Article

The Strategic Behaviour of SMEs

Vanessa Yanes-Estévez *, Ana María García-Pérez and Juan Ramón Oreja-Rodríguez

Departamento de Dirección de Empresa e Historia Económica, IUDE, Universidad de La Laguna, 38200 Tenerife, Spain; angape@ull.es (A.M.G.-P.); joreja@ull.es (J.R.O.-R.)
* Correspondence: vayanes@ull.es

check for updates

Abstract: This paper analyses the strategic behaviour of small and medium-sized enterprises (SMEs) and identifies the entrepreneurial, technological, and administrative problems of the Miles and Snow typology (1978). This typology is applied to a sample of SMEs in the Canary Islands (Spain) by using a multi-item questionnaire. Then, the Rasch Measurement Theory is applied to obtain the results, with the linear continuum as a key tool. By applying the Rasch Measurement, there is a coherency between the data treatment and the new interpretation of the Miles and Snow typology (1978), which lists 4 types that are close to trends than to pure types (for example, Sollosy 2013). There are differences between the administrative and the technological problems, with their technological approach being more prospector and their administrative one, which is more defender. This shows an almost absence of enterprises with purely defender or prospector behaviours. These results show that SMEs do not follow any comprehensive framework in order to develop their strategies. Managers should analyse their strategic situation and consider the alignment of the three problems.

Keywords: strategic behaviour; Miles and Snow typology; small and medium-sized enterprises; Rasch Measurement Theory

1. Introduction

The typology of Miles and Snow (1978) is one of the most used approaches for the study of the strategic behaviour of organizations (e.g., Anwar and Hasnu 2016; Bouhelal and Mohamm 2016; Frambach et al. 2016; Lin et al. 2014) and one of the most validated typologies (Fiss 2011; Parnell et al. 2015). This typology has been widely applied to large enterprises, and different results could be obtained for small and medium-sized enterprises (SMEs) due to their own characteristics (Akman et al. 2015). Miles and Snow (1978) established four types of strategic behaviours (prospector, defender, analyser, and reactor) based on three different problems faced by organizations: the entrepreneurial, the technological, and the administrative. According to Miles and Snow (1978), prospector companies are constantly looking for opportunities in the market, focusing on innovation (entrepreneurial problem); they have multiple technologies (technological problem), and flexible structures (administrative problem). Defender companies put their emphasis on the efficiency with a limited scope of product-market (entrepreneurial problem); they have cost-efficient technologies (technological problem), and highly centralized and formalized structures (administrative problem). Whereas the reactor behaviour is considered not to have a consistent and clear strategy, analyser companies are located between those two extreme strategic behaviours.

For almost four decades, researchers have used this typology in order to provide new knowledge on the strategic management of SMEs and overcome some of the difficulties related to it, such as the way in which firms are classified into one or another type of those proposed by Miles and Snow (1978). The most simple and used way of classification is by grouping enterprises in a rather subjective and discretionary manner into pure strategic types. To achieve that, the paragraph method (for instance,

Hult et al. 2006; Shoham and Lev 2015; Ingram et al. 2016), the cluster analysis (for instance, Blackmore and Nesbit 2012; Pinto et al. 2014), or the factorial analysis (Grimmer et al. 2017) have been used. Pure types that have been suggested as conceptual bases that are rather distant from the complex strategic reality of enterprises (Hékis et al. 2013). In practice, only businesses that incorporate facets of two or more strategies are viable (Parnell et al. 2015). In addition to this methodological weakness, we should also consider the attempt to establish cause-effect relations between the dependent and independent variables considered by using regression (for instance, Tang and Tang 2012) or factorial analyses (for instance, Ghezal 2015). Another identified weakness, and one of the most important, is the lack of explicit consideration of the entrepreneurial, technological, and administrative problems proposed by Miles and Snow (1978) to characterize the different strategic types.

On the other hand, the typology of Miles and Snow (1978) has been widely recommended in the case of SMEs, on which this paper is focused (for example, Aragón-Sánchez and Sánchez-Marín 2003; Azyabi et al. 2012; O'Regan and Ghobadian 2006). In this context, the objective of this paper is to widen the knowledge on the strategic behaviour of SMEs by identifying the entrepreneurial, technological and administrative problems of each type according to Miles and Snow (1978) and analysing their fit.

In this way, this paper contributes to the existing literature in several senses:

- Most research on the Miles and Snow typology (1978) uses a single problem (entrepreneurial, technological, or administrative) or does not differentiate among them, as if they were a single global reality (Frambach et al. 2016; Ingram et al. 2016), implicitly assuming that the three are perfectly aligned and have the same characteristics. Even in the case of a detailed analysis of the problems one by one, in the literature, little attention has been paid to the technological and administrative problems, and the majority of research has focused on the entrepreneurial side (Pinto et al. 2014). In this paper, the three problems proposed by the typology are considered explicitly: entrepreneurial, technological, and administrative. This will provide greater richness and detail about the strategic behaviour of SMEs, as well as knowledge on the degree of alignment of each one of the problems

- From the methodological point of view, this paper introduces new systems of measurement and validation that are more in line with the complex strategic reality of firms (among others, DeSarbo et al. 2005). The Rasch Measurement Theory (Rasch 1980) presents, through a polytomous scale, the joint measurements of items and firms along a linear continuum (This theoretical and methodological approach is in line with the new interpretations of the strategic types of Miles and Snow (1978) closer to trends than to pure types (e.g., Anwar and Hasnu 2016; Sollosy 2013; Woodside et al. 1999). Until now, tools and measurement systems have been used to establish clusters of firms in a somewhat 'artificial and manipulated' way. In addition, this methodology is considered to be one of the most current and appropriate methods in the field of Strategic Management (Marcoulides 1998) to improve the measurement of constructs that are not directly observable (Godfrey and Hill 1995). These unobservable constructs are precisely the ones that predominate in business research.

This work is structured in six sections. After this introduction, the second section reviews the main characteristics of the Miles and Snow typology (1978) and its application to SMEs. The third section presents the hypothesis to be tested and the fourth section describes how this research was designed. The results are presented in the fifth section and finally, in the sixth, the conclusions, implications and future research lines are presented.

2. Literature Review

2.1. Strategic Behaviour of SMEs according to the Miles and Snow Typology (1978)

The proposal of Miles and Snow (1978) for the study of the strategic behaviour of firms has had a profound effect on the field of Strategic Management (Hambrick 2003; Ingram et al. 2016). Miles and Snow (1978) establish four types of strategic behaviour depending on how firms decide to address

three problems: the product-market (entrepreneurial problem); technology used to obtain products or services (technological problem); and the coordination, organization, and implementation of their strategy (administrative problem). The strategic behaviours proposed by Miles and Snow (1978) are:

- Prospector strategic behaviour: developed by firms that constantly seek new market opportunities through innovation processes and new product development. They are characterized, from the organizational point of view, by being flexible and by the absence of a formal structure (Rugman and Verbeke 1987). They are firms that create change and uncertainty that their competitors must respond to (Blumentritt and Danis 2006). Therefore, capabilities such as technology and IT capabilities are significantly and positively related to their success (Song et al. 2007). From these organizations, a more external orientation is expected, focusing on change (Fiss 2011).

- Defender strategic behaviour: observed in those firms that concentrate on a narrow and limited scope of the firm, trying to protect their market share without looking for new opportunities outside their business. To do so, these firms emphasize cost reduction and increased efficiency. From the organizational point of view, they are characterized by the existence of hierarchical elements, such as the centralized decision making and the emphasis on formal financial monitoring systems (Rugman and Verbeke 1987). In the case of innovation, defenders focus on business processes rather than on products (Parnell et al. 2015). These types of firms tend to have a more internal orientation and are focused on stability (Fiss 2011).

- Analyser strategic behaviour: a combination of the two previous strategic types, although for some authors it is located on a continuum between defenders and prospectors (Zahra and Pearce 1990). They try to balance efficiency and cost control with innovation, trying to develop their marketing, R&D and production capacities equally (Lin et al. 2014). Therefore, they are firms that need to emphasize hierarchical elements at the same time as flexibility and informal decision-making (Rugman and Verbeke 1987). Therefore, they will behave as defenders in more stable areas and as prospectors in the most turbulent times (Blumentritt and Danis 2006). Their organizational structures combine characteristics of organic organizations with characteristics of mechanistic organizations.

- Reactor strategic behaviour: usually characterized as a type of non-viable strategy (Anwar and Hasnu 2016). In addition, reactors only respond to competitive events when they are forced and do so in an inconsistent or unstable manner (Hughes and Morgan 2008). They are characterized by a lack of congruence between the objectives of the firm, directive principles and process, which in turn generates a degradation of their performance (Balodi 2014). It would not be clear whether they are firms in a transitory phase or, on the contrary, in an 'enduring maladaptive pattern' (Zahra and Pearce 1990). Hence, doubts about their long-term viability arise (Kumar et al. 2012). Therefore, this strategic type is not generally considered in studies that apply this typology, such as Blumentritt and Danis (2006), Frambach et al. (2016) or Hughes and Morgan (2008).

For Miles and Snow (1978), the survival of the firm will depend on the quality of the alignment that managers achieve among the three problems mentioned, that is, the entrepreneur, the technological, and the organizational structures and processes developed. It is what Miles and Snow (1978) call the 'adaptive cycle' (Figure 1). The firms with the best results will be those with an internal consistency among these three problems (Blumentritt and Danis 2006). However, there are few papers that delve deeper into this analysis, with Blackmore and Nesbit (2012), Sollosy (2013) and Pinto et al. (2014) being among the few who do so.

The application of the Miles and Snow typology to SMEs has been specially recommended (for example, Aragón-Sánchez and Sánchez-Marín 2003; Azyabi et al. 2012; O'Regan and Ghobadian 2006). According to Rugman and Verbeke (1987), this typology is even preferable to Porter (1980) proposal when it comes to analysing the strategic behaviour of SMEs.
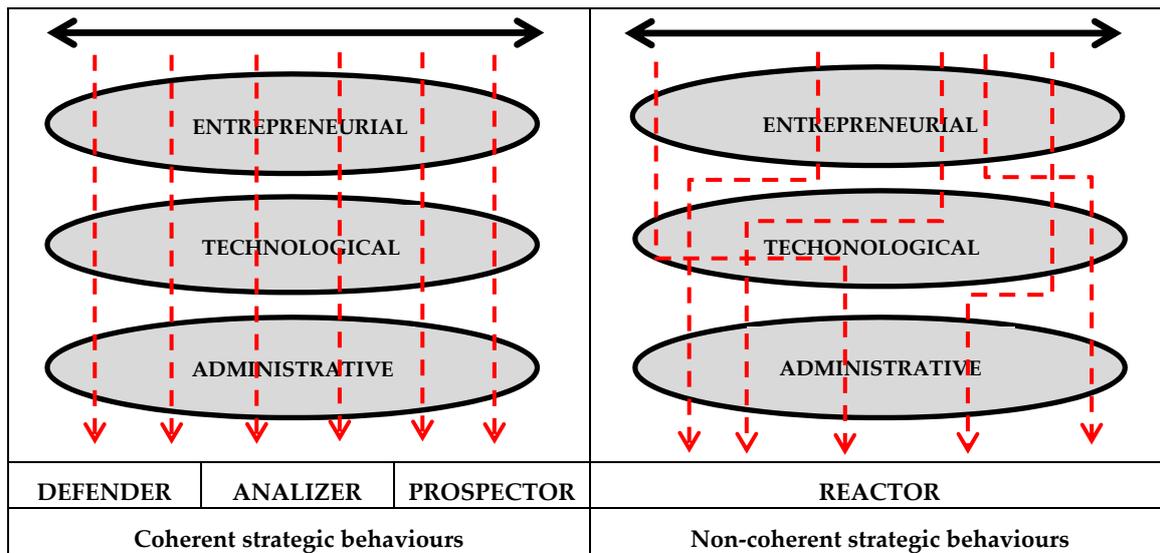
Figure 1. The adaptive cycle of Miles and Snow (1978). Source: adapted from Roca (2004) in Román-Cervantes et al. (2018).

One of the reference works that analyses the strategic typology of Miles and Snow (1978) in SMEs is that of Aragón-Sánchez and Sánchez-Marín (2005). These authors find that prospector SMEs have a greater technological development, are more innovative, and use more information technology. In addition, according to the same study, they have a greater number of flexible practices, are more concerned with human resources and are characterized by greater organizational development than analyser and defender firms. In addition, in O'Regan and Ghobadian (2006), another reference work in this field, these authors confirm, in the industrial sector, that prospector SMEs emphasize creativity, external orientation and greater interdepartmental cooperation than defenders. The latter, however, put more emphasis on internal capabilities and on the control mechanisms of the strategy than the prospector ones. On the other hand, Tang and Tang (2012) apply the approaches of Miles and Snow (1978) to a sample of SMEs in a changing environment like China. The authors conclude that 'prospector and analyser strategies attenuate the inverted U-shape relationship between entrepreneurial orientation and firms' performance while the moderating effect of the defender strategy is insignificant'.

Another group of works link this typology with strategic orientation and other aspects of SME management. Among them, Kumar et al. (2012), conclude that these organizations, for the most part, have a defender or reactor orientation, and Azyabi et al. (2012), propose a typology of strategic orientation based on the direction of knowledge. The latter find that SMEs are aggressive, conservative and balanced, in the line of the three strategic types of Miles and Snow (1978): prospectors, defenders and analysers.

For Al-Ansaari et al. (2014), in an emerging market such as Dubai, the strategic orientation is linked to the different organizational determinants (organizational culture, technology orientation, alliance and cooperation, and market orientation) of SMEs and has consequences in terms of innovation. Their results show that prospectors put more effort than defenders into developing organizational cultures, technology orientation, alliance and cooperation, and market orientation. Additionally, Mendoza Moheno et al. (2014) analyse the innovation developed by a sample of SMEs from the state of Hidalgo (México) and concluded that prospector SMEs are the ones with a better innovative position. In this same sense, Chereau (2015) related innovation to the strategic postures proposed by Miles and Snow (1978), being one of the few studies using each dimension of its adaptive cycle. This author emphasizes in his conclusions the influence of the hybridization of strategic profiles on the predictive validity of the strategy-innovation relationship. Thus, the necessity of leaving the idea of pure strategic

types behind and delving deeper into the analysis and configuration of more hybrid strategic types is shown.

All in all, beyond the connection between prospector SMEs and the different ways of innovation, the existing literature does not reach unanimous conclusions regarding the most appropriate strategic behaviour to be developed by each firm. On the contrary, there is a great disparity in the results. Researchers have used very diverse samples in different studies, for example, SME manufacturers of Northern China (Tang and Tang 2012), Australian SMEs (Blackmore and Nesbit 2012), SMEs from manufacturing and service industries in Dubai (Al-Ansaari et al. 2014), manufacturers firms in Southern Poland (Ingram et al. 2016), manufacturing firms in Northern Israel (Shoham and Lev 2015), and industrial firms in France (Chereau 2015), or even military organizations (Pinto et al. 2014). Moreover, the use of different theoretical and operational approaches in each of these works has also contributed to this disparity of results. This wide range makes it difficult to create a common theoretical framework and differences are frequent. They all highlight the need to address new conceptual approaches and systems of measurements closer to the strategic reality of SMEs, which usually do not follow any formal or planned process to develop their strategy (Salles 2006).

2.2. The Strategic Problems of the Miles and Snow Typology in SMEs

The lack of attention given by the literature to the different strategic problems of the Miles and Snow typology (1978) and, on the other hand, the notable differences between SMEs and large enterprises when it comes to facing their strategic processes, makes us consider the adaptive cycle of these SMEs, and how adjusted their strategic problems are.

The use of pure-type strategies to classify firms separates studies from the strategic reality, as it has been shown that there are no pure types (Anwar and Hasnu 2016; Chereau 2015; Saraç et al. 2014). In the specific context of SMEs, a position of hybrid strategies can be a more accurate representation of the Miles and Snow typology (1978), according to Chereau (2015). Moreover, given the dynamic nature of the adaptive cycle of Miles and Snow (1978), it would be very difficult for an isolated empirical study to result in a set of firms with their strategic problems totally aligned and embedded in a pure type. In this sense, Morais and Graça (2013) also consider that 'adaptation often occurs by moving sequentially through the entrepreneurial, engineering and administrative phase but in mature organizations, each of these three management problems tends to occur more or less simultaneously'. This means that SMEs generally develop and solve each of the three strategic problems which define their type of strategic behaviour differently; some of the strategic problems with more defender features (or less prospector) and others with fewer defender features (or more prospector).

Delving deeper into the three types of problems that allow us to establish the Miles and Snow typology (1987), Pertusa-Ortega et al. (2010) point out that organizational changes (administrative problem) are slower than changes in strategy (entrepreneurial and technological problems). In addition, Ballina et al. (2015) state that many firms persist in conservative attitudes, waiting to observe the operability of certain strategies (entrepreneurial and technological problems) before introducing changes in their structures (administrative problem). Thus, the hypothesis of this paper is presented:

Hypothesis 1. *In general, SMEs will adopt a more defender strategic behaviour (or a less prospector strategic behaviour) in their administrative problem than in their technological and entrepreneurial problems.*

3. Methodology

3.1. Population and Sample

This study is based on a sample of SMEs located in the Canary Islands (Spain) classified according to the number of employees established by the European Commission Recommendation 2003/361/EC

of 6 May 2003 (OJ EU 20.05.2003)[1]. Similar to business structures in other Spanish and European regions, in the Canary Islands, there is a clear predominance of micro-enterprises that represent 95.83% of all firms, with 54.93% of these not having any salaried employees. Furthermore, 24.72% of the Canarian firms belong to the retail sector; 60.76% to the rest of the services; and 14.53% to construction and industry (Ministerio de Industria 2016).

The information used was obtained through a questionnaire consisting of a set of closed questions about different aspects of the strategic behaviour of SMEs. From March to May 2016, the manager with strategic responsibilities in the firm was selected to answer the questionnaire.

Faced with both economic and time constraints to gain access to the complete population under study, a non-probabilistic and convenient method of sampling was used (Neuman 1997; Zikmund et al. 2010). This method is recommended to obtain a number of questionnaires quickly and economically when other types of sampling are not possible (Zikmund et al. 2010). The resulting sample comprised 90 SMEs of which 3.7% were industrial firms, 10.71% construction, and 85.51% of firms belonged to the service sector. This sector distribution is very representative of the Canarian economy and reflects a reality shared with all developed countries, where service firms are the driving force of the economy (Giannakis 2011) since the 'world economy has grown increasingly-service oriented' (Wang et al. 2015). In addition, most of the works that apply the Miles and Snow (1978) typology are developed in multi-industry settings (Anwar and Hasnu 2016), and sometimes, for considering sector representativeness, a convenience sample is used (for example, Parnell et al. 2015).

From the point of view of the size of the firms, the sample used is made up of 50% of microenterprises and 50% of small and medium-sized enterprises. Regarding the age of the SMEs in the sample, 37.8% of them are less than 10 years old, 36.7% are between 16 and 25 years old and for the remaining 25.6% of the sample, more than 25 years have passed since their incorporation.

3.2. Rasch Measurement Theory

The application of the Rasch Measurement Theory (Rasch 1980) in business administration and management is one the most recent methodological contributions in this field, after its growth in other disciplines like psychology, education, and medicine. This paper, therefore, fits within the collection of pioneering studies in applying this methodology to SMEs and to strategic management (for example, Fischer et al. 2006; Salzberger et al. 2014; Oreja-Rodríguez and Yanes-Estévez 2010; Oreja-Rodríguez 2015; Yanes-Estévez et al. 2010; García-Pérez et al. 2014; Martin et al. 2016).

In essence, this methodology analyses latent variables, which are not directly observable and happen to be the majority in management, by evaluating a series of items for a group of subjects (individuals, firms, etc.). When putting such an analysis into practice, it presents a number of advantages and characteristics that make Rasch models preferable to other techniques. Some of these advantages are commented below as a justification for their adaptation to our case, and the contribution made with its application.

One of the main benefits of the Rasch measurement models (Wright and Mok 2004) is that they are the only methodological way available for building linear measurements (Bond and Fox 2007) from ordinal observations (Fischer 1995; Linacre 2004). The one used in this study is known as the Rasch Rating Scale Model. This model was developed by Andrich (1978, 1988) specifically to deal with information from ordinal multiple category scales, like the ones used in this work.

Another advantage of the Rasch Measurement Theory (Rasch 1980) is that when applied, the researcher does not need to assume that the data follow a normal distribution (Engelhard 1984) as happens with other techniques. It does not attempt to characterize the population of subjects or the group of items together. It focuses on individual analysis. Besides that, there are several commonly accepted assumptions in the use of additive scales. For example, according to Fischer et al. (2006),

---

[1]　Micro-enterprise (0–9 employees), small enterprise (10–49 employees), and medium-sized enterprise (50–250 employees).

all the items have the same impact on the score of the scale, and all the categories keep the same distance from the next one. These assumptions do not have to be made through the application of the Rasch Measurement Theory (Rasch 1980).

The key feature of the Rasch Measurement Theory (Rasch 1980) is the ideal model that the methodology itself designs. From the measurements, a model is constructed with the characteristics required for a joint measurement (Andrich 2004). In contrast to other methodologies, the data fit that ideal model constructed. This feature lets the researcher identify those subjects and items that do not follow the designed ideal model and generates misfits.

From the analysis point of view, Rasch models are considered to be models of joint probabilistic analysis Perline et al. 1979[2], which use a common measurement to analyse items and subjects (individuals, organizations, SMEs . . .): the logit scale. Thus, this methodology is different from the rest because it uses the same units of measurement for the item parameters (in our study, items of strategic behaviour) and for the subject parameters (in our study, SMEs). This is known as a joint measurement. This advantage is displayed on the representative linear continuum of Rasch measurement models (Rasch 1980). In our study, both items and SMEs are simultaneously located on a linear continuum that represents the latent variable (strategic behaviour), and both can be analysed at the same time.

In this way, the linear continuum representing the latent variable 'strategic behaviour', (Figure 1) can position parameters of SMEs (subjects-β_n) and parameters of items of strategic behaviour (items-δ_i) simultaneously. The distances or differences between the parameters of the items (δ_i) and the parameters of the SMEs (β_n) (see Appendix A), allow us to conduct the joint analysis that characterizes and emphasizes this methodology[3]. Thus, the parameters of the items (δ_i) are placed along this continuum and the distance from the parameters of each SMEs (β_n) gives SMEs a strategic behaviour that ranges from more prospector (or less defender) to more defender (or less prospector), depending on the difference between both parameters being positive or negative, respectively. Similarly, the location parameters of SMEs (β_n) are also located along the continuum indicating a strategic behaviour that goes from more defender (less prospector) to less defender (more prospector), depending on the difference between both parameters being negative or positive, respectively.

In our study, the latent variable 'strategic behaviour' is represented on the linear continuum obtained after applying the Rasch Measurement Theory (Figure 2). Taking the design of the questionnaire into account, the items with smaller measurements would add prospector features to the strategic behaviour of SMEs, while the items closest to the upper end, defined as 'rare' (items with larger measurements), would add defender features to the strategic behaviour. On the contrary, SMEs located at the lower end of the continuum, defined as 'less' (SMEs with smaller measurements), develop a more defender behaviour, while SMEs located at the upper end, defined as 'more' (SMEs with larger measurements), have a more prospector behaviour.

If items of strategic behaviour and SMEs are analysed simultaneously (one of the contributions of this methodology), the presence of prospector or defender traits can be observed in the strategic behaviour of all SMEs but with different intensities according to their measurements and their subsequent location on the continuum. This approach fits the interpretation that, like Sollosy (2013), when using the Miles and Snow typology (1978), their types should be understood as organizational trends, rather than as pure postures.

---

[2]　To delve deeper into the fundamental and probabilistic mathematical developments of the methodology, see Appendix A and, among others, Wright and Stone Wright and Stone (1999).

[3]　The parameters are estimated through a method of maximum verisimilitude using the Winsteps program version 3.92.1 (Linacre 2017), which considers the PROX and JMLE algorithms (joint maximum likelihood estimation).
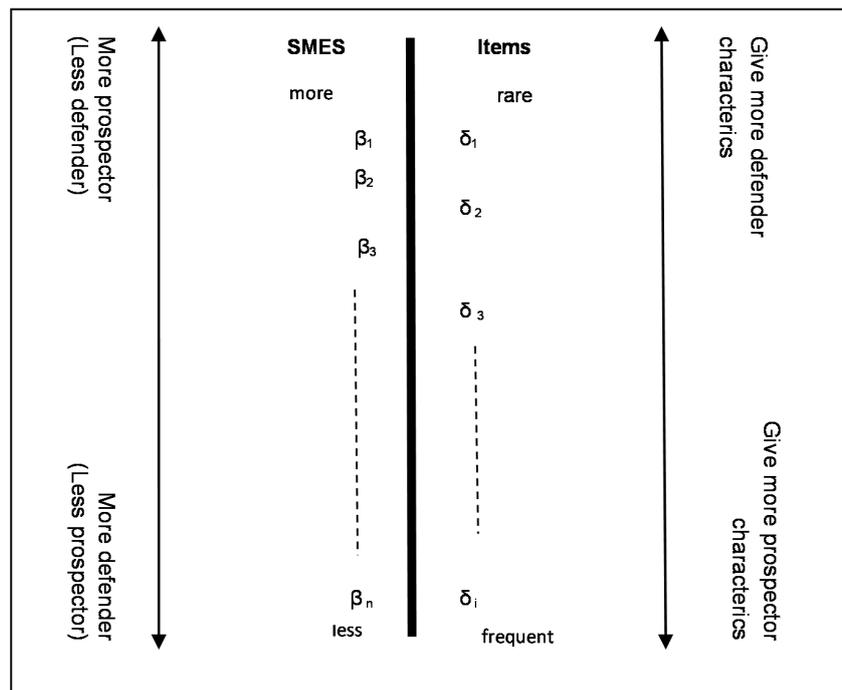
Figure 2. The Rasch methodology lineal continuum of the latent variable 'strategic behaviour'.

3.3. The Scale of Strategic Behaviour

The scales used to obtain the Miles and Snow typology (1978) have ranged from the simplest, such as the application of the paragraph method (for example, Frambach et al. 2016; Parnell et al. 2015; Shoham and Lev 2015), to the design of a questionnaire with items of the three problems that characterize the strategic types (e.g., Ingram et al. 2016). Other studies consider objective measurements (e.g., Blackmore and Nesbit 2012). In these latter cases, there is a serious problem, according to Zahra and Pearce (1990), which is to consider only one or very few items in order to determine the strategic types of firms.

In this paper, the strategic behaviour of SMEs will be analysed by using a multi-item scale. Based on the proposals of Aragón (1996) and Conant et al. (1990), fifteen items belonging to the three problems considered by Miles and Snow (1978) are adapted (Table 1). These items are presented to the managers to position their firms with respect to a continuum ranging from one to five. Lower values on the questionnaire scale correspond to the characteristics of a defender strategy, while higher values show the behaviour of a prospector firm. The intermediate values correspond to an analyser firm. To avoid a loss of information, the scale was recalibrated, fulfilling the requirements proposed by Andrich (1978, 1988).

To evaluate the quality of the measurements of strategic behaviour, the indicators established by the Rasch Measurement Theory (Rasch 1980) were used. Firstly, the linearity of measurement requirements was checked through several indexes: data fitting, Point-measure correlations (PTMA) and Rasch-residual-based Principal Components Analysis (PCAR)[4]. These indicators showed us that the measurements met such a requirement, obtaining positive correlations, and explaining 30% of the model variance with an unexplained variance eigenvalue of the first contrast of 1.97, and therefore less than 2.

---

[4] Point-measure correlations (PTMEA) are those between the observations of an item and the corresponding measure of the items (Linacre 2009) and must be positive in order to corroborate the adequacy of the measurements. Rasch-residual-based Principal Components Analysis (PCAR) shows the contrast between opposite factors, not the load on a factor (Linacre 2009). It looks for patterns in the data that do not accord with the Rasch measurements, that is, for the unexpected part of the data (Linacre 2018). In order for the measurements to reflect only one dimension of the construct, the unexplained variance of the first contrast must be lower than 2.

Table 1. The scale of strategic behaviour (defender/prospector).

DEFENDER Strategic Behaviour		PROSPECTOR Strategic Behaviour
ENTREPRENEURIAL PROBLEM		
E1. The sector in which your firm currently carries out its activities is . . .		
narrow (related areas) and with little chance of being widened	1 2 3 4 5	wide (diversification into different areas) and continuously being developed
E2. About the developments in your business environment what you tend to do is . . .		
study the changes in the environment in your sector in depth	1 2 3 4 5	study the conditions, events and changes of the general business environment
E3. The best way to face competition in your sector is a . . .		
strong resistance in defence of your current products and improvements, especially, in prices and/or services.	1 2 3 4 5	continuous development of your range of products making them more attractive to customers (innovative, etc.)
E4. The way in which your firm proposes to grow is through . . .		
market penetration with your current products and in your current markets.	1 2 3 4 5	the development of new products and markets.
E5. The reaction of your firm to possible opportunities in its business environment would be . . .		
to analyse and study them cautiously.	1 2 3 4 5	to take advantage of them quickly.
TECHNOLOGICAL PROBLEM		
T6. With respect to the technology in your firm, the main concern is to have . . .		
cost-efficient technology	1 2 3 4 5	flexible and innovative technology
T7. The kind of technology your firm currently has is . . .		
homogenous and based on a well-developed core technology.	1 2 3 4 5	multiple and not based on any specific core technology, rather on the diverse technical skills of personnel.
T8. The technology that your firm currently has is one of the most advanced in the market as . . .		
the effort in continually developing it has reduced costs to very competitive levels	1 2 3 4 5	even if your costs are not low, the technology allows you to do unique and diverse jobs in the market.

Table 1. *Cont.*

DEFENDER Strategic Behaviour	←——————→	PROSPECTOR Strategic Behaviour
ADMINISTRATIVE PROBLEM		
A9. The most influential individuals in your firm are found among the experts and managers of . . .		
production and finance	1 2 3 4 5	marketing and R&D
A10. The individuals who currently hold top positions in the firm come from . . .		
promotions from within the firm.	1 2 3 4 5	personnel contracted outside the firm when necessary.
A11. Planning in your firm is quite . . .		
rigorous and a priori (before the action).	1 2 3 4 5	open, impossible to completely carry out before the action.
A12. The firm is organized by . . .		
functions, with members specialized in their area.	1 2 3 4 5	products/customers with members that participate in multiple tasks.
A13. The control of your firm is . . .		
centralized (mainly the responsibility of senior management) and supported by vertical information systems.	1 2 3 4 5	decentralized and participative (encouraging staff to participate) and supported by horizontal information systems.
A14. Coordination among the staff of your firm is . . .		
simple and conflict resolution is through hierarchical relationships.	1 2 3 4 5	complex and conflict resolution is through personal relationships.
A15. When the degree of deviation in performance of your firm must be determined, the firm prefers to focus on the average performance . . .		
compared to that of previous years.	1 2 3 4 5	compared to competitors.

Source: adapted from Aragón (1996) and Conant et al. (1990).

In a second step, the reliability of the SMEs and the items is analysed using the indicators of the Rasch Measurement Theory (Rasch 1980)[5]. Regarding reliability, the measurements reach satisfactory levels to carry out the study (Nunnally 1987), with the item reliability being 0.93 and the SMEs' reliability being 0.73 (Table 2).

Table 2. The reliability and validity of the measures.

	INFIT		OUTFIT		RELIABILITY	CORRELATION
	MNSQ	**ZSTD**	**MNSQ**	**ZSTD**		
SMEs	0.99	−0.1	1.03	0.0	0.73	10.0
ITEMs	0.99	−0.2	1.03	−0.2	0.93	−10.0

On the other hand, the global validity of the model has been checked through the Infit and Outfit statistics provided by the model, each one expressed through the MNSQ and ZSTD[6], and raw score correlation. The results show the global validity of the measurements used (Table 2).

In addition to the global validity of the model, an individual validity analysis of the measurements of each item and each SMEs has been conducted again through the INFIT and OUTFIT indexes, thus, values over 2 generate distortions in the measurement (Linacre 2018). These values are never surpassed in the measurements of this study.

4. Results

4.1. Analysis of the Strategic Behaviour of SMEs

To achieve our goal, the Rasch methodology (Rasch 1980) needs to be executed to the data obtained through the questionnaires responded by the SMEs managers. This allows us to obtain the representative linear continuum of such methodology (Figure 2).

According to Miles and Snow (1978), it is clear from the joint measurement map (Figure 3) that the items belonging to the technological problem and some characteristics of the entrepreneurial and administrative problems are found in the lower part of the map, showing smaller measurements[7]. In this way, the characteristics related to technological development and some characteristics of the entrepreneurial and administrative problems reveal prospector traits in the SMEs' strategic behaviour. Thus, based on Rasch's own methodology (1960/1980), when analysing items and SMEs simultaneously by using the linear continuum, it can be observed that these prospector features of SMEs become more evident and more intense in the SMEs that are placed higher up along the continuum (where $\beta_n > \delta_i$). In this way, it could be said that SMEs, in general, are characterized by a strategic behaviour in which special emphasis is given to flexible and innovative technological development (items T6, T7, and T8). In addition, they face competition with a constant innovation of products (item E3) and a wide and diverse field of activity (item E1). Furthermore, the planning developed by these organizations is open (item A11) and control is established in a decentralized and participatory manner (item A13).

---

[5] The Rasch Measurement Theory (Rasch 1980) and its application through the Winstep program provides a reliability index of separation for the person, and another for item reliability, which has no equivalent in traditional indices. They are interpreted in a similar manner to Cronbach's alpha.

[6] According to Linacre (2018), the Infit is an information-weighted fit statistic, which is more sensitive to unexpected behaviour affecting responses to items near the person's measure level, while the Outfit is an outlier-sensitive fit statistic, more sensitive to unexpected behaviour by persons on items far from the person's measure level. MNSQ is the mean-square outfit statistic with expectation 1 and the ZSTD is the outfit mean-square fit statistic t standardized to approximate a theoretical mean 0. Correlation is the Pearson correlation between raw scores and measures, it is expected to be 1 for SMEs and −1 for items, when the data are complete (Linacre 2018).

[7] Due to space considerations, measurements are not included in this paper but are available on request from the authors.
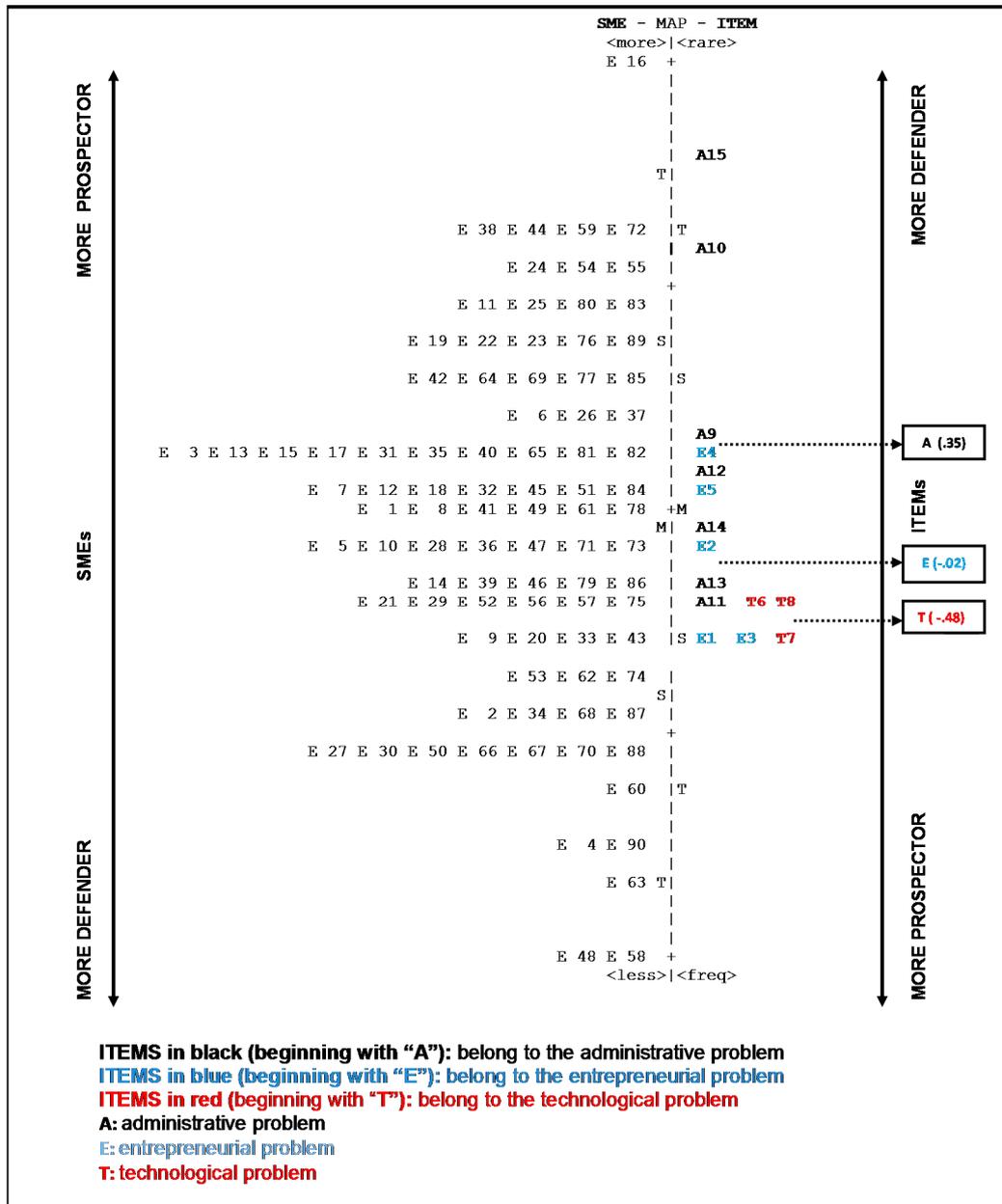
Figure 3. The strategic behaviour of SMEs.

On the contrary, as we move up along the linear continuum, the rest of administrative or entrepreneurial traits or items start appearing. This means that given the design of the questionnaire, the higher up the items are located on the continuum, the more defender traits are added to the strategic behaviour of SMEs (where $\delta_i > \beta_n$). If items and SMEs are analysed simultaneously by using the linear continuum, it can be observed that these defender traits are present in all SMEs in the sample, although it is true that they are present with different intensities. SMEs located in the lower part of the continuum have a more defender strategic behaviour than those located at the top.

Thus, the strategic behaviour of SMEs is characterized as being analyser in a set of traits, such as the type of organization or coordination (items A14 and A12), with the most influential person of the firm being in the area of production/finance and R&D/marketing (item A9). The firm's position regarding the growth opportunities offered by the environment (items E4, E5, and E2) is also included in this intermediate block of items.

Finally, in the upper part of the continuum, there are two items of the administrative problem: how to consider and evaluate the performance of the firm (item A15) and the origin of the people who occupy the highest positions of the firm (item A10). In the first case, the performance of previous years is considered, and in the second case, the personnel from within the firm are addressed, which gives the SMEs a marked defender character as far as these aspects are concerned.

4.2. Differences between the Three Problems of the Strategic Behaviour of SMEs

Once the strategic behaviour that characterizes the SME sample is presented, the aim is to confirm differences that were initially observed in Figure 2 among the three strategic problems (entrepreneurial, technological, and administrative). To achieve that, the analysis of the subgroups of items provided by the Rasch methodology (1960/1980) is used, taking the three groups of items of each problem. In this way, it can be determined whether there are significant differences between the strategic features of the entrepreneurial, technological, and administrative problems of all SMEs in the sample[8].

As can be seen in Tables 3 and 4, the only significant difference detected among the three groups of items is found between those that integrate the administrative problem and those that belong to the technological one (Prob. Rasch-Welch 0.31). In this way, the administrative problem has more defender traits and the technological problem has more prospector ones. Therefore, SMEs are characterized mostly by flexible and innovative technology, while their organizational structures and processes are more centralized and bureaucratic. This result allows us to partially validate the hypothesis.

Table 3. The descriptive analysis of the strategic problems of SMEs according to the subgroup of items.

Items Count	Mean Measure	S.E Mean	P.S.D.	S.SD	Median	Model Separation	Model Reliability	Code
15	0.00	0.16	0.61	0.64	−0.17	3.61	0.93	
7	0.35	0.29	0.70	0.75	0.16	4.02	0.94	**ADM**
5	−0.20	0.16	0.32	0.36	−0.17	1.72	0.75	**ENT**
3	−0.48	0.07	0.10	0.13	−0.42	0.00	0.00	**TEC**

ADM: administrative problem; ENT: entrepreneurial problem; TEC: technological problem; SUBTOTAL RELIABILITY: 0.68; UMEAN = 0; USCALE = 1.

Table 4. The analysis of significant differences among the problems of the strategic behaviour of SMEs according to the subgroup of items.

Item Code	Item Code	Mean Measure	Difference S.E.	t	Welch d.f.	2-Sided Prob. Rasch-Welch
ADM	**ENT**	0.54	0.33	1.67	9	0.130
ADM	**TEC**	0.82	0.29	2.80	6	**0.031**
ENT	**TEC**	0.28	0.18	1.59	5	0.172

ADM: administrative problem; ENT: entrepreneurial problem; TEC: technological problem

5. Conclusions, Implications, and Future Lines of Research

5.1. Conclusions

A first general conclusion that can be drawn from this study is the existence of clear differences between the administrative and the technological problem in the strategic behaviour of all the SMEs studied, with the technological approach being more prospector and the administrative one being more defender. Meanwhile, the entrepreneurial problem is situated at a more intermediate point.

---

[8] The Rasch methodology (1960/1980) allows for the analysis of groups of items through the estimate of a Student's *t* and the analysis of the significance of the differences through a 2-sided *t*-test using the Welch's adaptation of Student's *t*-test. A statistically significant finding for a single two-sided *t*-test is Prob. <0.05 (Linacre 2018).

The explanation could be related to the type of predominant activity in these SMEs that belong mainly to the service sector[9] (Ministerio de Industria 2016). In this sector, information technologies are the most used and, at times, may represent the only technologies that the firm uses. These types of technologies are characterized by their continuous evolution and their greater possibility to be assimilated by the firms of the sector compared to those of the industrial sector. This advantage could increase when it comes to the activity of service SMEs, whose entrepreneurs usually have a profile characterized by a greater capacity to absorb new information technology.

Thus, in order to understand the cycle of adaptation of the three problems that define the strategic behaviour of firms, the main sectorial characteristics in the sample need to be taken into account. First, the new information technology (technological problem) is incorporated due to its greater simplicity of implementation compared to other types of technology. Almost simultaneously, firms test new products/services-markets (entrepreneurial problem) in order to finally adapt administrative structures and processes (administrative problem) if the previous initiatives are successful. This is in line with what is presented by various works, such as those of Pertusa-Ortega et al. (2010) or Ballina et al. (2015).

Another important conclusion that emerges from this work is the almost total absence of SMEs with purely strategic defender behaviours or prospectors, with a large number of SMEs in the sample with the strategic analyser, reactor, or simply hybrid behaviours. This situation is confirmed by other recent studies in this field (e.g., Anwar and Hasnu 2016; Chereau 2015; Saraç et al. 2014). In conclusion, as Woodside et al. (1999) state, not all organizations fit into a pure strategic type. Some of them are identified as representatives of an ambiguous type or, simply, they are SMEs that innovate within the scope of the firm and the technology, leaving behind the consequent administrative change.

5.2. Implications

The results show that SMEs are following strategic behaviours that, although not pure, can respond to strategies that are deliberate and adjusted to the moments of high uncertainty in which they exist and to the dynamics of their adaptive cycle. The strategies of organizations are complex rather than simple and a mix of strategies is likely to be pursued at the same time. For this reason, it is unrealistic to categorize organizations as pure types (defenders or prospectors) (Boyne and Walker 2004; Meier et al. 2006). Along these lines, the results of recent research recognize the possibility of the coexistence of these strategies in a firm, which more accurately reflects reality (Tang and Tang 2012). This is even more relevant in the case of SMEs since strategic processes are less formal (Salles 2006), less explicit (Azyabi et al. 2012), and much more intuitive. In short, this fact need not necessarily be negative if it is the result of a deliberate strategy and not by chance. Even, for Leitner and Güldenberg (2010), a combination strategy is not only viable for SMEs, but rather a 'long-term advantageous option'.

However, the results obtained could also indicate that SME entrepreneurs do not know how to respond strategically to the difficult times they are going through. They may not be using any comprehensive framework to develop their strategies and assess their competitiveness, implementing their strategies in an unintentional manner (Zubaedah et al. 2013). They simply react when they are forced, just as any reactor would, because their problems are not aligned. In this sense, managers often lack conceptual structures that allow them to capture the complexity of their relationships and understand the processes that develop or could be developed with them, often preferring to stay in the 'comfort zone' of what they have always done and know (Yee and Platts 2006), especially in the case of SMEs.

In either case, whether they are deliberate strategies or not, the first implication of this paper is to highlight the need for managers to analyse their strategic situation and to reflect on the alignment of the three strategic problems. This is an important thought, as neither resources nor strategies

---

[9] According to the Ministry of Industry, Energy and Tourism (Perline et al. 1979), in the composition of the services sector in the Canary Islands, the largest percentage of companies is in the hospitality sector, business services, and real estate.

alone determine the performance of SMEs, but rather the adjustment between them (Edelman et al. 2005) and the environment. Therefore, it is necessary that the executives of SMEs be aware of the fact that their technological problem has features that are significantly more prospector (or less defender) than the administrative problem. This situation should respond to a strategic logic that leads SMEs to an improvement in their competitive position. Otherwise, it would not make any sense. Thus, the question that arises here is whether SMEs follow the normal dynamics of the adaptive cycle or, on the contrary, they are mostly analysers or even reactors, as Sollosy (2013) concludes.

These results also have important implications for institutions and public administration. The survival of an SME will depend on the quality of the alignment between the three problems in its strategy (Miles and Snow 1978) and the circumstances of each firm. Therefore, institutions must establish action plans and policies aimed at training and making managers reflect on the strategic adjustment between the three problems identified and the specific context of each firm.

From the point of view of its academic contribution, this paper also offers conceptual and methodological value to the existing literature as already noted. Thus, the application of the Rasch Measurement Theory (Rasch 1980) has allowed us to face the improvement of the measurement of latent variables: the strategic behaviour of SMEs. The methodological approach applied is linked to the delimitation of constructs that meet the requirements demanded by Boyd et al. (2005) with respect to variables that are not directly observable (Godfrey and Hill 1995), which are the majority in the field of business management. In this way, the Rasch Measurement Theory (1960/1980) achieves measurements that are objective and invariant of the subjects and items of the analysed constructs. This contribution is in line with other works presented in the Business Management research literature, such as Salzberger et al. (2014), Oreja-Rodríguez and Yanes-Estévez (2007), García-Pérez et al. (2014) and Martin et al. (2016) within the Rasch Measurement Theory (Rasch 1980), and those of Carroll et al. (2016) within the Item Response Theory (Lord 1980). Finally, the Rasch Measurement Theory (1960/1980) allows us to place the strategic types of Miles and Snow (1978) along a linear continuum and to analyse the different interactions of groups of items with groups of SMEs. This has allowed this paper to go one step further in perfecting the operationalization of the theoretical proposal of Miles and Snow (1978) for the case of SMEs.

5.3. Future Research Lines

This study has a series of limitations whose resolution constitutes the priority lines of future research. The first limitation is that it is a study referring to a certain moment in time. Therefore, it would be very interesting to incorporate data from other years in order to assess the evolution of these strategic problems, incorporating a more dynamic approach and closer to the adaptive cycle of Miles and Snow (1978). This study could also be extended to other types of samples that would make geographical comparisons possible.

In addition, it would also be necessary to incorporate the SMEs' performance to identify which SMEs are performing better or worse. The analyses of SME characteristics will allow us to know what their strategic behaviour is like and the degree of alignment between the three problems and the link with their size and age.

It is also important to delve deeper into the key role of the managers in these types of organizations, namely, their characteristics and perceptions when developing the strategic behaviour of their firms. Other possible relevant aspects in SME strategic behaviour, such as strategic references points (Fiegenbaum et al. 1996), could be analysed.

Given the importance and influence of the environmental uncertainty in the strategic development of firms, it would be necessary to incorporate this dimension of the environment to the general approach of this study.

In addition, making use of the potential of the Rasch Measurement Theory (Rasch 1980), the analysis of misfits could be carried out more thoroughly. This is a valuable tool that could

compare the strategic behaviour of each SME to those expected by the Rasch model. This would allow a more in-depth analysis of those SMEs with mismatches, i.e., those not behaving as expected.

Author Contributions: The authors contributed equally.

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

Appendix A

The basic model of the Rasch Measurement Models is the dichotomous Rasch model (Rasch 1980; Perline et al. 1979), which lets the transformation of raw scores into measurements of interval by means of the probability of response to dichotomous items.

Following the formalization of the transformation by Linacre (2005), the following can be established.

Let P_{ni} be the probability of subject *n* answering item *i* successfully. The field of variance of that probability is:

$$0 \leq P_{ni} \leq 1$$

This level does not correspond to the conceptual infinite of the latent variable and, therefore, the probability concept is transformed into the ratio odds concept,

$$\frac{P_{ni}}{1 - P_{ni}}$$

The ratio odds are defined as the relationship of the two opposing probabilities. The field of variation is:

$$0 \leq \frac{P_{ni}}{1 - P_{ni}} \leq \infty$$

If we make the ratio odds transformation, by obtaining its natural logarithm, a field of variance is achieved that corresponds to that of an infinite latent variable.

$$-\infty \leq ln\frac{P_{ni}}{1 - P_{ni}} = +\infty$$

This natural logarithm of ratio odds complies with the rules of concatenation required by Campbell (1919) for objective measurement; therefore, the measurement of social science constructs can be conducted indirectly by means of probabilistic inference, just as the composition of the stars can be inferred from spectral analysis (Linacre 2005).

This logarithm serves to reflect the difference between the skill of subject *n* and the difficulty of item *i*.

$$\ln \frac{P_{ni}}{1 - P_{ni}} = \beta_n - \delta_i$$

where:

β_n is the parameter of the skill of subject *n*, with a field of variance of $n = \{1, \ldots, N\}$
δ_i is the parameter of the difficulty of item, with a field of variance of $i = \{0, 1\}$

Those parameters are the distances from a local origin, in logits (units of logarithm-odds measurement) on a linear continuum representing the unidimensional latent variable.

From the natural logarithm of the ratio odds, the probability of subject *n* successfully answering item *i* can be determined as:

$$(P_{ni} = 1/\beta_n, \delta_i) = \frac{e^{(\beta_n - \delta_i)}}{1 + e^{(\beta_n - \delta_i)}}$$

(Dichotomous Rasch Model).

Linacre (2005) conclusion is that any set of data with a probabilistic structure that fits the Rasch model also complies with the Campbell's concatenation and, therefore, the estimations of their measurements have the same arithmetical properties of measurement as the length and weight.

In the integrated analysis of the strategic choice process, we will study each of the items of the Miles and Snow (1978) typology by means of an extension of the dichotomous Rasch model (Rasch 1980), called the Rasch Rating Scale Model (Andrich 1978, 1988). This model specifies the probability P_{nij} of a person n with skill β_n choosing category j on a common scoring scale applied to item i of difficulty δ_i. Its opposite would be the probability P_{ni} $(j-1)$ of selecting category $(j-1)$, therefore, the Napierian logarithm of the defined ratio odds would be:

$$\mathbf{ln}\frac{P_{nij}}{1 - P_{ni(j-1)}} = \beta_n - \delta_i - \tau_{ij}$$

In which parameters β_n and δ_i represent the measurements already indicated in the dichotomous Rasch model, and τ_j is the Rasch-Andrich threshold or calibration of the stage. It would be the point in the latent variable at which the probability of category j is the same as that of category $(j-1)$, considering the difficulty of item i.

The expression of that probability would be:

$$P_{nij} = \frac{1}{\gamma} \exp\left[j(\beta_n - \delta_i) - \sum_{k=0}^{j} \tau_{ki} \right]$$

where τ_1 is 0 and γ a normalized/standardized factor that reflects the sum of all the possible numerators.

The work is undertaken with two facets that interrelate in the Rasch Model (SMEs and strategic behaviour), where

β_n is the parameter of the skill of SMEs n, and whose field of variation $n = \{1, \dots, N\}$ (sample of analysed SMEs), which is specified in the level of prospector/defender strategic behaviour of the firms.

δ_i is the parameter of the difficulty of item i, and whose field of variation is $i = \{1, L\}$ (sample of items considered in the strategic behaviour construct of Miles and Snow (1978), which would be the prospector/defender strategic character of the items.

Thus, the items generate a more/less prospector/defender strategic behaviour and the SMEs develop a more/less prospector/defender strategic behaviour.

References

Akman, Gülşen, Burcu Özcan, and Tuğçen Hatipoğlu. 2015. Fuzzy multi criteria decision making approach to innovative strategies based on Miles and Snow typology. *Journal of Intelligent Manufacturing* 26: 609–28. [CrossRef]

Al-Ansaari, Yahya, Simon Pervan, and Jun Xu. 2014. Exploiting innovation in Dubai SMEs: The effect of strategic orientation on organizational determinants. *International Journal of Innovation and Technology Management* 11: 1450039. [CrossRef]

Andrich, David. 1978. A rating scale formulation for ordered response categories. *Psychometrika* 43: 561–73. [CrossRef]

Andrich, David. 1988. *Rasch Models for Measurement*. Newbury Park: Sage, ISBN 0-8039-2741-X.

Andrich, David. 2004. Controversy and the Rasch model. A characteristic of incompatible paradigms? *Medical Care* 42: I 7–I 16.

Anwar, Jamil, and S. A. F. Hasnu. 2016. Business strategy and firm performance: A multi-industry analysis. *Journal of Strategy and Management* 9: 361–82. [CrossRef]

Aragón, Antonio. 1996. La medición de la estrategia empresarial: Propuesta y validación de una escala multi-ítem para la medida de la estrategia de negocio según la tipología de Miles y Snow (1978). *Cuadernos de Economía y Empresariales* 31: 45–65.

Aragón-Sánchez, Antonio, and Gregorio Sánchez-Marín. 2003. Orientación estratégica, características de gestión y resultados: Un estudio en las pymes españolas. *Información Comercial Española* 809: 169–87.

Aragón-Sánchez, Antonio, and Gregorio Sánchez-Marín. 2005. Strategic orientation, management characteristics, and performance: A study of Spanish firms. *Journal of Small Business Management* 43: 287–308. [CrossRef]

Azyabi, Naief, Julie Fisher, Kerry Tanner, and Shijia Gao. 2012. Developing a Theoretical Framework for Knowledge Management Strategic Orientation among SMEs. Paper presented at the Pacific Asian Conference on Information System 2012 Proceedings. Paper 36. Available online: http://aisel.aisnet.org/pacis2012/36 (accessed on 24 May 2018).

Ballina, Francisco, Domingo García Pérez de Lema, and Francisco J. Martínez. 2015. La estrategia, factor determinante del rendimiento de la MIPYMe: Un estudio empírico en México D F. *Faedpyme International Review* 4: 66–78. [CrossRef]

Balodi, K. Chandra. 2014. Strategic orientation and organizational forms: An integrative framework. *European Business Review* 26: 188–203. [CrossRef]

Blackmore, Karen, and Keith Nesbit. 2012. Verifying the Miles and Snow strategy types in Australia small and medium-size enterprise. *Australian Journal of Management* 38: 171–90. [CrossRef]

Blumentritt, Tim, and Wade M. Danis. 2006. Business strategy and innovative practices. *Journal of Managerial* 18: 274–91.

Bond, Trevor G., and Christine M. Fox. 2007. *Applying the Rasch Model. Fundamental Measurement in the Human Sciences*. Mahwah: Erlbaum, ISBN 978-0-415-83341-7.

Boyd, Brian K., Steve Gove, and Michael A. Hitt. 2005. Construct measurement in strategic management research: Illusion or reality? *Strategic Management Journal* 26: 239–57. [CrossRef]

Boyne, George A., and Richard Walker. 2004. Strategy content and public service organizations. *Journal of Public Administration Research and Theory* 14: 231–52. [CrossRef]

Bouhelal, Fátima, and Kerbouche Mohamm. 2016. Why do we consider Miles and Snow's model's one of the most important strategic ones? *Maghreb Review of Economic and Management* 3: 23–34. [CrossRef]

Campbell, Norman. 1919. *Physics: The Elements*. Cambridge: Cambridge University Press.

Carroll, Robert J., David M. Primo, and Brian K. Richter. 2016. Using item response theory to improve measurement in strategic management: An application to corporate social responsibility. *Strategic Management Journal* 37: 66–85. [CrossRef]

Chereau, Philippe. 2015. Strategic management of innovation in manufacturing SMEs: Exploring the predictive validity of strategy-innovation relationship. *International Journal of Innovation Management* 19: 1550002. [CrossRef]

Conant, Jeffrey S., Michael P. Mokwa, and P. Rajan Varadarajan. 1990. Strategic types, distinctive marketing competencies and organizational performance: A multiple measurements-based study. *Strategic Management Journal* 11: 365–83. [CrossRef]

DeSarbo, Wayne S., C. Anthony Di Benedetto, Michael Song, and Indrajit Sinha. 2005. Revisiting the Miles and Snow strategic framework: Uncovering interrelationships between strategic types, capabilities, environmental uncertainty, and firm performance. *Strategic Management Journal* 26: 47–74. [CrossRef]

Edelman, Lina F., Candida G. Brush, and Tatiana Manolova. 2005. Co-alignment in the resource-performance relationship: Strategy as mediator. *Journal of Business Venturing* 20: 359–83. [CrossRef]

Engelhard, George. 1984. Thorndike, Thurstone and Rasch: A comparison of their methods of scaling psychological and educational test. *Applied Psychological Measurement* 8: 21–38. [CrossRef]

Fiegenbaum, Avi, Stuart Har, and Dan Schendel. 1996. Strategic reference point theory. *Strategic Management Journal* 17: 219–35. [CrossRef]

Fischer, Gerard H. 1995. Derivations of the Rasch model. In *Rasch Models. Foundations, Recent Development, and Applications*. Edited by Gerard H. Fischer and Ivo W. Molenaar. New York: Springer, pp. 14–38. ISBN 978-1-4612-4230-7.

Fischer, Arnout R. H., Lynn J. Rewer, and Maarten J. Nauta. 2006. Toward improving food safety in the domestic environment: A multi-item Rasch scale for the measurement of the safety efficacy of domestic food-handling practices. *Risk Analysis* 26: 1323–38. [CrossRef] [PubMed]

Fiss, Peer C. 2011. Building better casual theories: A fuzzy set approach to typologies in organization research. *Academy of Management Journal* 54: 393–420. [CrossRef]

Frambach, Ruud T., Peer C. Fiss, and Paul T. M. Ingenbleek. 2016. How important is customer orientation for firm performance? A fuzzy set analysis of orientations, strategies and environments. *Journal of Business Research* 69: 1428–36. [CrossRef]

García-Pérez, Ana M., Vanessa Yanes-Estévez, and Juan Ramón Oreja-Rodríguez. 2014. Strategic reference points, risk and strategic choices in small and medium sized enterprises. *Journal of Business Economics and Management* 15: 562–76. [CrossRef]

Ghezal, Said. 2015. Assessing the validity of a small business strategy instrument using confirmatory factor analysis. *International Journal of the Academic Business World* 9: 79–87.

Giannakis, Mihalis. 2011. Management of service supply chains with a service-oriented reference model: The case of management consulting. *Supply Chain Management: And International Journal* 16: 346–61. [CrossRef]

Godfrey, Paul C., and Charles W. L. Hill. 1995. The problem of unobservables in strategic management research. *Strategic Management Journal* 16: 519–33. [CrossRef]

Grimmer, Louise, Morgan P. Miles, John Byrom, and Martin Grimmer. 2017. The impact of resources and strategic orientation on small retail firm performance. *Journal of Small Business Management* 55: 7–26. [CrossRef]

Hambrick, Donald C. 2003. On the staying power of defenders, analyzers, and prospectors. *Academy of Management Executive* 17: 115–18. [CrossRef]

Hékis, Helio R., Marison L. Soares, Ricardo A. de Medeiros Valentim, Omar R. de Paula Teixeira, and Dyogo Felype Neis. 2013. Evaluation of Organizational Behavior—An application of the Typology of Miles and Snow in the Hotel sector Florianópolis—Santa Catarina—Brazil. *GGG Georgetown University-Universia* 7: 26–43.

Hughes, Paul, and Robert E. Morgan. 2008. Fitting strategic resources with product-market strategy: Performance implications. *Journal of Business Research* 61: 323–31. [CrossRef]

Hult, G. Tomas M., David Ketchen Jr., S. Tamer Cavusgil, and Roger J. Calantone. 2006. Knowledge as a strategic resource in supply chains. *Journal of Operations Management* 24: 458–75. [CrossRef]

Ingram, Tomasz, Teresa Krasnicka, Martyna Wronka-Pospiech, Grzegorz Głód, and Wojciech Głód. 2016. Relationships between Miles and Snow strategic types and organizational performance in Polish production firms. *Journal of Management and Business Administration. Central Europe* 24: 17–45. [CrossRef]

Kumar, Kamalech, Giacomo Boesso, Francesco Favoto, and Andrea Menini. 2012. Strategic orientation, innovation patterns and performances of Smes and large firms. *Journal of Small Business and Enterprise Development* 19: 132–75. [CrossRef]

Leitner, Karl-Heinz, and Stefan Güldenberg. 2010. Generic strategies and firm performance in Smes: A longitudinal study of Austrian Smes. *Small Business Economics* 35: 169–89. [CrossRef]

Lin, Chincho, Hua-Ling Tsai, and Ju-Chuan Wu. 2014. Collaboration strategy decision-making using Miles and Snow typology. *Journal of Business Research* 67: 1979–90. [CrossRef]

Linacre, John M. 2004. Estimation methods for Rasch measurements. In *Introduction to Rasch Measurement*. Edited by Everett V. Smith and Richard M. Smith. Maple Grove: JAM Press, pp. 25–47. ISBN 9780975535103.

Linacre, John M. 2005. *Winsteps. Rasch Measurement Computer Program*. Chicago: Winsteps.com, Available online: http://www.winsteps.com/winman/index.htm (accessed on 2 July 2013).

Linacre, John M. 2009. *Winsteps. Rasch Measurement Computer Program*. Chicago: Winsteps.com, Available online: http://www.winsteps.com/winman/index.htm (accessed on 2 July 2013).

Linacre, John M. 2017. *Winsteps. Rasch Measurement Computer Program*. Chicago: Winsteps.com, Available online: http://www.winsteps.com/winman/index.htm (accessed on 14 February 2017).

Linacre, John M. 2018. *Winsteps. Rasch Measurement Computer Program*. Chicago: Winsteps.com, Available online: http://www.winsteps.com/winman/index.htm (accessed on 25 July 2018).

Lord, Frederick M. 1980. *Application of Item Response Theory to Practical Testing Problems*. Hislldale: Lawrance Erlbaum Associates, ISBN 089859006X.

Marcoulides, George A., ed. 1998. *Modern Methods for Business Research*. New York: Psychology Press and Taylor and Francis Group, ISBN 0-8058-2677-7.

Martin, Wendy L., Alexander McKelvie, and G. Tom Lumpkin. 2016. Centralization and delegation practices in family versus non-family SMEs: A Rasch analysis. *Small Business Economics* 47: 755–69. [CrossRef]

Meier, Kenneth J., Laurence O'Toole Jr., George A. Boyne, and Richard M. Walker. 2006. Strategic management and the performance of public organizations: Testing venerable ideas against recent theories. *Journal of Public Administration Research and Theory* 17: 357–77. [CrossRef]

Mendoza Moheno, Jessica, Martin A. Hernández Calzada, and Blanca C. Salazar Hernández. 2014. Implications of strategy in innovation in SMEs. *International Journal of Business Environment* 6: 161–76. [CrossRef]

Miles, Raymond E., and Charles C. Snow. 1978. *Organizational Strategy, Structure and Processes*. New York: McGraw-Hill.

Ministerio de Industria, Energía y Turismo. 2016. *Estadísticas Pymes. Evolución e Indicadores, 14, Febrero. Secretaría General de Industria de la Pequeña y Mediana Empresa*. Madrid: Dirección General de Industria y de la Pequeña y Mediana Empresa.

Morais, Luis F., and Luis M. Graça. 2013. A glance at the competing values framework of Quinn and the Miles and Snow models: Case studies in health organizations. *Revista Portuguesa de Saúde Pública* 31: 129–44. [CrossRef]

Neuman, W. Laurence. 1997. *Social Research Methods. Qualitative and Quantitative Approaches*. Needham Heights: Allyn and Bacon, ISBN 0-205-19356-0.

Nunnally, Jum C. 1987. *Teoría Psicométrica*. Mexico: Trillas, ISBN 9701006348.

O'Regan, Nicholas, and Abby Ghobadian. 2006. Perceptions of generic strategies of small and medium sized engineering and electronics manufacturers in the UK: The applicability of the Miles and Snow Typology. *Journal of Manufacturing Technology Management* 17: 603–20. [CrossRef]

Oreja-Rodríguez, Juan Ramón. 2015. *Mediciones, Posicionamientos y Diagnósticos Competitivos. IUDE de la Universidad de La Laguna y FYDE-CajaCanarias-Colección E-BOOKS (9)*. Santa Cruz de Tenerife: Fundación FYDE-CajaCanarias.

Oreja-Rodríguez, Juan Ramón, and Vanessa Yanes-Estévez. 2007. Perceived environmental uncertainty in tourism: A new approach using the Rasch model. *Tourism Management* 28: 1450–63. [CrossRef]

Oreja-Rodríguez, Juan Ramón, and Vanessa Yanes-Estévez. 2010. Environmental scanning: Dynamism with rack and stack from Rasch model. *Management Decision* 48: 260–76. [CrossRef]

Parnell, John A., Zhan Long, and Don Lester. 2015. Competitive strategy, capabilities, and uncertainty in small and medium sized enterprises (SMEs) in China and the United States. *Management Decision* 53: 402–31. [CrossRef]

Pertusa-Ortega, Eva M., José F. Molina-Azorín, and Enrique Claver-Cortés. 2010. Competitive strategy, structure and firm performance. A comparison of the resource-based view and the contingency approach. *Management Decision* 48: 1282–303. [CrossRef]

Pinto, J. Castro, Nuh Altinsoy, and Nelson S. Antonio. 2014. The organizational alignment-strategy, structure and process: An empirical study regarding the impact on the performance of military organizations. *Euro Asia Journal of Management* 43: 3–22.

Perline, Richard, Benjamin D. Wright, and Howard Wainer. 1979. The Rasch model as additive conjoint measurement. *Applied Psychological Measurement* 3: 237–55. [CrossRef]

Porter, Michael. 1980. *Competitive Strategy*. New York: Free Press, ISBN 9780684841489.

Rasch, George. 1980. *Probabilistic Models For Some Intelligence and Attainment Tests*. Chicago: University of Chicago Press, Copenhagen: Danish Institute for Educational Research, First edition in 1960.

Roca, Vicente. 2004. El ajuste en las tipologías estratégicas: Análisis de su influencia en los resultados económicos. Ph.D. thesis, Universitat Jaume I, Castellón de la Plana, Spain.

Román-Cervantes, Cándido, Ana María García-Pérez, Enrique González-Dávila, and Vanessa Yanes-Estévez. 2018. Strategic behaviour of agribusiness cooperatives in Canary Islands and its "adaptive cycle". Paper presented at International Co-Operative Alliance 2018 Research Conference, Wageningen, The Netherlands, July 4–6.

Rugman, Alan M., and Alain Verbeke. 1987. Does competitive strategy work for small business? *Journal of Small Business and Entrepreneurship* 5: 45–50. [CrossRef]

Salles, Maryse. 2006. Decision making in SMEs and information requirements for competitive intelligence. *Production Planning Control* 17: 229–37. [CrossRef]

Salzberger, Thomas, Fiona J. Newton, and Michael T. Ewing. 2014. Detecting gender item bias and differential manifest response behavior: A Rasch-based solution. *Journal of Business Research* 67: 598–607. [CrossRef]

Saraç, Mehlika, Yasemin Ertan, and Elif Yücel. 2014. How do business strategies predict firm performance? An investigation on Borsa Istanbul 100 Index. *Muhasebe ve Finansman Dergisi The Journal of Accounting and Finance* 61: 121–34. [CrossRef]

Shoham, Avi, and Sara Lev. 2015. The Miles and Snow typology and its performance implications. In *Developments in Marketing Science: Proceedings of the Academy of Marketing Science*. New York: Springer, pp. 214–20.

Sollosy, Marc D. 2013. *A Contemporary Examination of the Miles and Snow Strategic Typology through the Lenses of Dynamic Capabilities and Ambidexterity*. Dissertations, Theses and Capstone Projects. Paper 552. College Town: Kennesaw State University.

Song, Michael, C. Anthony Di Benedetto, and Robert W. Nason. 2007. Capabilities and financial performance: The moderating effect of strategic type. *Journal of the Academy Marketing Science* 35: 18–34. [CrossRef]

Tang, Zhi, and Jintong Tang. 2012. Entrepreneurial orientation and SME performance in China's changing environment: The moderating effects of strategies. *Asia Pacific Journal of Management* 29: 409–31. [CrossRef]

Wang, Yulan, Stein W. Wallace, Bin Shen, and Tsan-Ming Choi. 2015. Service supply chain management: A review of operational models. *European Journal of Operational Research* 247: 685–98. [CrossRef]

Woodside, Arch G., Daniel P. Sullivan, and Randolph J. Trappey. 1999. Assesing relationships among strategic types, distinctive marketing competencies, and organizational performance. *Journal of Business Research* 45: 135–46. [CrossRef]

Wright, Benjamin D., and Magdalena M. C. Mok. 2004. An overview of the family of Rasch measurement models. In *Introduction to Rasch Measurement. Theory, Models and Applications*. Edited by Everett V. Smith and Richard M. Smith. Maple Grove: JAM Press, pp. 1–24. ISBN 9780975535103.

Wright, Benjamin, and Mark Stone. 1999. *Measurement Essentials*. Delaware: Wide Range.

Yanes-Estévez, Vanessa, Juan Ramón Oreja-Rodríguez, and Ana M. García-Pérez. 2010. Perceived environmental uncertainty in the agrifood supply chain. *British Food Journal* 112: 688–709. [CrossRef]

Yee, Choy L., and Ken W. Platts. 2006. A framework and tool for supply network strategy operationalisation. *International Journal of Production Economics* 104: 230–48. [CrossRef]

Zahra, Shaker A., and John A. Pearce. 1990. Research evidence on the Miles-Snow typology. *Journal of Management* 16: 751–68. [CrossRef]

Zikmund, William G., Barry J. Babin, Jon C. Carr, and Mitch Griffin. 2010. *Business Research Methods*. Boston: South-Western Cencage Learning.

Zubaedah, Siti, Avanti Fontana, and Adi Z. Afiff. 2013. Revisiting the Miles y Snow Typology. Strategic path mediating business strategy and resource configuration for innovation. *The South East Asian Journal of Management* 7: 16–40. [CrossRef]