn as they gain more experience of conducting international business. Experience of international business may moderate the effects of an SME's information use on its decision mode. Studies have found that as SMEs acquired more international experience, they tended to adopt a more planned, proactive and more comprehensive rational approach to new international developments (e.g. Chandra et al., 2009; Hilmersson & Jansson, 2012; Schweizer, 2012). Learning is likely to arise as network ties broaden, providing information that is both more precise and of wider scope, as well as through a process of trial and error. This is illustrated by the Nexo Vodbinderi case reported by Hilmersson and Jansson (2012) in which a small Danish SME producing trawls and nets for the fishery industry initiated its internationalization through an unsolicited order from Poland which led to a relationship with an agent who became responsible for developing customer relationships. A network of customers was then developed by the firm's owner through contacting foreign fishermen landing their fish at the firm's home port. In this way, the firm moved from a reactive decision mode to an incremental one as it gained experience and widened its network. The effects of experiential learning on SME decision mode, information use and network attachment is a fruitful avenue for further inquiry.

Another limitation of our analysis is that it does not address the issue of power, in the form of dependency on external network links. This factor is likely to influence both the decision

mode and network ties of an SME (Child & Rodrigues, 2011). For example, dependence on venture capital funding could place SME owner-managers under pressure to adopt a more rational decision-making mode by comparing alternatives and calculating costs and benefits. External dependency as a contingency could provide another avenue deserving further research.

6. Managerial relevance

Although it has not been our intention to suggest ways of improving the effectiveness of decisions on SME achieve internationalization, the subject clearly has considerable policy significance. The basic question is whether it is always better for decision-makers to undertake forward planning so as to enhance rationality as opposed to relying on intuition and/or opportunism. A more rational decision mode, requiring information of greater explicitness and scope and a wide range of network links, is generally more costly. Our configurational approach suggests that it is important for SME decision-makers to diagnose their internal competencies and how far they can rely on existing available network ties, knowledge, and resources to exploit internationalization opportunities, rather than simply imitating the activities of other SMEs. Their approach to decision making, and their overall strategic approach, should be realistically aligned with their internal competencies (Raymond & St-Pierre, 2013). Moreover, while more rational decision-makers, through comparing alternatives, may be less prone to mistakes, a cautionary note is that they need to keep their minds open to unexpected windows of opportunity which might not arise from a rational calculus or plan. The insights from our contingency analysis also suggest that SMEs embedded in different contexts have different support needs with regards to accessing information. Thus government support agencies should tailor their advice and internationalization programs to individual firm needs, including improving their links to networks and channels for SMEs to obtain requisite assistance and to develop key network relationships.

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