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3 Essays on Organizational Development and Design

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Summary of the thesis

The aim of this doctoral dissertation is to analyze the organizational design elements and business model configurations of young firms.

The thesis consists of three chapters. The first chapter reviews the literature on Organizational Life Cycle (OLC), and discusses the why, when, who, what, and how of such models. Adding to the extant literature review, I focus on the organizational design characteristics identifying each stage. Results demonstrate that OLC models suggest that size growth – considered as obligatory – generates business issues that firms are forced to solve by adopting only one possible organizational configuration, following the deterministic organizational approach.

The second chapter adopts the fsQCA approach to analyse organizational configurations of a sample of 96 Italian young firms (4 to 7 years old) operating in the middle and high tech industries. The analysis shows that in order to obtain high performance, organizational structure is a more relevant condition than strategy, and that in low turbulent environment young firms can adopt a greater variety of organizational combination than in high turbulent environment.

The third chapter focuses on business model configurations of young technology firms. In particular, the analysis is based on the configurations of business models themes, firms product strategies, and environmental elements. The findings show that young firms in high turbulent environment rely on efficiency centered business model combined to both niche and differentiation strategies, whereas in low turbulent environment efficiency and novelty centered business model are associated to either niche or differentiation strategies.

Chapter 1
Organizational design characteristics of life cycle models.
A review and future research agenda

Abstract

After a period of reduced interest in the management literature, organization design is experiencing a "renaissance". Organizational Life Cycle (OLC) models can predict organizations' design and development. This paper reviews the literature on OLC models and discusses the why, when, who, what, and how of such models. Adding to the extant literature review, we focus on the organizational design characteristics identifying each stage. Results demonstrate that OLC models suggest that size growth – considered as obligatory – generates business issues that firms are forced to solve by adopting only one possible organizational configuration, following the deterministic organizational approach.

1. Introduction

Early management scholars recognized the importance of organizational design, including March & Simon (1958), Burns & Stalker (1961), Lawrence & Lorsch (1967), and Thompson (1967). Nevertheless, over the past several decades, the literature has neglected new research related to organization design (Greenwood & Miller, 2010). According to Greenwood & Miller (2010) there exists a three-fold reason for this reduced interest: a) a shift in the level of analysis from the organization to the field, population, and community; b) the complex nature of today's organizations demanding detailed, qualitative, and time-consuming studies that do not align with actual publication pressures; and c) an increasing interest in understanding single dimensions of the organization (e.g., coordination mechanisms) rather than their interactions in a whole configuration (Miller et al., 2009).

At the same time, new challenges have fostered renewed attention to organization design, such as globalization, outsourcing, and capability development (Miller et al., 2009). In this modern context, firms require fitting organizational designs (Galbraith, 1999; Miller, 2003; Nadler &Tushman, 2003) to renew their existing capabilities (Teece et al., 1997; Zollo & Winter, 2002). This scenario calls for a significant return to organization design studies that embrace a holistic approach, focusing on the simultaneous interaction of multiple organizational design elements. OLC models provide a fitting response to this call.

OLC models consider a firm's life to be a sequence of different developmental stages. Developed between the 1960s and 1990s, the most relevant OLC models shared the organism life cycle analogy proposed by Gardner (1965). Indeed, like people and plants, organizations "have a green and supple youth, a time of flourishing strength, and a gnarled old age" (p. 20). A central tenet of life cycle theory is that organizations move through a series of phases. Hanks et al. (1993, p. 7) defined a life cycle phase as "a unique configuration of variables related to organization context or structure." The stages of the life cycle include the following: a) a sequence of events that describe how things change over time (Van De Ven, 1992); b) a hierarchical progression that is not easily reversed; and c) a composite of a broad range of organizational activities and structures (Quinn & Cameron, 1983). In short, OLC models simplify a myriad of facts associated with transformational change, reducing the complexity to a uniform, appealing, predictable, and deterministic pattern (Stubbart & Smalley, 1999).

Researchers have tested the empirical validity of these models via their specific mechanisms (e.g., stage change) and particular domains (e.g., family businesses). They have also investigated the models as guiding frameworks for studying the development of specific managerial practices (e.g., human resource management) with only partially conclusive findings (see for instance, Kallunki & Silvola, 2008; Wang & Singh, 2014). Despite these contributions, an organizational design inquiry into the models remains missing. In this paper, we aim to develop a thorough organizational analysis of the OLC models through a literature review of the seminal contributions: Lippitt & Schmidt (1967), Greiner (1972), Adizes (1979), Galbraith (1982), and Churchill & Lewis (1983).

Different from extant literature reviews on the subject, we discuss all five of Whetten's (1989) primary elements of good theory (why, when, who, what, and how). Thus, we extend Levie & Lichtenstein's (2010) previous analysis, which studied three theoretical elements (what, how, and why) of the OLC models. Specifically, we investigate the organizational design characteristics that are inherently associated with each stage of the models: vertical and horizontal differentiation, integration and coordination mechanisms, centralization and decentralization, and standardization and mutual adjustment.

Overall, our results demonstrate that all models propose a deterministic trajectory of organizational development even if not all organizational design elements are fully considered. When such a consideration does arise, different models propose various configurations.

The remainder of the paper follows this structure: the next two sections describe the research methodology and the selected OLC models. The paper then presents an analysis of the organizational design characteristics through the five primary elements of good theory before moving on to a discussion of the results.

2. Research methodology

Our literature review focuses on the OLC models published in management journals and considers three steps. First, in order to provide a revised and up-to-date overview of OLC models, we searched the "ISI Web of Knowledge" database (time span: 2000-2015 and Social Sciences Citation Index) using the following keywords: "review of life cycle of organization" and "organizational stages and growth." This search produced two review articles: Phelps et al. (2007) and Levie & Lichtenstein (2010).

Second, we analyzed the OLC models presented in these two reviews, 33 and 104 in each paper, respectively. We extracted the ones meeting the following three criteria: 1) the model should be novel and not based on previous models, 2) the model should present and discuss how organizational design characteristics change in firms' life cycles, and 3) the model should be an original intellectual source and not only an empirical test. As a consequence, we excluded papers that adopted OLC models to study managerial problems not related to organizational design, including Koberg, Uhlenbruck, & Sarason (1996) as well as Kallunki & Silvola (2008), both of which use Greiner's model to study, respectively, the organizational innovation and the use of activity-based costing in firms' life cycles. Through this analysis, we selected five models: Lippitt & Schmidt (1967), Greiner (1972), Adizes (1979), Galbraith (1982), and Churchill & Lewis (1983).

Third, both of the literature reviews used during the first step of analysis considered articles and contributions published between 1960 and 2006. Therefore, we ran a search in the "ISI Web of Knowledge" database selecting the time span of 2006-2015. In order to search for other OLC models, we chose the same keywords adopted by previous reviews: life cycle growth, stages theory of growth, stages of organizational growth, and organizational life cycle model. We then applied the three criteria for selecting new models, but without success: we did not discover any other model. Therefore, we continued our analysis based on the five previously-mentioned models.

3. Organizational life cycle: a description of the most relevant theoretical models

In order to provide an overview of the five models (see Table 2), we briefly describe each one. Then, through the information-gathering questions, we focus on their organizational design characteristics.

3.1. The Lippitt and Schmidt (1967) model

Lippitt & Schmidt (1967) developed one of the earliest OLC models, focusing on the private sector. They suggest that corporations progress through three stages of development, facing six major "managerial concerns" in order to progress from one stage to the next. At *birth*, critical concerns include creation of the system and achieving a survival threshold. During *youth*, the main concerns are stability and reputation. During *maturity*, achieving uniqueness and responding to diverse societal needs become major concerns. Management must solve the crises in a way that creates a sound base for dealing with future crises. When an issue is solved, firms progress to the following stage. Failures occur when managers fail to recognize the significant crises arising in the organizational life cycle. According to the authors, most companies retain, often by preference, simple organizational structures, uncomplicated product programs, and ordinary ambitions.

3.2. The Greiner (1972) model

Greiner (1972) assumes that a firm's life unfolds through a sequence of five stages of *evolution* and *revolution*. A stage of *evolution* is a period of growth where no major upheaval occurs in organization practices. In contrast, a *revolution* is a period of substantial turmoil in an organization's life. The resolution of each revolutionary period provides the go-ahead for the next stage. Greiner (1972) describes the growth stages on the basis of five parameters: management focus, organizational structure, top management style, control system, and management reward emphasis. The growth stages include the following: 1) creativity-led growth, broken off by a crisis of leadership; 2) direction-led growth, broken off by a crisis of autonomy; 3) delegation-led growth, broken off by a crisis of control; 4) coordination-led growth, broken off by a crisis of bureaucracy or a red-tape crisis; and 5) collaboration-led growth, broken off by a crisis of lack of internal solutions for growth. Evolutionary periods range from four to eight years depending on the industry: in fast-growing industries, the periods may be shorter, while in mature industries, the periods may be longer.

3.3. The Adizes (1979) model

Adizes' (1979) model suggests that firms move through stages due to changes in emphases on four activities: producing results (P), acting entrepreneurially (E), administering formal rules and procedures (A), and integrating individuals into the organization (I). As the organization passes from one phase in its life to the next, it emphasizes different roles, and the resulting role combinations produce varying organizational behaviour. Organizational decline occurs primarily because of an overemphasis on bureaucracy, rules, and procedures. The model suggests that organizations develop through ten stages: courtship, infant, go-go, adolescent, prime, mature, aristocratic, early bureaucracy, bureaucracy, and death. Progression across stages occurs mainly by overcoming the growth problems of successive stages. Organizations begin with an emphasis on entrepreneurial activity that later becomes coupled with an emphasis on producing results.

3.4. The Galbraith (1982) model

The model developed by Galbraith (1982) intends to capture the predictable dynamics of a new organization's stage-wise development. The basic idea is that firms move through predictable stages, but, according to the author, managers do not think in a stage-wise manner despite the predictability. His model focuses on start-up ventures. Such companies develop a business idea that consists of a market to be served, products to be sold, the basis for dominating the niche, and the resources and resource combinations needed to achieve dominance. Galbraith's (1982) model involves five stages: proof of principle prototype, model shop, start-up volume production, natural growth, and strategic maneuvering. To pass from one stage to another, the firms have to increase in size. Moreover, growth is guided by the product market and related to the product life cycle.

3.5. The Churchill and Lewis (1983) model

Churchill & Lewis (1983) used a combination of empirical research and a review of previous theoretical works in order to develop a new OLC model. Their theoretical development derives from the identification of three weaknesses in previous models. First, previous models assume that a company must grow and pass through all stages of development or die during the attempt to do so. Second, they are unable to capture the important early stages in a company's origin and growth. Third, they define company size mainly in terms of annual sales (although some mention the number of employees) while ignoring other factors, such as value added, number of locations,

complexity of product line, and rate of change in products or production technology. As a consequence, the model proposes five stages: conception/existence, survival, profitability and stabilization/growth, take-off, and maturity. Each stage is characterized by an index of size, diversity, and complexity, as described by five management factors: managerial style, organizational structure, extent of formal systems, major strategic goals, and the owner's involvement in the business. The model focuses on small enterprises. In order to grow and increase in size and profitability, the firms must adapt to the environment.

4. An analysis of the main features of the OLC models

In order to analyze and compare the main features of the selected OLC models, we discuss all five elements (why, when, who, what, and how) proposed by Whetten (1989) as primary elements of good theory. The "what" question provides the factors that must be considered in explaining the phenomena under study. The "how" of a theory demonstrates the relationships between the identified factors. The "why" element explains the selection of factors and the proposed causal relationships. The "who, where, and when" questions validate theory with empirical data while setting limits on its uses and applications.

Adapting these insights to our analysis, we develop the following five questions:

> *Why*: Why do firms move from one stage of development to the next (i.e., analysis of the internal and external pressures to change)?
>
> *When*: What is the duration of each stage, and what are the variables used in defining the organizational evolution within each stage?
>
> *Who*: Who are the actors managing the organizational development?
>
> *What*: What are the organizational design features that characterize the firm during each stage?
>
> *How*: How do firms move from one stage to the next?

Because this article focuses on the organizational design aspects characterizing the different stages of development, we thoroughly discuss the relevant 'what' questions in the final section of the article. In the following paragraphs, we devote our attention to analyzing the other four elements.

4.1. Why: the pressures to change

Internal and/or external factors explain why companies change their organizational structure and move from one stage to the following. Internal factors include strategic and managerial decisions, while external factors include market and competitive pressures.

Lippitt & Schmidt (1967) and Churchill & Lewis (1983) consider both the external and endogenous pressures in motivating organizational evolution. Such factors affect different phases of the organizational life cycle: initially, firms confront external pressures to affirm themselves and survive in the competitive market. Then, they face internal issues related to the organizational structure and management of human resources. According to Greiner (1972), the transitions across stages are mainly determined by internal factors: the "revolution" moments are indeed determined by changes in firm strategy, managerial objectives, and/or issues in organizational structure.

A different perspective is adopted by Adizes (1979) and Galbraith (1982), both of whom consider only external pressures. According to Adizes (1979), firms have to adapt to their external environment in order to grow. For instance, during the first stages of the OLC, organizations can survive in the market by increasing their sales and therefore responding to the customers' needs. Similarly, Galbraith (1982) focuses on market share as a means to sustaining firm growth and profitability.

4.2. When: the length of the stages

The second question concerns the "unit of measure" adopted by the OLC models in order to describe the length of each stage. The models do not explicitly indicate a time-length for the stages and, in some cases, they associate the duration of the stage with the size of the firm.

Though they do not indicate a number of years for each stage but generally focus on the flow of time, Lippitt & Schmidt (1967), Greiner (1972), and Adizes (1979) measure the duration of the stages using a time frame. According to Lippitt & Schmidt (1967), time is relevant because organizational issues may become significant crises if they are not resolved within a reasonable timeframe. According to Greiner's model, as time flows, new and different organizational problems emerge: the combination of age and size exacerbates the problem, activating a revolution period. Adizes (1979) suggests that at each lifecycle stage, a typical pattern of entrepreneurial and management behaviour emerges; therefore, time is relevant in predicting companies' activities.

Whereas previous models consider the flow of time as the most relevant factor in explaining the OLC model structure, Galbraith (1982) and Churchill & Lewis (1983) focus on organization size. As a consequence, size, not age, indicates the company's life cycle stage. Galbraith (1982), in particular, claims that firm growth is driven by the growth of the market, and then, each phase depends on external resources. When managers find the right way to govern and exploit external resources, the firm moves to the next stage. For their part, Churchill & Lewis (1983) relate firm growth to profitability: when the latter is satisfactory, the firm moves from one stage to the next.

4.3. Who: the actors leading the organizational development

Concerning the actors who lead the organization's development along its life cycle, all five models generically indicate that management is primarily responsible, namely the executives and/or the founders. In particular, managerial roles include recognizing the organizational issues when they emerge, solving the problems, and determining the appropriate configuration of organizational design elements to move from one stage to the next.

The five models fail to explain how a management team either supports or substitutes for the firm's founder, but they predict when this process occurs. For example, Lippitt & Schmidt (1967) assert that firms have entrepreneurs and a management team in the first stage. Together, they make key decisions for their organizations, such as how much risk to take. Greiner (1972) predicts that a business manager will be hired in the second stage; thus, in the first stage, only the founder(s) manage the firms. Adizes (1979), Galbraith (1982), and Churchill & Lewis (1984) claim that the management team appears in the third stage to support the founder in managing new departments and information and control systems. In essence, the five models do not focus on how a management team flanks the firm's founder; however, they predict that the latter is not able to manage the growth of the firm alone.

4.4. How: the process of development

The process that sustains the development of the organization along its life cycle varies significantly in the five models. The OLC models by Lippitt & Schmidt (1967) and Adizes (1979) identify the predictability of "crises" as the key elements activating the process of organizational development. According to Lippitt & Schmidt (1967), managers have to constantly monitor the market in order to identify "potential problems" (such as market uncertainties and creditors' demands). Adizes (1979) asserts that long-range planning is necessary in order to anticipate and

manage future endeavors, markets, and technologies. Therefore, firms can move to the next stage only if managers make decisions at the right time and with the right intensity.

The "revolution periods" described by Greiner (1972) are phases of considerable organizational turmoil (e.g., demand from middle managers for greater autonomy and the need for new, motivated employees). In this model, the nature of the solutions implemented by managers determines whether firms will move forward to the next stage.

The OLC models proposed by Galbraith (1982) and Churchill & Lewis (1984) consider organizational growth (in size) as the driving mechanism for development. The former claims that managers should define the right combination of all resources (such as people, rewards, and structure) to manage growth in each stage. The latter affirms that firms acquire resources to move to the following stage when they increase their market penetration, economic success, and profitability.

Insert Table 1 Here

5. The "what" of the OLC models: organizational design characteristics

The *what* question concerns firms' organizational design characteristics along the different stages of their life cycles. Even though all of the models agree in suggesting that companies in the early stage of development lack organizational structure, they focus on organizational issues emerging in different moments of firms' life cycles. When the firm is created, owners manage the business and are simultaneously entrepreneurs and managers (Adizes, 1979). The business owner (Greiner, 1972; Churchill & Lewis, 1983) deals with issues in business ideas and product development (Lippitt & Schmidt, 1967; Galbraith, 1982). Delegation is low, and the company is not structured. As a result, organizational issues will emerge as the company, surviving the start-up phase, tries to move to a further stage of development.

Table 2 summarizes the following analysis of organizational characteristics, such as vertical differentiation, horizontal differentiation, integration and coordination mechanisms, centralization and decentralization, and finally, standardization and mutual adjustment.

Insert Table 2 Here

5.1. Vertical differentiation

Vertical differentiation involves the installation of a chain of command among employees and managers. It thus relates to the number of supervision levels (Meyer, 1968; Hall et al., 1967). Vertical differentiation is analyzed with different levels of detail, meaning that some models explicitly address this issue while others "implicitly" refer to the increased number of hierarchical levels as companies evolve. Concerning the latter perspective, Lippitt & Schmidt (1967) predict that during the shift from the first to second stage, the organization becomes taller. By contrast, the last stage requires a flat organization structure. However, the authors do not provide a detailed description of how these changes occur. Similarly, Adizes (1979) discusses relevant issues regarding the development of hierarchy (i.e., decentralization of power), but he does not define how the organizational structure develops over time.

By comparison, the other three models clearly describe changes in vertical structure. In particular, Galbraith (1982) argues that vertical differentiation is initially related to issues of coordination and supervision of new employees hired in the second and third stage: the owner should add levels between himself and new entrants to manage the increased span of control. Then, in the last two stages, the owner hands over decision-making power to product managers in order to deal with the matter of diversity (new products and functions). Similarly, Churchill & Lewis (1983) claim that the development of hierarchical structure relates to the necessity for more supervisors as the firm size increases: when an organization becomes large, an effective delegation process and a greater number of managers allow the company to preserve its ability to make innovative decisions. Differently, Greiner (1972) declares that the number of the supervisors increases up to fourth stage, but decreases in the fifth stage.

Ultimately, the three models that describe the development of vertical differentiation assert that the organizational hierarchy becomes taller over firms' life cycles. Only Greiner (1972) predicts an initial rise in organizational hierarchy followed by a decrease in the last stage.

5.2. Horizontal Differentiation

Horizontal differentiation is explored in detail by all five analyzed models. In general terms, the models agree on depicting a trajectory of organizational development initially based on a functional criterion of horizontal differentiation followed by a divisional one. In particular, activities are grouped together by common function from the bottom to the top of the organization in terms of functional structure. Each functional activity, such as accounting,

engineering, human resources, and manufacturing, is grouped into a specific department (Taylor, 1947). Divisional structure instead occurs when departments are grouped together based on organizational outputs. Divisional structure is sometimes organized by product line(s) or profit centers (Anand & Daft, 2007).

According to this trajectory of development, Lippitt & Schmidt (1967) explain that firms first adopt a functional structure, with a key function represented by the R&D department. Then, when firms enter in the maturity phase, a divisional structure – specialization in products or services – is adopted. Similarly, Adizes (1979) claims that developing firms need a directive board to plan the organization structure in advance. First, a functional structure is adopted; then, in order to serve new products and markets, the organization moves toward a divisional structure by markets, products, or profit centers. Such an organizational form stimulates and develops the entrepreneurial personality of the managers. If the divisional structure is not well-adopted, the company fails.

The other three OLC models support steps of organizational development other than the divisional structure. Combining the two horizontal differentiation criteria, they suggest that companies first adopt a line-and-staff and then a matrix structure. The line-and-staff organization combines the line units, namely all the activities directly related to organizational goals (either functions or divisions), with staff departments that support and advise line departments (Fayol, 1949). The matrix combines a vertical structure with an equally strong horizontal overlay. While the vertical structure provides traditional control within functional departments, the horizontal overlay provides coordination across departments to achieve profit goals. This structure has lines of formal authority along two dimensions, such as functional and product, or product and region (Mee, 1964; Galbraith, 1971).

Greiner (1972) asserts that as firms grow, a functional structure is introduced to separate manufacturing from marketing activities. Then, when a firm grows, the increased delegation goes hand in hand with the adoption of either a divisional or a line-and-staff structure. The divisional structure focuses on market territories, while the line-and-staff combines product units with staff departments. Later, in the last stage, Greiner (1972) suggests implementing a matrix structure in order to assemble the opportune teams for the appropriate problems and to solve possible conflicts between line and staff.

Similarly, Galbraith (1982) affirms that developing firms should use a functional structure in order to coordinate new specialized product workers when they are hired. Then, more

organizational units (functions) are added in order to manage the increased production volume. If firms assume a product differentiation strategy, they satisfy the need to combine functional teams and product managers by "integrating departments." In the last stage, firms can adopt either a divisional structure (creating profit centers around regions, products, or markets) or a matrix structure in order to solve the issues related to diversification and vertical integration.

Finally, the model proposed by Churchill & Lewis (1983) proposes that firms require a functional structure to manage their financial, marketing, and production activities. Then, firms should be organized in either sales or production groups (divisional structure) to face issues related to the maintenance of managerial effectiveness in a rapidly-growing organization. When firms become larger, they require a line-and-staff structure to remain flexible and to improve managers' entrepreneurial spirit.

To sum up, the authors claim that when firms grow and employee numbers increase, the owners cannot manage everything alone; they need to set up an organizational structure. The first arrangement suggested by authors is a functional structure. Then, following a "deterministic" point of view, they predict a divisional, line-and-staff, and matrix structure.

5.3. Coordination mechanisms

March & Simon (1958) claim that coordination mechanics relate to a division of work that causes interdependence among organizational units. According to the OLC models, the need for coordination mechanisms emerges together with changes in horizontal differentiation criteria. In order to manage such issues, the authors suggest different mechanisms.

Lippitt & Schmidt (1967) propose managing increasing complexity due to the addition of new departments with systematic plans and long-range planning. Furthermore, they promote the adoption of upward communication systems in order to share information between departments.

Greiner (1972) and Churchill & Lewis propose different mechanisms in order to address specific issues: budgets should support coordination when functions are created; profit responsibility is introduced to coordinate and stimulate employees who belong to different divisions; teams and task groups satisfy the need for cross-functional integration; and strategic planning and standard cost systems reduce inefficiencies generated by the increasing size.

Galbraith (1982) asserts that hierarchy can improve coordination and control when new departments are added. He claims that general management (e.g., multifunctional managers) can solve conflicts among functional units. When firms increase their number of products, cross-

functional teams are required. Finally, if firms pursue growth through diversification by regions, products, or markets, managers should combine the use of profit centers and corporate culture to coordinate employees.

Adizes (1979) divides the life of firms into two main periods: before and after maturity (the sixth stage). According to the author, up to maturity, employees are guided by an *internal agent* (individuals working for the organization who have the experience of an improving situation) and oriented by organizational culture. After the maturity stage, firms need an *external agent of change* (outside consultants who are temporarily employed by the organization) in order to lead and coordinate workers.

In summary, the authors affirm that firms should set up both the organizational structure and coordination mechanisms at the same time. The analysis shows that there is a lack of agreement related to which coordination mechanism best fits each type of organizational structure.

5.4. Centralization and decentralization

Centralization and decentralization define the distribution of power and the level of participation in strategic decisions within an organization (Hage, 1980). Issues of centralization and decentralization emerge during the life cycle of firms for various reasons.

Whereas Adizes (1979), Churchill & Lewis (1983), and Lippit & Schmidt (1967) explain that decentralization is adopted in order to motivate employees to follow their own initiatives and attract creative workers when the size of a firm increases, Galbraith (1982) suggests increasing decentralization in order to support product diversification, assigning managers the responsibility of new products.

Different from the other models, Greiner's model claims that growing firms should decentralize to satisfy the demand for greater autonomy from middle managers; however, when firms reach their largest size, namely in the last two stages, centralization becomes necessary again in order to regain control and to achieve greater coordination over firms.

In brief, the authors affirm that the process of decentralization is directly linked with the growth of the firms: bigger firms need more delegation. According to the authors, decentralization allows firms to achieve diverse benefits, such as increased worker motivation and greater work flexibility. Only Greiner (1972) holds an opposing view; in fact, he claims that centralized management is the best choice to resolve issues related to the large size of firms.

5.5. Standardization and mutual adjustment

All of the authors consider two kinds of coordination tools, standardization and mutual adjustment. Standardization is a way of using rules and norms to standardize workers' behavior, while mutual adjustment is the process through which employees use their judgment rather than standardized rules to address problems, guide decision making, and promote coordination. Lippitt & Schmidt (1967) suggest implementing and then updating administrative policies in the second stage. Adizes (1979) claims that in the maturity (sixth) stage, a well-managed bureaucracy is essential for firm survival. Galbraith (1982) and Churchill & Lewis (1983) recommend adopting formal rules in the third stage in order to have a better control system and to improve efficiency in strategic planning.

Differently, Greiner (1972) maintains that when firms reach the fifth stage, they emphasize greater spontaneity in management action. Therefore, as in the first stage, employees' social control and self-discipline takes over for the formal control used up to the previous stage.

Analyzing the two coordination tools of standardization and mutual adjustment, the five models predict that small firms do not need to standardize job activities in the early stages of life. When the number of workers, departments, and functions increases, firms should standardize procedures and routines. Greiner (1972) does not completely agree with this point; indeed, he maintains that the last stage of firms is based on manager flexibility and spontaneity.

6. Discussion

After a decrease in interest in developing new theories on organization design (Greenwood & Miller, 2010; Miller et al., 2009), a renewal has occurred due to new challenges, such as globalization, outsourcing, and capability development (Miller et al., 2009); this renewed focus is necessary to manage firms' capabilities and resources. The OLC models provide us with a holistic approach toward firms' organizational elements, explaining why these models are still used in the organizational literature as a guiding framework for empirical studies (e.g., Kallunki & Silvola, 2008; Wang & Singh, 2014).

This paper has reviewed the literature about OLC models before analyzing Whetten's (1989) five primary elements of good theory (why, when, who, what, and how) for the following five models: Lippitt & Schmidt (1967), Greiner (1972), Adizes (1979), Galbraith (1982), and Churchill & Lewis (1983).

The results of this analysis confirm some limits to the OLC models, constraints that are recognized in the literature. The results also highlight some new issues from the organizational perspective. First, these models affirm that the growth of the firms is linear and sequential (Levie & Hay, 1998; Quinn & Cameron, 1983; Rutherford et al., 2003; Stubbart & Smalley, 1999). Firms have continuous growth over their lifespan, even if many researchers show that firms that do survive never grow beyond a very small size (Coad, 2007). The models also maintain that organizational hierarchy becomes taller over the life cycle and that the process of decentralization is directly linked with firm growth. The analysis also shows that Greiner's (1972) model predicts either different or opposite arrangements for solving issues related to the last stage, such as centralized management, managers' flexibility and spontaneity, and decreased organizational hierarchy.

Second, the growth of the firms creates internal issues related to organizational structure that need to be resolved (Fombrun & Wally, 1989). The authors of the five models predict only one possible configuration to solve these issues (Mckelvie & Wiklund, 2010). In fact, they claim that in each stage, firms adopt a different organizational structure; in particular, the authors predict a change from a functional structure to a matrix, adopting a divisional or a line-staff structure at intermediate stages. This deterministic point of view about firm growth is not fully recognized in the literature. Indeed, it is not easy to predict *a priori* when and how firms should choose a particular organizational solution (Terziovski, 2010), and internal organization may not be determined independently of firm boundaries (Brahm & Tarziján, 2015). Also, according to the literature about configurational equifinality (Gresov & Drazin 1997), there is no single optimal design. Rather, managers choose designs that optimize one contingency while addressing the other to the fullest extent possible, given their firms' particular contexts and capabilities (Westerman et al., 2006).

Third, our review reconfirms some considerations of the OLC models that are recognized in the literature. In fact, from our analysis it remains unclear: a) how many stages there are in an organization's life cycle and precisely what each stage constitutes (Phelps et al., 2007); b) if a particular stage model has become dominant in the field (Levie et al. 2010), and c) if the stages are correlated to the organization's chronological age (Bailey & Grochau, 1993; Rutherford et al., 2003).

Taking into account the results and limitations of the OLC models, we suggest that future studies test if firms take growth for granted. They might also investigate if business owners or managers

adopt a predictable organizational structure change or if there are different organizational configurations adopted at each stage of the life cycle.

7. Conclusion

While previous reviews of OLC models have focused mainly on general issues, we have focused on the organizational design characteristics identifying each stage of firm life.

The results of the literature review demonstrate that OLC models suggest that size growth – considered as obligatory – generates business issues that the firm is forced to solve by adopting only one possible organizational configuration, following the deterministic organizational approach.

To conclude, we recognize some limitations to our analysis, such as the restriction arising from the criteria that we have used to select the organizational life cycle models in order to follow our aim. Indeed, we have selected only novel models excluding all models based only on an empirical test. Therefore, we did not take into account all of the OLC models, even those models still used in the literature.

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Table 1

Author(s)	Numbers of Stages	Why	When	Who	How
Lippitt & Schmidt (1967)	*Three*: birth, youth and maturity	Both exogenous and endogenous	Flow of time (one of the issue will acquire exceptional importance)	Management	Solve the crisis and create the base for the future crises
Greiner (1972)	*Five*: creativity, direction, delegation, coordination and collaboration	Endogenous problem	Both age and time have to increase	Top managers	Solving the revolution
Adizes (1979)	*Ten*: courtship, infant, go go, adolescent, prime, mature, aristocratic, early bureaucracy, bureaucracy and death	External	In the long run, organization must adapt to its external environment	Management	Change role combination and organizational behavior
Galbraith (1982)	*Five*: proof of principle prototype, model shop, start up volume production, natural growth and strategic maneuvering	External (market-product life cycle)	Increase in size	Management	Implement the right organization that fits with the size
Churchill & Lewis (1983)	*Five*: conception, survival, profitability, take off and maturity	Both external and endogenous	Increase in size	Business owner Management	Firms have to increase in size and profitability

Table 2

WHAT	Lippitt & Schmidt (1967)	Greiner (1972)	Adizes (1979)	Galbraith (1982)	Churchill & Lewis (1983)
Vertical Differentiation		The number of the supervisors increases up to fourth stage and decreases in the fifth stage (*From 2° to 5°*)		Venture managers manage the span of control issues (*From 2° to 5°*)	Balance between number of employees and supervisors (*From 2° to 5°*)
Horizontal Differentiation	Functional and divisional structure (*2°,3°*)	Functional to divisional, line-staff and then to matrix structure (*From 2° to 5°*)	Functional then divisional structure (*From 2° to 9°*)	Functional to modified functional and then to divisional or matrix structure (*From 2° to 5°*)	Functional, a divisional and line/staff structure (*From 3° to 5°*)
Integration/ Coordination Mechanisms	Systematic plans and upward communication flows (*2°,3°*)	Budgets, profit centers and task group (*From 2° to 5°*)	Organizational culture and facilitators (*From 2° to 9°*)	Structures to coordinate, planning and budgeting systems (*From 2° to 5°*)	Budgets, operational and strategic planning (*From 3° to 5°*)

WHAT	Lippitt & Schmidt (1967)	Greiner (1972)	Adizes (1979)	Galbraith (1982)	Churchill & Lewis (1983)
Centralization/ Decentralization	**C.:** venture managers do everything (1°) **D.:** delegation increases over time (2°,3°)	**C.:** centralization to have control and coordination (1°,4°,5°) **D**.: functional organization with decentralization (2°, 3°)	**C.:** founders have all the power (from 1° to 4°) **D**.: decentralize to the subordinates (From 5° to 9°)	**C.:** owner has all the power (1°,2°, 3°) **D.:** the management decentralize to the departments (4°, 5°)	**C.:** the owner does everything (1°, 2°) **D.:** decentralize to functional manager (3°,4°,5°)
Standardization/Mutual Adjustment	**M.A.:** firms should move with speed and flexibility (1°) **S.:** firms implement and then update policies (2°,3°)	**M.A**.: informal communication, team action, social control and self-discipline (1°, 5°) **S.:** Formal communication and planning procedures (2°,3°,4°)	**M.A.:** people take own initiative (1°, 2°, 3°) **S**.: formal plans and written procedures (4°, 5°, 6°, 7°)	**M.A.:** decision process is spontaneous (1°, 2°) **S.:** formal rules and control (3°, 4°, 5°)	**M.A.:** no formal planning (1°, 2°) **S.:** Formal systems (3°,4°,5°)
Structures suggested	Functional and divisional	Functional, divisional, line-staff and matrix	Functional and divisional	Functional (and with integrated departments),divisional and matrix	Functional, divisional, and line-staff

Chapter 2

Organizational configurations in the early stages of firm's life cycle.
A Qualitative Comparative Analysis in middle and high technology industries.

Abstract

Previous researches have investigated various aspects of young firms success, but only few of them have considered the organizational structure, and the relationship between internal elements and external variables. This study adopts the fuzzy set qualitative comparative analysis (fsQCA) to analyse the configurations of structure, strategy and environmental elements associated to high performance of 96 Italian young technology firms. Our findings show that in order to obtain high performance, organizational structure is a more relevant condition than strategy, and that in low turbulent environment young firms can adopt a greater variety of organizational combination than in high turbulent environment.

Keywords: Organizational configurations; young firms; technology firms; fsQCA.

1. Introduction

The entrepreneurship literature recognizes that young firms success is related to a number of factors, such as founding conditions, human capital (Shrader et al., 2007; Pollock et al., 2009; Colombo & Grilli, 2010; Geroski et al., 2010), firms' strategy (Chrisman et al., 1998; Baum, et al., 2001; Mishina et al., 2004), and environmental circumstances (Romanelli, 1989; Box et al., 1993; Short et al., 2009; Clarysse et al., 2011). In such literature, the organizational features of young firms have received less attention, most likely because, as Colombo et al. (2016) have noted, "*to date, research on organizational design has focused primarily on established firms*". However, mature organizations face different structural challenges (Cameron & Quinn, 1983; Gilbert, 2005, 2006; Kimberly, 1979; Shane, 2003) than smaller firms, therefore suggesting a potential gap in the literature.

From a theoretical point of view, the lack of an exhaustive analysis of organizational structural elements in the entrepreneurship literature can be linked to the mainstream view (Colombo et al., 2016), which sustains that young ventures adopt the simple organization (Greiner, 1972; Mintzberg, 1979). An opposite view sustains instead that the design of organizational structure is one of the crucial tasks that entrepreneurs should consider in

establishing their businesses (Donaldson, 1995; David & Han, 2004; Alvarez & Barney, 2005), because the lack of a structure can be a liability (Stinchcombe, 1965).

From an empirical point of view, the few studies (e.g., Sine et al., 2006; Colombo & Grilli, 2013) that have analyzed the organizational structure of young firms have limited their analysis to the effect of one organizational element (for example vertical or horizontal differentiation) on firms performance. Therefore neglecting the consolidated approach according to which the organizational structure cannot be determined independently of firm's strategy and environment elements (Snow et al., 2005).

On the latter point, previous researches, which have analyzed both internal and external fit of the firms, looking the relationship between strategy and structure (Chandler, 1962; Miller, 1992), and between structure and contextual factors (Lawrence & Lorsch, 1967) are flowed into configurational fit approach (Soda & Furnari, 2012). Such approach conceives organizations as holistic entities, comprised of a set of subsystems distinguished from components alone (Meyer et al., 1993). The earlier configurational scholars did not fully capture all the elements of the causal complexity such as *equifinality*- alternative factors can produce the same outcome-, *conjunctural causation*- single conditions display their effect only together with other conditions-, and *casual asymmetry*- presence of a condition for Y does not imply absence of that condition for ~Y-. This is a consequence of the use of linear correlation-based approaches that are not designed to address these three features of causal complexity (Ragin, 1987; Fiss, 2007). To overcome these limitations, Charles Ragin's (1987, 2000, 2008) has developed the Qualitative Comparative Analysis (QCA), which relies on Boolean comparative logic to reduce and identify combinations of conditions and configurations that, in conjunction, explain a given outcome (Ragin, 1987). This new way of thinking -based on the casual complexity- constitutes the emergence of the neo-configurational perspective (Misangyi et al., 2017).

Building on these theoretical considerations, we adopt the fuzzy set qualitative comparative analysis (fsQCA) to analyze organizational configurations associated to high performance of 96 Italian young technology firms. The fsQCA allows us to focus not on isolating independent effects of individual explanatory factors but on revealing combinatory patterns that explain a certain outcome (Ragin, 2008). The analysis shows four equifinal combinations of structure, strategy and environmental elements, which provide alternative combinations of these elements.

Our results contributes to entrepreneurship literature adopting an organizational design perspective. We show that organizational structure is a more relevant condition than strategy for the configuration associated to high performance and that in low turbulent environment young firms may adopt a variety of organizational configurations, whereas in high turbulent environment the number of organizational choices is limited. Our study is one of the first attempts of organizational configurations analysis of young firms, by considering at the same time multiple elements linked to an outcome. As a consequence, we differ from previous studies (e.g., Bruton & Rubanik, 2005; Sine et al., 2006) that focused on the effect of a single variable on organizational performance.

The remainder of the paper follows this structure: in the next section we review young firms and configurational approach literatures. Then we describe the research methodology, and the discussion of results.

2. Theoretical Framework

2.1 Young firms

The entrepreneurship literature acknowledges that failure rate of the firms is higher in the first years of the organizations' life cycle (Haltiwanger et al., 2009; Stangler & Kedrosky, 2010). Indeed, scholars affirm that firms do face a higher risk of being selected out from their competitive environment in the first years of their existence, than later (Stinchcombe, 1965; Hannan & Freeman, 1977; Henderson, 1999; Kor & Misangyi, 2008). This happens because young firms lack of experience, legitimacy and trust with clients.

On the other hand, the success of young firms is related to founding conditions, such as human capital (Shrader et al., 2007; Pollock et al., 2009; Colombo & Grilli, 2010; Geroski et al., 2010), firms' strategy (Chrisman et al., 1998; Baum, et al., 2001; Mishina et al., 2004), and environmental circumstances (Romanelli, 1989; Box et al., 1993; Short et al., 2009; Clarysse et al., 2011). Only, few scholars have analyzed the internal organizational structure of young ventures (Baron, et al. 1999; Beckman & Burton, 2008; Colombo et al., 2016). This lack of an exhaustive analysis of organizational structure elements of young firms is related the mainstream view (Colombo et al., 2016), which sustains that young ventures adopt the simple organizational structure, which is characterized by the flexible, centralized and informal structure (Mintzberg, 1979). Conversely, other scholars sustain that the design of organizational architecture is one of the crucial tasks that entrepreneurs must take to establish their businesses (Donaldson, 1995; David & Han, 2004; Alvarez & Barney, 2005). Indeed, the

lack of structure of young firms is recognized as a liability (Stinchcombe, 1965, Sine et al., 2006).

In addition, the few empirical studies that have analyzed the organizational structure of young firms have limited the analysis to the effect of a single variable on a given outcome (e.g., performance), thus neglecting the relationship between organization structure and the others internal and external elements. For instance, Sine et al. (2006) demonstrate that specialization of tasks in entrepreneurial teams positively influences sales growth; Cosh and colleagues (2012) prove that less formalized high-tech entrepreneurial ventures have better innovative performance, whereas formalization and decentralization lead to a better performance in the commercialization of innovations; and Colombo & Grilli (2013) show that hierarchy increases with the level of uncertainty of the business environment, and with the heterogeneity of the competencies of the human capital.

In sum, the theoretical and empirical deficiency of the entrepreneurship literature in considering the organizational features as a crucial factor for determining the firm performance leads to the need for a configurational analysis, that considers how the elements of the organizational structure fit with other internal and external conditions.

2.2 Configurational approach

The complexity of today's organizations and the turbulence of their environments have encouraged management scholars to recall and extend the contingency theory of organizational designs (Sinha & Van de Ven, 2005; Obel & Snow, 2012; Van de Ven et al., 2013). Basically, the contingency theory is a theoretical approach that take into account the relationship between internal (organizational) and external elements. This approach has been developed by management scholars (e.g., Lawrence & Lorsch, 1967; Burns & Stalker, 1961) to challenge the idea of "the one best way" and the deterministic trajectory of organizational development of classic management scholars (e.g., Urwick, 1944; Taylor, 1947) and of life cycle theorists (e.g., Greiner, 1972; Churchill & Lewis, 1983).

However, the contingency scholars have been criticized because they consider only a limited set of structural elements and analyze their relationships with a limited set of abstracted situational factors (Meyer et al., 1993). To overcome these limitations, scholars have theorized the configurational approach that is based on the idea that whole of organizational elements cannot be understood in isolation. As Meyer et al., (1993) have argued "*rather than trying to*

explain how order is designed into the parts of an organization, configurational theorists try to explain how order emerges from the interaction of those parts as a whole" (p. 1178).

The key concept, which provides the starting point for the development of the configurational approach, is related to the idea that the internal organizational structure cannot be determined independently of firm boundaries and environmental conditions (Brahm & Tarziján, 2015). In fact, previous studies suggest that external factors (e.g., industry conditions) account for a range of 15 - 19 percent of a firm's performance, while strategy and organization is responsible for about 32 percent of performance results (McGahan & Porter, 1997, 2003; Reufli & Wiggins, 2003; Short et al., 2009). Clearly, firm's strategy, structure and environment elements must be integrated (Snow et al., 2005).

The contemporary configuration theory combines two distinct research streams (Lampel & Bhalla, 2011). The first sustains that the aim of the organizational design process is to reinforce the interdependencies that enhance the ability of the organization to adapt to its competitive environment (Gresov & Drazin, 1997; Khandwalla, 1973; Kumar et al., 2009). The second stream argues that organizations seek a position in the competitive environment to get superior performance, and then develop an interlocking set of value creating activities to defend the competitive advantage (Porter, 1996; Porter & Siggelkow, 2008). Although, these two research streams have two different starting points for investigating the interaction between organizations and their environments, they are complementary (Short et al., 2008). The former examines either the 'fit', or the best configuration of the firms for meeting the demands of the competitive environment (Burton & Obel, 2004). The latter considers that the sustainable advantage is linked to the value creating activities that are already at the disposal of the organization.

To sum up, this approach proposes that organizational performances are a result of the fit between the external context and internal arrangements (Miles & Snow, 1984; Van de Ven & Drazin, 1985; Snow et al., 2005), and it offers a holistic view since it considers the relationships between organizational, structure and environmental elements (Soda & Furnari, 2012).

Moreover, the configurational approach recognizes that organizations can be better understood via "*identifying distinct, internally consistent sets of firms than by seeking to uncover relationships that hold across all organizations*" (Ketchen et al., 1993: 1278), and it conceives organizations as holistic entities, both comprised of a set of subsystems (Meyer et

al., 1993), which are related to each other in a coherent ensemble. These ensembles are often referred to as ideal types or archetypes (Van de Ven et al., 2013).

In management literature, the most famous organizational archetypes have been designed by Burns & Stalker (1961) and Miles & Snow (1978). The former identifies two ideal types, mechanistic and organic organizational structures as the opposite ends of a continuum. The mechanistic organizations perform well under conditions of certainty adopting strong hierarchies with a clear line of authority, formal communication mechanisms, high levels of differentiation, and clear role definitions. The organic typology fits to environment with high levels of uncertainty, it endorses a flat and horizontal structure, with lateral and face-to-face communication, and informal coordination mechanisms.

On the other hand, Miles & Snow (1978) observe four archetypes, such as the *prospector*, the *defender*, the *analyzer*, and the *reactor*. The *prospector* type operates in an uncertain environment, adopting low formalization and low specialization, high levels of decentralization and few hierarchical levels. The strength of the prospector is the identification and exploitation of new product and market opportunities. The *defender* is almost the opposite of prospector, it faces a stable and predictable environment. Thus, defenders seek stability and control in their operations achieving efficiency through high formalization and high centralization, specialization, and vertical structure. The strength of this archetype is the high degree of concentration on one segment of the market. The *analyzer* is the combination of the prospector and defender types utilizing characteristics of both. Indeed, its strength is the ability to respond to prospectors while maintaining efficiency in operations. The *reactor* is a unique typology because it lacks an appropriate set of response mechanisms with which to confront environmental change. This archetype does not show a consistent environment-structure-strategy alignment.

Criticizing the use of archetypes in order to illustrate organizational configurations, some scholars suggest that they are descriptive but they lack a supporting theory to predict and explain which organizational practice is complementary with which other and these elements are understood only when a configuration is identified (McPhee & Scott Poole, 2001; Grandori & Furnari, 2008; Fiss, 2011).

In addition, typological theories lack of empirical support (Fiss, 2011), indeed some researchers show that Burns & Stalker (1961) and Miles & Snow (1978) typologies do not hold in particular contexts. For instance Sine et al. (2006) find out that new ventures in turbulent environment with mechanistic configurations outperform those with organic

organizational structures. Meier et al. (2010) demonstrate that Miles & Snow (1978) configurations do not hold in public sector. Davis et al. (2009) questioned the typologies of Burns and Stalker noting that, in high-velocity environments, less structure enables firms to capture opportunities; and Meuer (2014) provides two alternative archetypes to the Burns & Stalker (1961) typologies which lead a higher implementation of management innovation. Other empirical researches affirm that firms to reach high performance sacrifice external fit to maintain an internally consistent structure, while the lower performing firms have internal inconsistency to respond to different environmental contingencies (Khandwalla, 1973; Miller, 1992; Child, 1975, 2005).

This possibility to reach the same result through different paths leads to the concept of *equifinality* in organization design (Drazin & Van de Ven, 1985). Equifinality holds the idea that "a system can reach the same final state from different initial conditions and by a variety of different paths" (Katz & Kahn, 1978, p.30). The equally effective design options for given environmental situations (Gresov & Drazin, 1997; Meyer et al., 1993) imply that not all parts of a configuration are equally important. Indeed, as Fiss (2011) has claimed scholars should move away from a fully holistic view in order to understand what elements of configurations really matter. As a consequence, typologies consist of core and peripheral elements (Fiss, 2011). The former are those causal conditions for which the evidence indicates a strong causal relationship with the outcome of interest, the latter are those for which the evidence for a causal relationship with the outcome is weaker. These definitions suggest that, within a given typology, more than one constellation of different peripheral elements may surround the core elements without any effect on the performance (Fiss, 2011).

In addition to equifinality, scholars recognized others two features of the configurational approach such as *conjunctural causation* which sustains that outcomes are affected by the interdependence of multiple conditions-; and the *asymmetry causality* which implies that causally related elements in one configuration may be unrelated in another" (Meyer et al., 1993). Although, these aspects of causal complexity have been theorized by the configurational research in management (Short et al.,Payne, & Ketchen, 2008), there was a lack of tools that were able to capture the causal complexity (Fiss, 2007; Fiss, Marx, & Cambré, 2013). Indeed, correlation-based approaches are not designed to address conjunctural, equifinal, and asymmetrical causal relations (Ragin, 1987, 2000). To overcome these limitations, Charles Ragin's (1987, 2000, 2008) has developed the Qualitative

Comparative Analysis (QCA), which allows researchers to reveal combinatory patterns that explain a certain outcome (Ragin, 2008).

This new way of thinking -based on the casual complexity- constitutes the emergence of the neo-configurational perspective (Misangyi et al., 2017).

Building on these theoretical considerations, we apply a qualitative comparative analysis to a sample of 96 Italian young technology firms.

3. Research Design

3.1 Data

Our data comes from a random sample of 2,500 Italian firms operating in manufacturing middle - high tech industries. We submitted the questionnaire from December 2015 to February 2016, through the Computer-Assisted Telephone Interviewing (CATI) method. This method allowed us to be confident about the identity of respondents and to monitor the quality of the answers provided. The survey contains several data concerning firm's business model, internationalization strategies of firms, entrepreneurial orientation, and business networking. The scale validity of our survey was tested, assessing the response rate of 108 firms selected from the initial population.

We received 280 completed questionnaires (11,2% response rate). The respondents are members of the founding team (87% of the cases) or CEO(s) (at least 5 years of experience in leading the firm). To explore our research question we selected firms from 4 to 7 years old, that are considered by the literature as "young" firms (Bruderl & Schussler, 1990; Kor & Misangyi, 2008; Clarysse et al., 2011). As a consequence, the final sample consists of 96 companies.

In order to analyze the configuration elements of young firms, we have chosen from the survey data regarding organizational design and strategy. Whereas, for environmental context we have collected data from the Annual Report 2016 by the Italian National Institute of Statistics (ISTAT), and for firms' performance the AIDA database, which contains comprehensive economic and financial information on over 1 million Italian companies.

We have selected organizational design, strategy and environmental variables as follow:

Organizational structure - As far as organizational design variables, following previous studies (e.g., Sine et al., 2006; Cosh et al., 2012; Colombo & Grilli, 2013), we collected data regarding vertical and horizontal differentiation, degree of centralization and degree of standardization. The vertical differentiation involves the installation of a chain of command

among employees and managers. So it is related to the number of levels of supervision (Meyer, 1968; Hall et al., 1967). The horizontal differentiation or specialization refers to the division of labor and roles into subunits and to the possibility of people inside an organization to become more specialized and skilled. Centralization and decentralization define the distribution of the power and the level of participation in strategic decisions within an organization (Hage, 1980). Standardization is related to the way of using rules and norms to standardize behavior of the workers (Hall et al., 1967). In order to assess the organizational structure of the company, respondents were required to assess on a Likert scale (from 1 – totally disagree to 7 - totally agree) to what extent their company adopt such organizational mechanisms. Only in the case of vertical and horizontal differentiations, respondents indicate the number of hierarchical levels and the number of formalized functions.

Firm strategy - Regarding firms strategy we followed the construction of Porter's Generic Competitive Strategies (1980). Therefore, respondents were required to assess the competitive strategy of their company either as cost leadership (the firm intends to be a low cost producer, hence cost efficient) or differentiation (the company offer a unique product or service that allows firms to charge a premium price). On the other hand, niche or mass-market strategies are related to attention of firms on a specific type of customer, product or geographic location (Porter, 1980).

Environment - In order to assess the turbulence of environment in which firms operate we have combined two indicators: mortality rate and synthetic index of competitiveness (SIC) (Aldrich, 1979; Mintzberg, 1979). The former, gives an indication of the dynamism and stability of the environment, to isolate the instability of the market and the results of the competitive threats among firms. Therefore, this indicator explains new ventures' possibility to survive and their ability to overcome the liability of newness (Freeman et al., 1983) since it sums up the overall firms mortality risk (Shepherd et al., 2000). The latter, synthetizes through a geometric average: cost competitiveness, profitability, variation of export, share of turnover exported and share of innovative companies of each firm's' industry. This synthetic indicator provides information regarding the Complexity of the environment, because it includes a measure of "technical intricacy" (Mintzberg, 1979). The same indicator (SIC) is employed as a measure of resource availability in the sector or "munificence" (Aldrich, 1979), which is seen as the extent to which the environment provides resources for the firm.

In addition, our sample is composed by firms operating in middle and high tech industries, which offer a variation in the rate of change and uncertainty of the firms' environments that is not available in a single-industry study (Fiss, 2011).

Performance - We have adopted firms' sales growth as a measure of performance, following previous studies related to young firms (Brush & VanderWerf, 1992; Davidsson & Wiklund, 2000; Wiklund & Shepherd, 2005), and considering that for the new ventures indicators about financial performance are difficult to obtain and interpret (Chandler & Hanks, 1993).

To calculate the firms' sales growth, we used the compound annual growth rate CAGR:

$$CAGR = \left(\frac{Ending\ Value}{Beginning\ Value}\right)^{\left(\frac{1}{\#\ of\ years}\right)} - 1$$

Where: EV: ending value, BV: beginning value, n: number of years. We gathered data related to firms' performance from the AIDA database.

3.2 Methodology

This study adopts the Qualitative comparative analysis (QCA), which draws upon the principles of comparison in the study of social phenomena. Basically, QCA considers that cases are best understood as configurations of attributes resembling overall types. This approach is based on the "method of difference" and the "method of agreement" developed by Mill (1843; 2002), in which one examines instances of the cause and outcome to understand patterns of causation. QCA is based on set theory and uses Boolean comparative logic to reduce and identify combinations of conditions and configurations that, in conjunction, explain a given outcome (Ragin, 1987).

The use of the Boolean algebra and the set-theoretic approach allows QCA to conceptualize and analyze causal complexity, that is characterized by equifinality, conjunctural causation, and the asymmetry causality.

QCA relies on logical minimization to identify necessary and sufficient conditions that predict the occurrence and non-occurrence of an outcome. Necessary conditions are causes that must be present for an outcome to occur. Sufficient conditions are causes that always lead to the outcome. Sufficient conditions are identified using a truth table algorithm. A truth table is a conventional instrument in logic that exhibits all possible combinations of present and absent conditions. The number of rows in a truth table is calculated as 2k (with k denoting the number of conditions taken into account) (Ragin, 2008). The results of the analysis are evaluated using two model coefficients: coverage and consistency. The former considers the

proportion of consistent cases that display a given outcome. The latter describes degree to which cases exhibit the set-theoretical associations in a given solution term. It is calculated by taking the proportion of cases consistent with the outcome.

We have chosen the set-theoretic method, namely fuzzy set Qualitative Comparative Analysis (fsQCA) (Ragin, 2008). Differently from conventional quantitative methods (e.g., ANOVA, SEM), fsQCA studies cases as configurations of causes and conditions, or causal recipes, "a specific combination of causally relevant ingredients linked to an outcome" (Woodside & Zhang, 2013, p. 268). Important to highlight is that set-theory uses set-subset connections rather than correlations between the variables to establish links between the conditions. While correlations are based on the covariance of the variables analyzed, set-subset connections are based on the degree of membership in sets and subsets. Therefore, if set X is contained in set Y, then X is sufficient for Y. On the other hand, if set Y is contained in set X, then X is necessary for Y (Ragin, 2008; Garcia-Castro & Francoeur, 2016).

In sum, fsQCA methodology focuses not on isolating independent effects of individual explanatory factors but on revealing combinatory patterns that explain a certain outcome (Ragin, 2008). Therefore, we can conceptualize and measure configurations as multidimensional phenomena.

In fsQCA, each variable is operationalized as membership scores within pre-defined sets (Meuer, 2014). Through the calibration process, researchers can assign a value of 0 which represents full non-membership, whilst a score of 1 indicates full membership (Ragin, 2008). Following the literature related to organizational configurations and entrepreneurship literature (Wiklund & Shepherd, 2005; Fiss, 2011; Colombo & Grilli, 2013), we have determined the conditions of configurations and the outcome of the analysis. The next section explains the calibration's process of these variables.

3.3 Calibration

We have chosen the firms' growth sales as outcome of our analysis. Thanks to AIDA database, we calculated the CAGR sales of firms founded before 2010 for each of the 8 ATECO (SIC code in Italy) sectors in which firms of the sample operate. Then, we compare the firms' performance with the performance of the sector in which they operate. Hence, for each sector, the 75th percentile of the sales CAGR of firms between 2008 and 2014 has been taken as measure of full membership, the mean has been considered as measure of full non-

membership into the set of high performance firms, and the halfway between the mean and the 75th percentile has been taken as the crossover point (Fiss, 2011) (see note 1 of the appendix). As we have explained in the previous section, our independent measures are related to organization structure, strategy and environmental elements. We have collected data related to organization structure and firm's strategy through our survey, whereas we gathered data of environmental measures from the Annual Report 2016 by the Italian National Institute of Statistics (ISTAT).

In order to calibrate the variable related to vertical differentiation, we followed Hanks, et al. (1994) that reported 3.18 as the medium level and 4.00 as the highest level of vertical differentiation between three clusters of firms ranging from 4.29 to 7.36 years. Therefore, we have calibrated 4 as full membership, 0 for full non-membership, and 2 is the value for the crossover point (see note 2).

We have calibrated the variable horizontal differentiation using the scale derived from Pugh et al., (1968). We have set fully membership =8, fully non-membership =1, and crossover point =4 (see note 3).

The variable related to centralization was measured through two items based on a 1-7 point Likert scale. The first, investigates whether the decision-making power is centralized in the hands of the CEO/director/founder, while the second investigates whether collaborators play an active role in taking important decisions for the company. The two variables have been calibrated and then combined through the use of the Boolean operator AND. We took as crossover point the middle of the scale = 4, firms that expressed the maximum point of agreement = 7 were considered fully in, and those that expressed the maximum point of disagreement were considered as fully out = 1 (see notes 4 and 5).

To measure formalization, we adopted four items related to formalization of roles, the use of formalized procedures, and the formalization of communication and information systems. Coherently with Miller & Friesen (1984), Hanks et al. (1994), and Fiss (2011) we defined the crossover point the middle of the scale = 4 and 1 and 7 respectively as point of full non-membership and full membership in the fuzzy set corresponding to each of the four questions (see note 6).

For what concerns causal variables measuring strategy, we are in line with Fiss (2011) who applied the well-known framework for general strategies of Porter (1980). Indeed, the strategy of a firm can be identified through two different continuum of elements: differentiation vs cost leadership and focus on a niche market vs. mass market. Our items identify whether the

organization launches radically new products and patents on a regular basis, and whether the organization focuses on restricted segments of the market therefore pursuing a niche strategy. The items were based on 1- 7 points Likert scales, and we used as crossover point the middle of the scale and the extremes 1 and 7 as points of full membership and full non-membership.

In order to assess and then calibrate the turbulence of environment in which firms operate we gathered data from ISTAT. We have created and combined two indicators: mortality rate and synthetic index of competitiveness (SIC) (Aldrich, 1979; Mintzberg, 1979). Then, we assigned values - for both indicators - corresponding to each firm of the sample, based on the ATECO sector of pertinence. Afterwards, the two variables have been calibrated separately by looking at the minimum and maximum levels reported in the sample (correspondent to points of full membership and full non-membership), and as crossover points we chose the mean values reported in the sample. We calibrated mortality rate with 2.8 for full non-membership and 13.2 as full membership value and 5.7 the crossover point. The synthetic index of competitiveness was calibrated with 121.3, 112, 56, as respectively value for full membership, crossover point, and full non-membership. Then we have aggregated the two indicators through the logical operator AND (see note 7).

3.4 Analysis

Once we have calibrated the outcome and independent measures, we have performed necessity analyses of all conditions and their negations, applying a recommended consistency benchmark of ≥ 0.9 (Schneider & Wagemann, 2012), however have we not found any necessary conditions (Ragin, 2006). We have, then, conducted sufficiency analyses using Ragin's (2008) truth table algorithm (Greckhamer et al., 2008), in which are organized all logically possible combinations of absent and present conditions (Meuer, 2014). We have minimized the truth table by considering the coverage threshold at two cases, which indicates the minimum number of empirically observed cases for each configuration.

Then, we have set the consistency threshold - the proportion of cases consistent with the outcome - at 0.80, which is above the recommended minimum of 0.75 (Ragin, 2006; Fiss, 2011) (see note 8).

Ragin's (2008) truth table analysis displays all theoretically possible configurations, also those which do not show empirical evidence (Ragin, 1987; Greckhamer et al., 2008). To deal with this issue, the counterfactual analysis offers different solutions to overcome the limitations of a lack of empirical instances. We have adopted a combination of intermediate and

parsimonious solutions (Fiss, 2011; Greckhamer, 2016). The parsimonious solution includes all simplifying assumptions of both easy and difficult counterfactuals (see note 9). The intermediate solution, whereas, includes assumptions based on easy counterfactuals, which is based on researchers' assumptions. Taking into account the extant organizational configuration theory, and our explorative aim for the analysis, we have not made strong assumptions (Misangyi & Acharya, 2014). The conditions in the parsimonious solution are denoted as core conditions, because they withstand both easy and difficult counterfactuals, while the intermediate solution stands between the parsimonious and complex (no counterfactuals) solutions, and are identify as peripheral (Fiss, 2011; Misangyi & Acharya, 2014).

In the next paragraph, we analyse the configurations associated to high performance of young firms.

Insert Table 1 Here

4. Results

Table 1 reports the results of our fsQCA analysis. We have adopted large circles to represent core conditions, and small circles for peripheral conditions. Crossed-out circles denote the absence of conditions, while empty cells indicate "don't care" (Ragin & Fiss, 2008; Fiss, 2011). In addition, in table 1, we have reported the "raw coverage", that shows which share of the outcome is explained by alternative configurations. We also report the "unique coverage", that indicates the proportion of cases featuring the outcome that are covered by a given configuration. The "overall solution coverage" - which indicates the raw coverage aggregated across all the configurations – is 0.40, therefore our configurations account for 40% of the instances of the outcome (Ragin, 2008; Aversa et al., 2015).

The solution indicates the presence of core and peripheral conditions as well as neutral permutations. The presence of four solutions points to a situation of first order (or across-type) equifinality of solutions, while the neutral permutation within solutions 1a and 1b shows the existence of second-order (or within-type) equifinality (Fiss, 2011).

The solutions 1a and 1b share the same core elements. These configurations exhibit firms with vertical differentiation (core) in low turbulent environment (peripheral). We note that these firms are formalized and adopt a niche market strategy. The centralization structure is absent in 1a configuration; while in the 1b does not matter. The configuration 1b, also, combines the horizontal differentiation with a differentiation strategy.

These two configurations display some similarity with the ideal typologies such as defender by Miles & Snow (1978) and mechanistic configuration of Burns & Stalker (1961). Indeed, firms of configurations 1a and 1b combine vertical differentiation, formalization and niche market in low turbulent environment. However, configuration 1b differs from configuration 1a by combining both niche market and differentiation strategies.

The configuration 2 is associated to high performance firms in low turbulent environment, as those of the configuration 1. This configuration shows firms that rely on centralization of decision making power. Indeed, the configuration 2 indicates - as core elements - the absence of horizontal structure and formalization. As peripheral elements, these firms display an absence of vertical structure, and a niche market strategy.

Although in low turbulent environments, typologies developed by Miles & Snow (1978) and Burns & Stalker (1961) predict firms based on vertically and formalized structure, the configuration 2 shows that a centralized and flexible structure combined to a niche strategy is linked to high performance.

The configurations 3 and 4 exhibit firms, which combine both niche and differentiation strategies (peripheral elements), in high turbulent environment (core element). These configurations, however, differ for the organizational structures elements. Configuration 3 is based on a horizontal, flat and decentralized structures, same as the organic and the prospector typologies. This configuration is similar to organic and prospector typologies, however differ from them for the adoption of both niche market and differentiation strategies in high turbulent environment.

On the other hand, the configuration 4 illustrates high centralized firms (core element), and based on horizontal and formalized structures. This configuration contradicts ideal archetypes, which are based on informal and decentralized structure to compete in high turbulent industries.

As we have previously highlighted, the overall coverage of these solutions accounts for 40% of membership in the outcome. This value indicates elements of randomness within configurations, and therefore these solutions leave room for other possible paths to achieve high performance.

Taking into account, also, the asymmetric understanding of causality, and in line with previous studies that adopt fsQCA (e.g., Fiss, 2011; Aversa et al., 2016), we have calculated the configurations linked to low and very high performance (for the coding's procedure see

note 10). However, we have not found any configuration leading to either very high or low performance.

5. Discussion

The entrepreneurship literature has been given few attention to the young firm's organizational structure and it has limited the analysis to the effect of a single variable on firms' performance, neglecting the relations among internal elements with external variables.

In line with the neo-configurational approach, our analysis contributes to the knowledge of which combinations of structure, strategy and environmental elements are linked to high performance of young firms. Analysing a sample of 96 Italian young technology firms, we have found four equifinal organizational configurations.

Configuration 1a illustrates tall, formalized, and decentralized firms that pursue a niche strategy in low turbulent environment. Such configuration resembles, at least from the structural point of view, what occurs in knowledge-intensive business services (KIBS) firms. These firms create relationships with their customers through an intense knowledge-sharing and co-exploration activity to develop customized services (Miles, 2005; Miozzo & Grimshaw, 2005). The configuration 1a fits very well to KIBS firms because through the decentralization the organizational units are able to acquire autonomously knowledge from different sources and partners, whereas the formalization favors the dissemination of such new knowledge within the firm. Indeed, the growth of such firms strongly depends on their ability to gather knowledge from customers to develop customized solutions and to encapsulate such knowledge in standard or modular services for further exploitation in new or other supply relationships (Cohen & Levinthal, 1990; Zander & Kogut, 1995; Campagnolo & Cabigiosu, 2015; Cabigiosu et al., 2015).

Configuration 1b shows formalized young firms that combine a horizontal and vertical structure with both niche and differentiation strategies in low turbulent environment. This configuration is in line with the prediction of Stinchcombe (1965), who sustains that young firms require formalization and specialization as necessary conditions in order to sustain the business growth. In fact, functional specialization is related with the development of departments with specific knowledge on tasks, that leverage information-processing capabilities (Thompson, 1967). In addition, a vertically differentiated structure facilitates integration and control of specialized functional units, while preventing potential negative

effects associated with the risk of sub-unit orientation and the associated higher costs of coordination (Chandler, 1990; Teece, 1992).   The combination of horizontal and vertical differentiation supports the growth of a firm, particularly in stable environments.

Configuration 2 shows high centralized and flexible firms operating in low turbulent environment. This configuration represents an example of "one person company", in which founders/CEOs centralize the decision-making power in their hands leaving their personal imprint on the firm (Burton & Beckman, 2007; Colombo et al., 2016). This structure may characterize small firms operating as small suppliers or sub-suppliers of larger firms: in such cases, a high flexibility is required, in order to be adaptive to the customer requests. Furthermore, the centralization increases the velocity of the decision making process, therefore fostering responsiveness to the clients' needs and favouring firm's growth.

Configuration 3 illustrates horizontally differentiated firms that adopt both differentiation and niche strategies in high turbulent environment. This configuration recalls the main characteristics of team-based organizations, where members share common tasks and goals (Reuf et al., 2003). The lack of centralized decision-making power implies that team members get to know each other as in the case of firms founded by a small group of friends or relatives. More specifically, this type of structure supports the growth of the firm because coordination among specialized units is likely to be facilitated by mutual trust and common knowledge background among team members. A flexible and team-based organizational structure is particularly suitable in high turbulent environment because teams can be quickly arranged or reconfigured in line with environmental or market changes.

Configuration 4 shares with configuration 3 the same strategy and environment conditions, however firms belonging to this configuration adopt a horizontal, centralized and formalized structure. The different organizational structure elements may be linked to the composition of functional teams. In this case, teams may be formed by people with diverse competencies and a diverse background. This implies a need for a formalized and centralized structure to handle the decision-making power (Dessein, 2002; Aghion & Holden, 2011), clarify tasks and roles within teams and facilitate integration (Shenkar & Zeira, 1992).

In order to have an overall picture of our fsQCA analysis, we have to analyse how combinations of elements are linked (core vs. peripheral conditions) to high performance. Our findings show that in low and high turbulent environments the elements of strategy appear only as peripheral conditions, whereas the elements of organizational structure are present also as core conditions. As a consequence, we argue that organizational structure is a more relevant

condition than strategy, and that entrepreneurs should set up the organizational structure in the early phases of firms life rather considering this issue of secondary importance. In addition, we have found that in low turbulent environment young firms can choose among a greater variety of organizational combinations than in high turbulent environment, which somehow contradict mainstream literature on the subject (Burns & Stalker, 1961; Greiner, 1972; Churchill & Lewis, 1983).

6. Conclusion

This study analyses configurations of structure, strategy and environmental elements associated to high performance of 96 Italian young technology firms. We contribute to the entrepreneurship literature showing that organizational structure is a more relevant condition than strategy. We argue that entrepreneurs should set up the organizational structure in the early phases of firms life rather than later. In addition, we show that in low turbulent environment young firms can choose among much diversified organizational combinations than in high turbulent environment.

Our findings suffer of some limitations that can provide insights for future researches. For example, we lack of information about changes over time, in fact it is interesting to investigate how organizational configurations change across time (Aversa et al., 2015; Colombo et al., 2016).

Moreover, we have provided only examples of firms that may fit with the four organizational configurations. Future researches may combine the QCA with the case study analysis (e.g., Aversa et al., 2015), in order to fill the lack of interpretivist researches in entrepreneurship literature (Stahl, 2007; Leitch et al. 2010).

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Table 1- Organizational configurations Italian young firms

Results	1a	1b	2	3	4
Structure					
Vertical Differentiation	●	●	⊗	⊗	⊗
Horizontal Differentiation	⊗	●	⊗	●	●
Centralization	⊗		●	⊗	●
Formalized	●	●	⊗	⊗	●
Strategy					
Niche Market	●	●	●	●	●
Differentiation		●	⊗	●	●
Environment					
High Turbolence	⊗	⊗	⊗	●	●
Consistency	0.89	0.87	0.84	0.82	0.8
Raw Coverage	0.12	0.2	0.13	0.14	0.15
Unique Coverage	0.03	0.08	0.05	0.05	0.03
Overall Solution Consistency	0.86				
Overall Solution Coverage	0.40				

Black circles ("●"): presence of a condition - Circles with a cross-out ("x"): absence

Large circles: core conditions - Small circles: peripheral conditions

Blank spaces: don't care

Appendix

Note 1

In order to measure organizations' performance, we used the variable CAGR sales. We used the Italian database AIDA to find information regarding the performance of firms that are part of the same sectors that our sample covers, in order to define the anchoring points for the calibration of the outcome variable. In particular, we calculated the CAGR sales of all firms present in the database AIDA founded before 2010 for each of the 8 ATECO sectors (equivalent of the SIC code in Italy), and we calibrated the outcome variable depending on the performance of the sector. Hence, for each sector, the 75th percentile of the sales CAGR of firms between 2008 and 2014 has been taken as a measure of full membership into the set of high performance firms (for firms born after 2008, we took the year after their founding as starting point for the calculation of CAGR), the mean has been taken as a measure of full non-membership into the set of high performance firms, and the halfway between the mean and the 75th percentile has been taken as the crossover point. In this way, all firms of the sample that perform below the average of their sector are excluded from the set of high performance firms (Fiss, 2011). Table 2 summarizes the process of calibration of the outcome variable.

Table 2. ATECO Sectors

ATECO Sector	n	fully in (75th percentile)	fully out (mean)	crossover point (halfway)
20	2775	6,72%	-1,69%	2,51%
26	3652	6,40%	-3,58%	1,41%
27	4124	4,52%	-4,97%	-0,22%
28	11615	5,19%	-3,34%	0,93%
29	1266	4,01%	-6,93%	-1,46%
30	1360	4,64%	-7,93%	-1,64%
32	3528	5,56%	-4,72%	0,42%
33	3766	7,79%	-1,31%	3,24%

Note 2

Hanks et al. (1994) reported the number of 3.18 as the medium level of organizational levels between three clusters of firms ranging from 4.29 to 7.36 years. They counted the number of hierarchical levels including direct workers and the CEO, following Pugh & Hickson's (1976) measure. In particular, when levels equal to 3.18 (Cluster B) the structure is described as starting to add organizational levels to its hierarchy while the highest level = 4.00 of vertical differentiation that a new venture can reach is prescribed in Cluster C. Since in our questionnaire respondents were asked to number the current intermediate positions besides the CEO, the chosen crossover point of the variable renamed is 2 and the point of full membership has been set at 4 to indicate an organization that has significantly grow in number of levels as Hanks et al. (1994) observed in a sample of 86 new ventures. The point of full non-membership corresponds to VERT.DIFF=0, meaning that there is no other intermediate position between the CEO and the employee at the lowest level.

Note 3

To measure the horizontal differentiation of firms we used a scale derived from Pugh et al., (1968), which is commonly recognized in the organizational literature. The respondent had to report the number of functional areas formalized in the company among 8 different functions provided. The maximum number of functions has been set as the point of maximum membership in the set (HOR_DIFF=8), companies that mentioned only one function have been considered out of the set (HOR_DIFF=1) and the average number of functions possibly present in the firm has been set as the crossover point (HOR_DIFF=4).

Note 4

In the case of items of the questionnaire based on 1-7 point Likert scale, we took as crossover point the middle of the scale =4, firms that expressed the maximum point of agreement =7 were considered fully in, and those that expressed the maximum point of disagreement were considered as fully out =1. To avoid the issue related to the fuzzy membership score of exactly 0.5, we added a constant of 0.001 to causal conditions' scores below 1 in order to overcome this limitation and consider answers of 4 as more in than out (Fiss, 2011).

Note 5

The variable related to centralization vertical was measured through two items (named PD9_8 and ~PD9_9) based on a 1-7 point Likert scale. The second items measures the level of decentralization and therefore has to be reversed in order to measure centralization. This operation is done through the set negation (symbol ~) of variable. The same values can be derived by subtracting to 8 the value associated to each answer, which is a number between 1 and 7.

We combined the two items through the use of the Boolean operator AND which returns true if and only if the two inputs are true: CENTR = PD9_8* ~PD9_9 (where * is the logical operator AND). In this way, respondents who indicated a high level of centralization in first question and a low level of decentralization in the second question have been categorized as centralized through the assignation of a membership score higher than 0.5.

This logic operator is reflected in fuzzy logic by an operator which returns the minimum of the two inputs' values. The ratio behind the inclusion of two questions is to build a causal variable (CENTR) that isolates those firms consistently centralized. In fact, new ventures usually report a high level of centralization, but have also founding teams to which decisions on new products' development, for example, are delegated. Therefore, a more exclusive measure of centralization has been built (CENTR) by restricting the fuzzy membership to both centralized and not decentralized firms.

Note 6

In our questionnaire, we measured the level of formalization adopting 4 items: PD9_1 and PD9_2 for the formalization of roles, PD9_3 explored the use of formalized procedures, and PD9_10 studied the formalization of communication and information systems. These measures are similar to the one used by Miller & Friesen (1984) and by Hanks & Chandler (1994). They used a 7-point Likert scale and measured formalization of roles, the extent of defined formal procedures, the use of budgets, job description etc.

The items PD9_1, PD9_2, PD9_3, and PD9_10 exhibit a Cronbach's Alpha of 61%, similar to the Alpha found by Meuer et al. (2015) among five items investigating the level of decentralization.

For what concerns calibration, we defined our values coherently to Miller & Friesen (1984), who empirically tested the levels of formalization on 36 companies and considered as in a

stage of "early formalization" firms that reported an average score of 3.68/7. More recently Fiss (2011) measured formalization and used as crossover point the middle of a 5-points scale. We combine the four items with the following Boolean operations: FORM = (PD9_1+ ~PD9_2)*(PD9_3+PD9_10), where + is the logical operator OR and * is the logical operator AND.

Note 7

We created two variables (ENV_MORT and ENV_SIC) and assigned values corresponding to each firm of the sample, one for mortality rate and another for the indicator SIC, based on the ATECO sector of pertinence. Table 3 gives a general view of environmental attributes assigned to each ATECO sector inside the middle and High Tech. However, data associated to each firm of the sample are more detailed and depend on the age of the firms, in order to report the level of turbulence of the environment that the company has faced since its birth. Indeed, to each firm of the sample it has been assigned a mortality rate value associated to the third ATECO digit averaged from the year of birth of the firm until 2013 (the last year available); the same was done for the indicator SIC which was available only at the second ATECO digit. Afterwards, the two variables EN_MORT and EN_SIC have been calibrated separately by looking at the minimum and maximum levels reported in the sample (correspondent to points of full membership and full non-membership) and as crossover points we chose the mean values reported in the sample which are similar to the average values reported for the whole Middle and High-Tech sector in Table 3. Then, the aggregation of EN_MORT and EN_SIC is carried out through the logical operator AND: ENV = EN_MORT * EN_SIC (where * is the logical operator AND). In this way the variable ENV results to be more circumscribed and clearly identifies those firms that exhibit a very high level of turbulence compared to others.

Table 3. Environmental attributes

ATECO sector	Mortality rate	SIC
21 Pharma	3,8	148
26 Computer/Electronic equipment	6,2	101
30 Transport equipment	6	113
20Chemicals	4,1	121
25.4 Weapons	1,7	89
27 Electric equipment	5,6	115
28 Mechanical equipment	4,2	119
29 Motor vehicles	5,3	174
32.5 Mechanical instruments	5,5	102
33 Installation and fixing of mechanical equipment	7,6	56
Average	5	113,8

Note 8

The calculation of Consistency and Coverage are done as follows:

Consistency $(X \subseteq Y) = \Sigma min (x_i, y_i)/\Sigma x_i$;

Coverage $(X \subseteq Y) = \Sigma min (x_i, y_i)/\Sigma y_i$; where X_i is the degree of membership of individual i in configuration X and Y_i is its degree of membership in outcome Y.

Note 9

In easy counterfactuals a redundant causal condition is added to a set of causal conditions that lead to the outcome in question. In difficult counterfactuals refer a condition is removed from a set of causal conditions leading to an outcome, on the assumption that this condition is redundant (Fiss, 2011).

Note 10

For very high performance, we have coded the halfway between the mean and the 75th percentile =0, and 75th percentile =1.
To code low performance, the mean (see note 1) has been taken as a measure of full membership, and the halfway between the mean and the 25th percentile has been taken as the crossover point) (Fiss, 2011).

Chapter 3

Business model configurations of young technology firms.

Abstract

In the entrepreneurship field is missing an empirical configurational analysis that combine elements of business model and strategy. This study investigates configurations of business model associated to high performance of young technology firms. We found that young firms adopt efficiency and novelty centered business model associated to either niche or differentiation strategies, in low turbulent environment. Whereas, in high turbulent environment an efficiency centered business model is combined to niche and differentiation product strategies.

Keywords: business model, configurational approach, young firms, fsQCA.

1. Introduction

The business model concept explains the logic of the firm, the way it operates and how it creates and captures value for its stakeholders (Baden-Fuller et al., 2008; Casadesus-Masanell & Ricart, 2010). The value creation and its capture are respectively interests of entrepreneurship and strategy scholars. As a consequence, the business model construct has been recognized as link between strategy and entrepreneurship literature (Demil et al., 2015). The business model construct, also, has been examined through the lens of the configurational approach (e.g., Zott & Amit, 2007, 2008, Kulins et al., 2016). Configurations are defined as "the degree to which an organization's elements are orchestrated and connected by a single theme" (Miller, 1996, p. 509). An example of the configurational approach applied to business model is the study developed by Zott and Amit (2007), in which the authors analyse the effect of business model design themes (Amit and Zott, 2001) on the performance of entrepreneurial firms, taking into consideration the role of the environment. Moreover, in another research the same authors show that business model themes are linked with firms product strategies (Zott & Amit, 2008). However, an empirical configurational analysis that combine elements of business model and strategy in the entrepreneurship field is still missing. To date, in fact, business model themes have been examined in isolation, neglecting the effect of their combinations (Kulins et al., 2016). This lack is caused by the research methodology adopted in previous researches, that rely on linear correlation-based approaches which are not able to

catch the causal complexity underlying configurations (Ragin, 1987; Fiss, 2007). This limit can be overcome adopting the Qualitative Comparative Analysis (QCA), which exploits the Boolean algebra to identify combinations of conditions and the elements of casual complexity (Ragin, 1987; Fiss, 2007).

The aim of our analysis is adopt the QCA approach to analyze the business model configurations of 96 Italian young firms, and then to challenge the results of previous researches (e.g., Zott & Amit, 2007, 2008). Our findings contribute to the literature related to the business models in entrepreneurship field, showing that efficiency and novelty centered business model can be simultaneously adopted, and that both of these themes can be associated to either niche or differentiation strategies. We have, also, analysed differences of these combinations taking into account the turbulence of the environment, finding that young firms in high turbulent environment rely on efficiency centered business model combined to both niche and differentiation strategies, whereas in low turbulent environment efficiency and novelty centered business model are associated to either niche or differentiation strategies.

The next section of the paper addresses the literature of business model configurations, followed by a description of the methodology and of the results. We conclude with a section related to the discussion and suggestions for future researches.

2. Theoretical Framework

2.1 Business model

The business model concept has drawn the attention of academics and practitioners since the mid-1990s (Zott et al., 2011; Demil et al., 2015), thanks its capability to explain value creation (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002). Management scholars, also, sustain that business model is a potential source of competitive advantage (Christensen, 2001; Markides & Charitou, 2004), and it is linked to firm survival (George & Bock 2011).

In a recent literature review about business model concept Zott et al. (2011) suggest what a business model is not: 1) business models is not a linear mechanism to create value from suppliers to the firm to its customers, but it involves complex and interconnected activities among multiple players; 2) the business model is different from product market strategy and corporate strategy; 3) business model span firm boundaries and cannot be reduced only to internal issues of firms.

Despite a growing interest about the business model, the literature lacks of an agreement about its definition, except for the general concept provided by Amit & Zott (2001): "the

business model is proposed as a unifying mechanism describing the content, structure, and governance of transactions" (Amit & Zott, 2001.p. 511).

The most recognized business model construct that explains the value creation of firms has been developed by Amit & Zott (2001). Their model sustains that the firms' value creation is based on four business themes*: efficiency, complementarities, lock-in,* and *novelty*.

The creation of value through *efficiency* is related to transaction costs theory, which suggests that transaction efficiency increases when costs per transaction decrease (Williamson, 1975). Zott & Amit (2001) provided some examples of ways to lower transaction costs, such as reducing information asymmetries between buyers and sellers, optimizing inventory management, and simplifying transactions.

Complementarities are present when more goods (either outputs or inputs of firm's profit function) together provide more value than the sum of the value of having each of the goods separately (Milgrom & Roberts, 1990). The complementary goods may be vertical (e.g. offer services after-sales) or horizontal complementarities (e.g. create complementary products such as cameras and films).

Value creation through *lock-in* is created by involving customer or strategic partners in long-term relationship. This leads to an increment of willingness to pay of customers (Williamson, 1975)*,* and lower opportunity costs for firms (Katz & Shapiro, 1985).

The fourth way associated to value creation is *novelty*, which relates to a new way to do business, for instance, designing new transaction mechanisms or creating new market. Therefore, a business innovation that goes beyond the traditional sources of value creation, such as the introduction of new products or services (Amit & Zott, 2001).

The most relevant empirical researches based on the Amit & Zott (2001)'s model have been conducted by Zott & Amit (2007, 2008). These authors have demonstrated that there is a positive association between novelty-centered business model design and firm performance – under different environmental conditions - and that entrepreneurs' attempts to design both efficiency and novelty business models can be counterproductive (Zott & Amit, 2007). In addition, Zott & Amit (2008) have shown that the two business model themes innovation and efficiency are linked to product differentiation and cost leadership strategies.

In sum, adopting a configurational approach to analyze young firms' performance, Zott & Amit (2007, 2008) sustain that the innovation and efficiency centered business model themes are associated to firms' product strategies, taking into account the effect of the environment.

This research have analysed the combinations of business model themes and firms product strategies using a cross-sectional regression (Zott & Amit, 2007) and hierarchical OLS regression techniques (Zott & Amit, 2008). However, the use of these quantitative methods did not allow researchers to fully capture the combinatory patterns that explain the relationship among the elements (Ragin, 2008). This limit calls for a different methodological approach able to capture the effect of the combination of elements. In the next section, we are going to explain what is the configurational approach and how it can be applied to the analysis of firms business model.

2.2 Business model configurations

The configurational approach is a valid starting point in order to develop measures of business model (Zott & Amit, 2007). The configurations are defined as "the degree to which an organization's elements are orchestrated and connected by a single theme" (Miller, 1996, p. 509). The configurational approach sustains that organizations can be better understood via "identifying distinct, internally consistent sets of firms than by seeking to uncover relationships that hold across all organizations" (Ketchen et al., 1993: 1278), and it conceives of organizations as holistic entities (Meyer et al., 1993). Configurations consist of core and peripheral elements (Fiss, 2011). The former indicates a stronger causal relationship with the outcome (of interest) than the latter. This implies that within a given typology, peripheral elements may surround the core elements without any effect on the performance (Fiss, 2011). Therefore, the same result can be achieved through different paths, linking this characteristics to the concept of *equifinality* (Drazin & Van de Ven, 1985), which holds the idea that "a system can reach the same final state from different initial conditions and by a variety of different paths" (Katz & Kahn, 1978, p.30). The equifinality is one of three elements of casual complexity, such as *conjunctural causation*- which sustains that a single condition displays its effect only together with other conditions, and *asymmetrical complexity* that assumes presence of a condition for Y does not imply absence of that condition for ~Y.

These elements cannot be detected by the linear correlation-based approaches (Ragin, 1987; Fiss, 2007). To overcome these limitations, can be applied a different methodological approach named Qualitative Comparative Analysis (QCA). The QCA relies on Boolean algebra to identify combinations of conditions and the elements of casual complexity (Ragin, 1987; Fiss, 2007).

The aim of this analysis is adopt the QCA approach to analyze the business model configurations of young firms, and then to compare and to challenge the results of previous researches (e.g., Zott & Amit, 2007, 2008).

3. Research Design

We have randomly selected a sample of 2,500 Italian firms operating in manufacturing middle - high tech industries. Then, we have submitted the questionnaire from December 2015 to February 2016. The survey contains several data concerning firm's business model, strategies of firms, and organizational design elements. We have collected 280 completed questionnaires (11,2% response rate). The final sample consists of 96 firms, by selecting only firms from 4 to 7 years old.

We took data related to business model themes and strategy from the survey. Whereas, for environmental context we have collected data from the Annual Report 2016 by the Italian National Institute of Statistics (ISTAT), and for firms' performance form the Italian database AIDA.

In line with previous studies (Zott & Amit, 2007, 2008), we have considered as themes of business model the efficiency and novelty centered because they are the corresponding themes to product differentiation and cost leadership.

Regarding firms strategy we have extended previous analysis (e.g., Zott & Amit, 2008) considering the four Porter's Generic Competitive Strategies (1980). We have asked to respondents to assess the competitive strategy of their company either as cost leadership (the firm intends to be a low cost producer, hence cost efficient) or differentiation (the company offer a unique product or service that allows firms to charge a premium price). On the other hand, niche or mass-market strategies are related to attention of firms on a specific type of customer, product or geographic location (Porter, 1980).

In order to assess the turbulence of environment we have combined two indicators: mortality rate and synthetic index of competitiveness (SIC) (Aldrich, 1979; Mintzberg, 1979). The former gives an indication of the dynamism and stability of the environment, since it sums up the overall firms mortality risk (Shepherd et al., 2000). The latter, synthetizes through a geometric average: cost competitiveness, profitability, variation of export, share of turnover exported and share of innovative companies of each firm's' industry. This synthetic indicator provides information regarding the Complexity of the environment, because it includes a measure of "technical intricacy" (Mintzberg, 1979).

We have calculated as a measure of performance the firms' sales growth (Brush & VanderWerf, 1992; Chandler & Hanks, 1993; Davidsson & Wiklund, 2000; Wiklund & Shepherd, 2005),

To calculate the firms' sales growth, we used the compound annual growth rate CAGR:

$$CAGR = \left(\frac{Ending\ Value}{Beginning\ Value}\right)^{\left(\frac{1}{\#\ of\ years}\right)} - 1$$

Where: EV: ending value, BV: beginning value, n: number of years. We gathered data related to firms' performance from the AIDA database.

4. Methodology

The Qualitative comparative analysis (QCA) is based on set theory and uses Boolean comparative logic to reduce and identify combinations of conditions and configurations that, in conjunction, explain a given outcome (Ragin, 1987).

QCA aims to identify necessary and sufficient conditions that predict the occurrence and non-occurrence of an outcome. Necessary conditions are causes that must be present for an outcome to occur. Sufficient conditions are causes that always lead to the outcome. Sufficient conditions are identified using a truth table algorithm. A truth table is an instrument that exhibits all possible combinations of present and absent conditions.

QCA explains the three elements of casual complexity such as equifinality- alternative factors can produce the same outcome-, conjunctural causation- single conditions display their effect only together with other conditions-, and asymmetry- presence of a condition for Y does not imply absence of that condition for ~Y-. We have chosen the set-theoretic method, namely fuzzy set Qualitative Comparative Analysis (fsQCA) which reveals combinatory patterns that explain a certain outcome (Ragin, 2008). In fsQCA, each variable is operationalized as membership scores within pre-defined sets (Meuer, 2014). The calibration process allows researchers to assign a value of 0 which represents full non-membership, whilst a score of 1 indicates full membership (Ragin, 2008).

4.1. Calibration

In order to measure the business model themes efficiency and novelty we have adopted three items for each theme, based on 1- 7 points Likert scales. We have calibrated these items looking the mean and median of the answers, therefore adopting the way named "knowledge of the researcher" (Ragin, 2008). We have adopted the minimum and maximum of the scale as

full non -membership and full membership, and 5 and 6 as crossover point. Then we have combined the items related to efficiency and novelty with the logic operator AND (See note 1 of the Appendix).

To measure firms' product strategy, we have identified through our survey the general strategies developed by Porter (1980), such as differentiation vs cost leadership and focus on a niche market vs mass market. Our items identify whether the organization launches radically new products and patents on a regular basis, and whether the organization focuses on restricted segments of the market therefore pursuing a niche strategy. The items are based on 1- 7 points Likert scales, and we have chosen as crossover point the middle of the scale and the extremes 1 and 7 as points of full membership and full non-membership.

In order to define the turbulence of environment, we have collected data from the I.S.T.A.T. annual report 2016. We have used two indicators such as mortality rate and synthetic index of competitiveness (SIC) (Aldrich, 1979; Mintzberg, 1979). For each firm of our sample, we have assigned a value related to the two indicators. Then, we have calibrated and combined values to create an index that shows which firm (and industry) faces higher turbulence. We calibrated mortality rate with 2.8 for full non-membership and 13.2 as full membership value and 5.7 the crossover point. The synthetic index of competitiveness was calibrated with 121.3, 112, 56, as respectively value for full membership, crossover point, and full non-membership. Then we have aggregated the two indicators through the logical operator AND (See note 2).

We have chosen as outcome the firms' growth sales. Thanks to AIDA database, we calculated the CAGR sales of firms. For each sector, we have adopted the 75th percentile of the sales CAGR of firms between 2008 and 2014 as measure of full membership, the mean has been considered as measure of full non-membership, and the halfway between the mean and the 75th percentile has been taken as the crossover point (Fiss, 2011) (See note 3).

Insert Table 1 Here

5. Results

Table 1 shows two equifinal business model configurations associated to high performance of a sample of 96 Italian young firms, in middle and high tech industries. The notation of the table is the following: large circles to represent core conditions, and small circles for peripheral conditions. Crossed-out circles denote the absences of conditions, while empty cells indicate "don't care" (Ragin & Fiss, 2008; Fiss, 2011).

The "overall solution coverage" - which indicates the raw coverage aggregated across all the configurations – is 0.40, therefore our configurations account for 40% of the instances of the outcome (Ragin, 2008) (See note 4).

We have conducted the necessity analyses of all conditions and their negations, applying a consistency benchmark of ≥ 0.9 (Schneider & Wagemann, 2012), however we have not found any necessary condition (Ragin, 2006).

We have, then, conducted sufficiency analyses setting the consistency threshold at 0.80. We have chosen a combination of intermediate and parsimonious solutions (Fiss, 2011; Greckhamer, 2016).

The results of the analysis indicate the presence of core and peripheral conditions as well as neutral permutations. The two configurations show a first order equifinality, while the neutral permutation within solutions 1a and 1b shows the existence of second-order equifinality (Fiss, 2011).

The solutions 1a and 1b exhibit equal core elements, such as the simultaneous combination of efficiency and novelty centered business model in low turbulent environment. As peripheral element, configuration 1a adopts a niche market strategy, whereas the configuration 1b relies on a differentiation strategy. Therefore, these configurations exhibit efficiency and novelty centered business model with either niche or differentiation strategies.

Configuration 2 displays as core element the use of efficiency centered business model in high turbulent environment. This theme of business model is combined to both niche and differentiation strategies. This configuration highlights that young firms in high turbulent environment focus on efficiency and that they can combine both firms' product strategies.

We have, also, analysed the configurations linked to low and very high performance, however the analysis did not show any configuration associated to these levels of performance (See note 5).

6. Discussion and Conclusion

The business model concept has drawn the attention of academics and practitioners since the mid-1990s (Zott & Amit, 2011; Demil et al. 2015), thanks its capability to explain value creation (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002). Even though many researches have analysed business models in entrepreneurship filed, an empirical configurational analysis that combine elements of business model and strategy is still missing.

This study adopts the QCA approach to analyze the business model configurations of 96 Italian young firms operating in middle and high tech industries.

The configurations 1a and 1b show that young firms combine efficiency and novelty centered business model, that is considered a positive association in the Amit & Zott (2001)'s model, even though it was not confirmed by Zott & Amit (2007)' results. The two business model themes are considered as core element, and therefore strongly associated to firms' performance. In addition, we have found that both themes of business models can be associated to either niche or differentiation strategies, but not simultaneously present as in the previous results of Zott & Amit (2008).

These results illustrate that – regardless to the strategy adopted – young firms reach high performance by creating new activities or service and at same time increasing the efficiency.

An example is an airline company that focuses on a niche market (for example only domestic flights for workers) by offering a new service (e.g., laundry service or Wi-Fi connection on board), and to reduce some costs (newspapers, meals on board).

An example of a company that belongs to configuration 1b is an innovative producer of hardware such as personal computers, tablets, smartphones, video game console that all share the same type of software in order to reduce costs for its development.

Configuration 2 shows that environmental conditions affect business model configurations. Indeed, we have found that young firms in high turbulent environment rely only on efficiency centered business model. In this particular environment, also, we have shown that young firms combine this theme to both niche and differentiation strategies, differently from the results of Zott & Amit (2008) that have found a god fit only between efficiency theme and cost firms strategy.

A firm that can adopt this configuration is an automobile manufacturer that produces different types of car (such as micro car, sport car, and pick up track) by outsourcing some activities to third parties or doing strategic alliances to increase efficiency.

To recap, our configurational analysis contributes to the literature related to business model of young firms showing that efficiency and novelty centered business model can be simultaneously adopted, and that both of these themes can be associated to either niche or differentiation strategies.

The analysis suffers of some limitations that leave suggestions for future researches. For example, we have excluded from the analysis two business model themes such as lock-in and complementarity (e.g. Kulins et al., 2016), because they are considered not directly linked to

firms performance. However, further researches about these two themes are required (Kulins et al., 2016). Also, we have assumed the presence of one business model per firm neglecting the presence of multiple business models (Casadesus-Masanell & Tarziján, 2012; Benson-Rea et al., 2013; Clausen and Rasmussen, 2013; Aversa et al., 2016). Future researches can address these limits in order to reduce the lack of the framework related to business model in entrepreneurship field (George & Bock 2011).

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Table 1. Business model configurations

Table 1			
Results			
	1a	**1b**	**2**
Business Model			
Efficiency Centered	●	●	●
Novelty Centered	●	●	
Strategy			
Niche Market	●		●
Differentiation		●	●
Environment			
High Turbolence	⊗	⊗	●
Consistency	0.8	0.82	0.83
Raw Coverage	0.33	0.34	0.28
Unique Coverage	0.02	0.02	0.05
Overall Solution Consistency		0.83	
Overall Solution Coverage		0.40	
Black circles (●): presence of a condition			
Circles with a cross-out (x): absence of a condition			
Large circles: core conditions - Small circles: peripheral conditions			
Blank spaces: don't care			

Appendix

Note 1
In the case of items of the questionnaire based on 1-7 point Likert scale, we took as crossover point the middle of the scale =4, firms that expressed the maximum point of agreement=7 were considered fully in, and those that expressed the maximum point of disagreement were considered as fully out =1. To avoid the issue related to the fuzzy membership score of exactly 0.5, we added a constant of 0.001 to causal conditions' scores below 1 in order to overcome this limitation and consider answers of 4 as more in than out (Fiss, 2011).

Note 2
Taking into account the ATECO sector of pertinence, we have assigned values to each firm to assess and then combine the mortality rate and SIC indexes. We have calibrated separately the two indexes by looking at the minimum and maximum levels reported in the sample (correspondent to points of full membership and full non-membership) and as crossover points we chose the mean values reported in the sample. Then we have aggregated the two indicators through the fsQCA command AND.

Note 3
we calculated the CAGR sales of all firms present in the database AIDA founded before 2010 for each of the 8 ATECO sectors (equivalent of the SIC code in Italy), and we calibrated the outcome variable depending on the performance of the sector.
Then we used as a measure of full membership into the set of high performance firms, for each sector, the 75th percentile of the sales CAGR of firms between 2008, the mean has been taken to assess the full non-membership, and the halfway between the mean and the 75th percentile has been used as the crossover point. Therefore, firms of the sample that perform below the average of their sector are excluded from the set of high performance firms (Fiss, 2011).

Note 4
Consistency $(X \subseteq Y) = \Sigma min (x_i, y_i)/\Sigma x_i$;
Coverage $(X \subseteq Y) = \Sigma min (x_i, y_i)/\Sigma y_i$; where X_i is the degree of membership of individual i in configuration X and Y_i is its degree of membership in outcome Y.

Note 5
For very high performance, we adopted the halfway between the mean and the 75th percentile =0, and 75th percentile =1.
To code low performance we have used as measure of full membership, and the halfway between the mean and the 25th percentile has been taken as the crossover point) (Fiss, 2011).