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EFFECT OF COMPANY SIZE ON MANAGER'S PERCEPTION

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Abstract
The purpose of this study is to explore the effect of a company's size on its manager's perception towards changes in market needs and manufacturing flexibility. To serve the purpose, a questionnaire was designed by considering different types of manufacturing flexibility and changes occurring in market needs. The collected data were then analyzed to verify the proposed hypotheses. The results showed that a company's size significantly influence manager's perception towards manufacturing flexibility and market requirements. For instance, reliability is given higher priority by managers of micro and small enterprises in comparison with managers of medium and large enterprises. Similarly, routine flexibility is found to be significantly more important to managers of micro and small enterprises, while production facility flexibility is considered more important by managers of medium and large enterprises. Furthermore, the results showed that there is a positive relationship between changes in market requirements and manufacturing flexibility, showing that manufacturing flexibility is governed by changes in market requirements. This research was conducted with managers at various companies in the energy sector; so the results may not be applicable to other industries.

Keywords
manufacturing flexibility, micro and small enterprises, medium and large enterprises, company size, market needs, performance.

Introduction

With significant technological advancements, increased product and service innovation and rapidly changing consumer needs, companies are facing more challenges than ever before. To survive in this dynamic business environment firms are forced to continuously streamline operations and improve their performance. In the search of better performance, manufacturing industries have gone through different stages of development – from traditional blacksmith's shop to fully automated plants and along the way, various operations principles and systems were introduced: The Ford System, Toyota Production System, World Class Manufacturing, Lean Manufacturing and many more but companies are still facing a number of challenges. To survive in a dynamic business environment, a company needs to earn reasonable profits. To earn profits, customer needs to purchase the services or goods offered by the company; so the goods and services have to be produced based on the customer's needs and requirements. The main challenges for companies is to guarantee customer order fulfillment (considering changes in demand) while minimizing inventory levels and costs. It is easy to say that companies need to quickly adapt their products or services and manufacturing options or facilities to meet customer needs and managers should make these decisions based on facts and calculations. In the real world, however, managers are not able to make rational decisions because it is more difficult to accurately predict changes in customer behavior and data may not always be available or applicable. Often, managers make business decisions based on intuition, market pressure and various other factors. Therefore, there is a need to

understand how various factors influence manager's perception.

There have been a number of studies carried out in terms of manufacturing flexibility and firm's performance, for example, Swamindass and Newell [1], Pagell and Krause [2], Zhang, Vonderembse and Lim[3], Da Silveira [4] and Camisón and López [5]. Similarly, much of literature shows that firm size impacts organizational outcomes, mainly: performance Swamidass and Kotha [6] Stanwick and Stanwick [7], Orlitzky [8]; research and development Santarelli and Sterlacchini [9] and innovation Kleinknecht [10], Vaona and Pianta [11], and Shefer and Frenkel [12]. However, firm size has not been studied in relation to managerial perception, specifically in regard to manufacturing flexibility and changes in market needs. Hence, this paper refers to the managerial perception on manufacturing flexibility and its usefulness in firm's performance, especially the type of manufacturing flexibility to be adopted by small and medium size enterprises (SMEs) in relation to market uncertainty and firm's performance; the most important point is to change manager's perception and decision-making eventually.

The above-mentioned research discussion made us think: Do the managers of small and medium size companies react in the same manner as those of larger enterprises? How do they prioritize different types of manufacturing flexibility in response to changing market requirement? Do they share a common opinion and perception? Does company size have any influence on their perception? These are the common questions to be addressed in this research. The study is focused on small and medium size enterprises, particularly on companies working in the energy sector in the region of Vaasa, Finland. The research question can be summarized as follows:

Do company size influence manager's perception towards different attributes of market needs and manufacturing flexibility?

Literature review

Manufacturing flexibility and changes in market needs

In a competitive environment, a firm needs to predict its market requirements [13], evaluate its activities on a continuous basis and should have the ability to tackle rapidly changing market requirement – meaning a company needs to be flexible. Flexibility is the strategic tool to remain competitive in the business where technology, social trends and economy changes without a notice, so in the present business world survival of a firm depend upon its flexibility, because it helps to address customer needs and requirements faster [14]; however, it is not necessary that flexibility will provide competitive advantage [15].

In a turbulent market environment, manufacturing flexibility is becoming increasingly important at operational level. Flexibility helps a firm make necessary adjustment in order to respond to changes in the external environment i.e. market requirements in terms of cost, quality, time and technology [16]. Similarly, Shewchuk and Moodie [17] define flexibility as an attribute of decision making, an economic indicator and a strategic tool. Moreover, flexibility is related to environmental uncertainty [18], however, environment plays an important role in determining a suitable strategy [19]. Flexible and opportunity focused strategies can help to overcome the unpredictable changes in the business environment [20]. Furthermore, flexibility provides the effective utilization of tools, optimization of resources and elimination of process wastes and inefficiencies in the system [21]. Similarly, Bigelow [22] says that in order to achieve operational excellence, an organization needs to clearly define its requirements, establish an effective way of communication and maintain periodical assessment. According to Johnson [23] operational excellence needs a vision and says the close relationship with the customer will not only help to know the weakness of a company but also helps to maintain defectless operation. Thus, flexibility helps a firm to respond rapidly changing market environment and can be used as a weapon to overcome competitive threats while keeping time and quality constant [24]. Moreover, flexibility addresses operations strategy to gain quick (effective and efficient) adaptation to the changing environment in the market [21]. Thus, we can propose the following hypothesis:

H1: Manufacturing flexibility is needed to respond the changes in market requirements.

Types of manufacturing flexibility

Flexibility has been classified in several ways by different researchers based on specific models and assumptions. Goldhar and Jelinek [25], Brill and Mandelbaum [26] and Chryssolouris and Lee [27] used relative vs. absolute way of classifying flexibility. In the same way, Kumar and Kumar [28] proposed classification based on uncertainty, while Taymaz [29] proposed classification based on the level of decomposition. Gustavsson [30], Gerwin [31], Slack [32], Barad and Sipper [33], and Gupta and Buzacott [34] proposed classification of flexibility based on time-dependent nature of flexibility. In a similar manner, Oke [24] defined the business environment in two

forms: make to stock and make to order, and argues for only three types of flexibility: new product flexibility, mix flexibility and volume flexibility. Referring to different researcher Parker and Wirth [35] categorized different types of manufacturing flexibility as machine flexibility, process flexibility, product flexibility, routing flexibility, volume flexibility, expansion flexibility, operation flexibility, and production flexibility. However, for this research, the different types of manufacturing flexibility considered are as follows:

- **Machines and equipments flexibility:** It is the ability of a machine and equipment to adapt a wide range of production and parts style.
- **Production facility flexibility:** It deals with the multi-product manufacturing facility and helps a firm to make adjustments like scheduling of batch sizes and choice of production facility according to product type.
- **Product mix flexibility:** It can be defined as the ability to adapt future change in the product, as for example introducing a new product or derivatives of existing products while maintaining total production quantity. It is also known as process flexibility.
- **Product features flexibility:** It can be defined as manufacturing flexibility which provides the facility of including or adjusting features as demanded by the market.
- **Routing flexibility:** It can be defined as the ability to produce goods or service on an alternative workstation in case of equipment/machine breakdown or tool failure or other interruptions in the unit.
- **Volume flexibility:** It can be defined as the ability of a system to maintain the level of production of goods or services when there is a change in demand, while keeping it profitable.
- **System flexibility:** It can be defined as the overall ability of manufacturing system to adopt a wide range of manufacturing needs. In other words, the ability of manufacturing system for expansion if needed and includes all the above mentioned flexibilities.

Measures of changes in market requirements

Customer needs and requirements are changing constantly with time and technological innovation. In order to have better performance and remain competitive, the companies should be able to keep pace with those needs and requirements. There are several factors such as culture, income, lifestyle, custom and fashion that influence needs and requirements of a customer. In practice, the customer needs and requirements are not only diverse but also dynamic. Therefore, a firm is recommended to make a periodical assessment of goods and service offered. This periodical assessment can be performed in the light of product price, customized and unique products, on time delivery, product features, change in demand, latest technology & Innovations and reliability (Brand & After sales service). In this research, these factors are considered to understand the impact of company size on managers perception in regards to changes in market requirement and needs.

Manufacturing flexibility and firm's performance

Manufacturing flexibility refers to an organization's ability to produce a variety of products, rapid capacity adjustments and more customized products. It enables organizations to respond effectively to changing circumstances, particularly, when dealing with a turbulent business environment that may be characterized by rapid changes in product life cycles and innovative process technologies.

Anand and Ward [19] emphasized that flexibility is the key predictor of a firm's performance, especially in a turbulent market environment and recommends the adjustment of flexibility level according to the market volatility situation. A similar view is proposed by Gebauer and Lee [36] and says that flexibility provides operational efficiency. In addition, they argue that the flexibility requirement needs to be determined on the basis of business processes. For example,expansion flexibility can be linked with marketing strategies when dealing with market growth, at the same time, interaction between manufacturing flexibility, marketing and operations strategies enables a firm to maintain product mix, to provide customized product and also to introduce new products, ultimately affecting organizational performance. Camisón and López [5] argued that the flexible manufacturing system is an efficient solution for organizational performance and mediated by product, process and organizational innovation. Therefore, it is emphasized that in the context to turbulent environment, the capability of producing low cost and high quality product is not enough for better organizational performance [37]. Hence it is wise to think that companies having a higher level of manufacturing flexibility will have better performance. Thus, we can propose the following hypothesis:

H2: Manufacturing flexibility affects a firm's performance.

Research methodology

Under this research, convenience (selected sample) method of sampling has been used. A survey was conducted across various companies in the energy sector within the region of Vaasa, Finland. Two hundred and eighty one (281) different persons working at managerial levels were contacted to participate in the survey. Two different questionnaires based on pre-defined measures of changes in market requirement and manufacturing flexibility were sent to respondents through e-mail. In the first question, the respondents were asked to express their views on whether the manufacturing flexibility is needed to respond to changes in the market requirements and to what extent. Similarly, in the second question respondents were asked to express their views on whether manufacturing flexibility affects the performance of their company and to what extent. A reminder e-mail was sent over a week from the first dispatch of the questionnaires. For the ease of answering, Likert scale of rating from 1 to 5 was used, where lower values represents a lower level of importance and higher values represents a higher level of importance. The respondents were asked to answer each question on the basis of his/her professional experience. The collected data were analyzed in two phases with the help of SAS software. In the first phase, data were analyzed through descriptive statistics (mean, median, mode and standard deviation) and Pearson correlation test. Based on the obtained results, a relevant conclusion was drawn. Similarly, in the second phase, data were analyzed to see the distribution type so that proper statistical methods could be used to test the hypotheses.

Presentation, analysis and interpretation of results

Among those 281 persons, only 41 participated in the actual survey with a response rate of 14.59%. The companies that participated in the survey ranged from micro enterprises to large enterprises. The percentage of participating companies is shown in the following pie chart (Fig. 1).

The data were analyzed in two parts: first, it was analyzed as one single group to verify the proposed hypotheses; second, the entire data were divided into two groups, micro and small enterprises in one group and medium and large enterprises in the other to see the impact of company size on manager's perception. To interpret the properties of data; mean, median, mode and standard deviation were calculated with the help of SAS software. The test results are shown in the following table (Table 1).

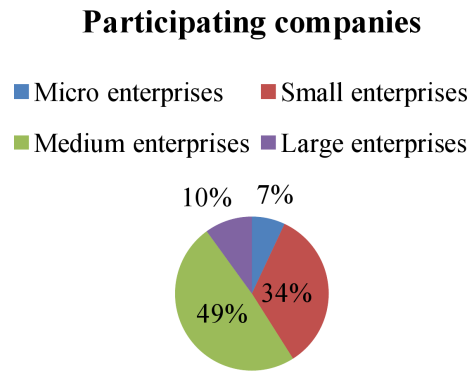

Fig. 1. Breakdown of participating companies in the survey.

Table 1
Mean, median, mode and standard deviation for H1.

H1: Manufacturing flexibility is needed to respond the changes in market requirements	Mean	Median	Mode	Standard deviation
Changes in product price	3.512	4	4	0.925
Provide customized and unique products	4.073	4	5	0.959
Meet on time delivery as required by customer	4.537	5	5	0.636
Changes in product features	3.683	4	4	0.82
Meet unexpected change in demand	3.732	4	4	0.807
Use latest technology & Innovation	3.366	3	3	1.019
Provide reliability (Brand & after sales service)	3.732	4	4	0.867

Then, distribution analysis was made to know the nature of data, which showed data obtained from the survey are not normally distributed. Hence, Non-parametric i.e. Wilcoxon signed rank (one sided) test was performed to test the main hypothesis (H1). Before Wilcoxon signed rank (one sided) test was performed, Cronbach coefficient alpha was calculated, and the obtained value was 0.68, which means there is sense to go for the Wilcoxon signed rank (one sided) test. So to carry out the test, average of different attributes of market requirements i.e. data obtained from the survey were calculated to know the value of descriptive statistics in single form, then Wilcoxon signed rank (one sided) test was performed with

this average value to verify the above results. The obtained values from statistical analysis are shown in the following table (Table 2).

Table 2
Mean, median, mode, standard deviation and p value for H1 in single form.

Mean	Median	Mode	Standard deviation	P-value from Wilcoxon signed rank (one sided) test at significance level, $\alpha = 0.05$
3.805	3.857	4	0.504	0.00005

Note: H_0: The population median = 3; H_1: The population median > 3

Interpretation: On average, the mean, median and mode for each attribute of market requirement individually and in single form is greater than 3 (Table 1 and 2); similarly the standard deviation shows that the majority of respondent lies above the mean value. Which means the majority of respondents believe that manufacturing flexibility is needed to respond to changes in market requirements. Furthermore, P-value from Wilcoxon signed rank (one sided) test is lower than 0.05; which means that there is no reason to accept the H_0 hypothesis. Hence, H1 hypothesis is approved.

Similar test was carried for H2 hypothesis and the obtained results are shown below (Table 3), followed by the corresponding attributes.

Table 3
Mean, median, mode and standard deviation for H2.

H2: Manufacturing flexibility affects a firm's performance	Mean	Median	Mode	Standard deviation
Machines and equipments flexibility	3.390	4	4	1.202
Production facility flexibility	3.756	4	4	1.067
Product mix flexibility	3.439	4	4	1.026
Product features flexibility	3.171	3	3	0.863
Routing flexibility	3.854	4	4	0.823
Volume flexibility	3.902	4	4	0.664
System flexibility	3.098	3	4	1.020

Once again,a similar test was performed for the second question. In the second case, the value of Cronbach coefficient alpha was found to be 0.61, which means that there is a sense to go for the Wilcoxon signed rank (one sided) test. The obtained values from statistical analysis are shown in the following table (Table 4).

Table 4
Mean, median, mode, standard deviation and p value for H2 in single form.

Mean	Median	Mode	Standard deviation	P-value from Wilcoxan signed rank (one sided) test at significance level, $\alpha = 0.05$
3.516	3.571	3.857	0.532	0.00005

Note: H_0: The population median = 3; H_1: The population median > 3

Interpretation: On average, the mean, median and mode for each attribute of manufacturing flexibility individually and in single form is greater than 3 (Table 3 and 4); similarly the standard deviation shows that the majority of respondent lies above the mean value. This means that majority of respondents believe that manufacturing flexibility affects a firm's performance. Furthermore, P-value from Wilcoxon signed rank (one sided) test is lower than 0.05; which means there is no reason to accept the H_0 hypothesis. Hence, H2 hypothesis is approved.

In a similar manner, correlation test between different measures of changes in market requirements and manufacturing flexibility was performed. The obtained results of correlation test are shown in the following table (Table 5).

Table 5
Correlation between measures of changes in market requirements and manufacturing flexibility.

	Measures of changes in market requirements	Manufacturing flexibility
Measures of changes in market requirements		
Pearson Correlation	1	0.271
Sig. (1-tailed)		0.043
N	41	41
Manufacturing flexibility		
Pearson Correlation	0.0271	1
Sig. (1-tailed)0.043		
N	41	41

*Correlation is significant at the 0.05 level (1- tailed)

Interpretation: The relationship between changes in market requirements and manufacturing flexibility is tested with H1. The Table 5 correlation analysis revealed that manufacturing flexibility is needed to respond the changes in market requirements.

Now, to see whether there is any impact on manager's perception towards different attributes of changes in market requirement and manufacturing

flexibility due to the size of the company, the entire data were divided in two groups, micro and small enterprises in one group and medium and large enterprises in the other. Then, the data were analyzed in a similar process as mentioned above. The calculated mean values are shown in the following figures (Fig. 2 and 3).

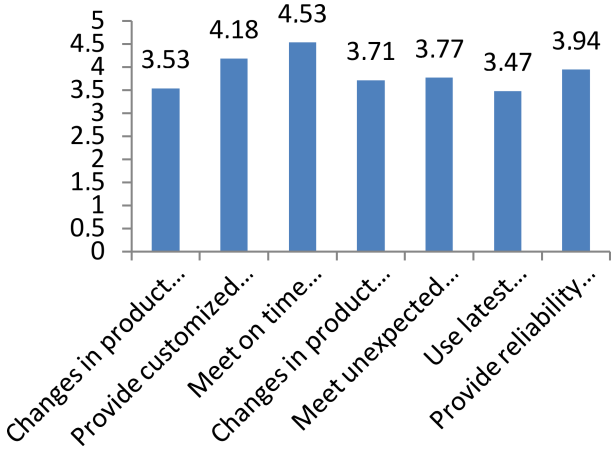

Fig. 2. Bar diagram of mean values to measures of changes in market requirements in case of micro and small enterprises.

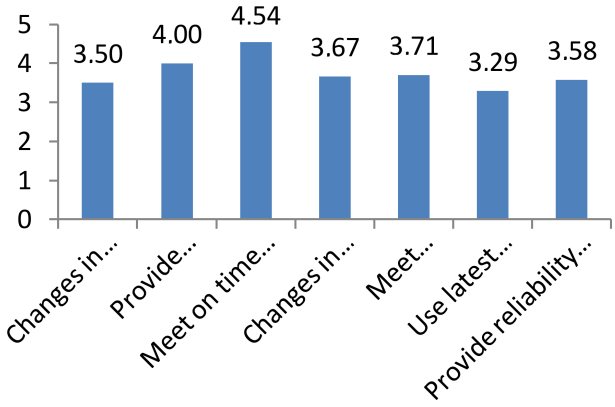

Fig. 3. Bar diagram of mean values to measures of changes in market requirements in case of medium and large enterprises.

Interpretation: On the basis of the above bar diagram (Fig. 2), it can be concluded that managers of micro and small enterprises give highest importance to Meet on time delivery as required by customer and lowest importance to Use latest technology & innovation. Furthermore, the seven different attributes of changes in market requirements can be prioritised in terms of high significance to low significance as Meet on time delivery as required by customer (4.529) > Provide customized and unique products (4.176) > Provide reliability (Brand & after sales service) (3.941) > Meet unexpected change in demand (3.765) > Changes in product features (3.706) > Changes in product price (3.529) > Use latest technology & Innovation (3.471).

Interpretation: On the basis of the above bar diagram (Fig. 3), it can be concluded that managers of medium and large enterprises give highest importance to Meet on time delivery as required by customer and lowest importance to Use latest technology & innovation. Furthermore, the seven different attributes of changes in market requirements can be prioritised in terms of high significance to low significance as Meet on time delivery as required by customer (4.542) > Provide customized and unique products (4.000) > Meet unexpected change in demand (3.708) > Changes in product features (3.667) > Provide reliability (Brand & after sales service) (3.583) > Changes in product price (3.500) > Use latest technology & Innovation (3.292).

From the above bar diagrams (Fig. 2 and 3), the following comparison table (Table 6) can be made, which shows the comparative analysis of the managers' response to different attributes of changes in market requirements.

Table 6
Comparison between the response from managers of micro and small enterprises and medium and large enterprises to measures of market requirements.

Attributes of market requirements	Micro and small enterprises	Medium and large enterprises
Changes in product price	Sixth Priority	Sixth Priority
Provide customized and unique products	Second Priority	Second Priority
Meet on time delivery as required by customer	First Priority	First Priority
Changes in product features	Fifth Priority	Fourth Priority
Meet unexpected change in demand	Fourth Priority	Third Priority
Use latest technology & Innovation	Seventh Priority	Seventh Priority
Provide reliability (Brand & after sales service)	Third Priority	Fifth Priority

Interpretation: From the Table 6, it is seen that there is a significant difference in the perception between managers from micro and small enterprises and those from medium and large enterprises. Hence, it can be concluded that company size has significant influence on manager's perception.

Similarly, the obtained values of mean for different attributes of manufacturing flexibility are shown in the following figures.

Interpretation: On the basis of the above bar diagram (Fig. 4), it can be concluded that managers of micro and small enterprises give highest importance to routing flexibility and lowest importance to product feature flexibility. Furthermore, the seven different attributes of manufacturing flexibility can be prioritised in terms of high significance to low significance as Routing flexibility (4.000) > Volume flexibility (3.941) > Machines and equipments flexibility (3.353) > System flexibility (3.353) > Production facility flexibility (3.294) > Product mix flexibility (3.294) > Product features flexibility (3.059).

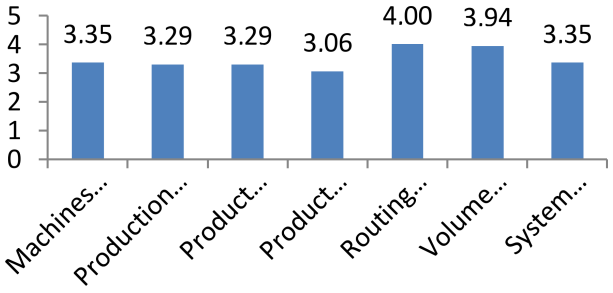

Fig. 4. Bar diagram of mean values to different attributes of manufacturing flexibility in case of micro and small enterprises.

Interpretation: On the basis of the above bar diagram (Fig. 5), it can be concluded that managers of medium and large enterprises give highest importance to production facility flexibility and lowest importance to system flexibility. Furthermore, the seven different attributes of manufacturing flexibility can be prioritised in terms of high significance to low significance as Production facility flexibility (4.083) > Volume flexibility (3.875) > Routing flexibility (3.750) > Product mix flexibility (3.542) > Machines and equipments flexibility (3.417) > Product features flexibility (3.250) > System flexibility (2.917).

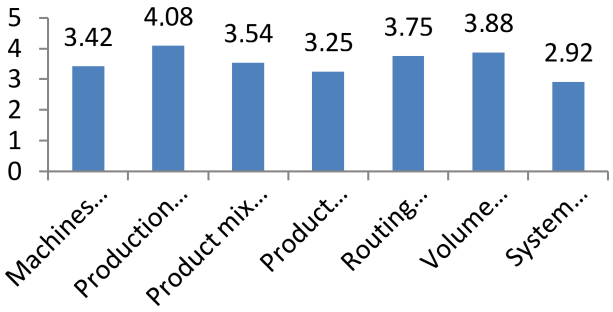

Fig. 5. Bar diagram of mean values to different attributes of manufacturing flexibility in case of medium and large enterprises.

From the above bar diagrams (Fig. 4 and 5), the following comparison table (Table 7) can be made, which shows the comparative analysis of the managers' responses to different attributes of manufacturing flexibility.

Table 7
Comparison between the different attributes of Manufacturing flexibility and managerial response.

Attributes of manufacturing flexibility	Micro and small enterprises	Medium and large enterprises
Machines and equipments flexibility	Third Priority	Fifth Priority
Production facility flexibility	Fifth Priority	First Priority
Product mix flexibility	Sixth Priority	Fourth Priority
Product features flexibility	Seventh Priority	Sixth Priority
Routing flexibility	First Priority	Third Priority
Volume flexibility	Second Priority	Second Priority
System flexibility	Fourth Priority	Seventh Priority

Interpretation: From Table 7, it is seen that there is a significant difference in perception of managers from micro and small enterprises and those from medium and large enterprises. Hence, it can be concluded that company size has significant influence on manager's perception.

Discussion and conclusion

In previous research, it is seen that manufacturing flexibility has been studied in terms of innovation, performance, technology, production capacity and fluctuation in demand (volume) but the manager's experience (i.e. how manufacturing flexibility and changes in market needs and requirements is being perceived by managers, regardless of their company size) has been ignored. To fill this research gap, manufacturing flexibility, changes in market requirements and performance have been studied from the perception of managers from companies with varying sizes (micro, small, medium and large). In general, small companies are more flexible and customer-focused compared to large companies. This may be due to the small market size, limited number of customers and low investment requirements. In the future, a researcher may consider these factors to measure the level of manufacturing flexibility in relation to the firm's performance and size (for example the ratio of a firm's size to the number of products or customer variation could be used, through secondary data or firm's data) and predict the sustainability of competitive operations in dynamic market situations.

Furthermore, this study is entirely based on managers working in the energy sector; so the obtained

results may not represent other industries and their managers. Therefore, future researchers can also use a longitudinal survey research followed by a long and deep case study or more diversified sample (considering different sectors and industries) for the generalization of used framework. In a similar manner, the comparison of services and manufacturing sector in regards to manufacturing flexibility and changes in market requirements could also reveal interesting differences or similarities among different sectors. Beside some limitations, this study offers some interesting findings to help us understand how managers' perceptions on market & manufacturing needs are influenced by the size of their companies.

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