



The Effect of Operational Flexibility on Performance: A Field Study on Small and Medium-sized Industrial Companies in Jordan

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ABSTRACT

In the context of an unstable business environment, companies should be looking for a mechanism to deal with uncertainty. Flexibility maybe one of those mechanisms which can help company to cope with instability in the best way possible. As one of the basic types of flexibility, operational flexibility has become an essential capability which an organization seeks to acquire because it enables companies to respond quickly and effectively to dynamic environments, and as a result, improve firm performance. The aim of this study is to investigate the relationship between operational flexibility and firm performance. The sample consists of 90 industrial companies in Jordan, and the questionnaire has been developed for and distributed to senior managers and managers in operations, product development, financial and marketing departments. Descriptive analysis was also correlated and regression techniques used to obtain the results. Our field study showed that operational flexibility positively affects both the operational and the financial performance of small and medium industrial companies in Jordan. More specifically, volume flexibility as a type of operational flexibility does not affect the performance of these companies in Jordan, but both mix flexibility and new product flexibility positively affect the operational and financial performance of these companies.

INTRODUCTION

Increasingly, business are faced with a complex and unstable environment, and companies find themselves faced with great challenges and continuous changes, so they have to find a mechanism which enables them to cope with changes in the market. Flexibility maybe one of the mechanisms which help a company to deal with uncertain situations and cope as well as possible with instability. Flexibility refers to a firm's ability to cope with uncertainties and deal with environmental changes, and as a result create opportunities to acquire a sustainable competitive advantage Slack (1987); Gerwin (1993); Upton (1995); Gupta and Somers (1996); Sawhney (2006); Tiwari et al. (2015), Chahal et al. (2018). Flexibility is also defined as "*the ready capability to adapt to new, different, or changing requirements*" Fawcett et al. (1996), which means being ready to do things quickly or respond fast. Wright and Snell (1998) have also defined flexibility as a firm's ability to reconfigure resources and activities quickly in response to environmental demands. Most definitions of flexibility refer to a firm's ability to respond quickly to changes in their dynamic environment. For example, from a marketing perspective flexibility is described by Stalk (1988) as "*being responsive to the market*". From an operations management perspective, Hua et al. (2018) clearly indicate that flexibility plays a critical role as an operational capability which enables companies to effectively respond to the challenges presented by dynamic and volatile environments, and as a result, leads to better performance and competitive advantages.

Based on the literature we can identify two main categories of flexibility: strategic and operational. Research into tactical flexibility is too limited, and few authors have written on the subject and so their contributions are included in operational flexibility dimensions Cannon and St. John (2004); Carlsson (1989); Lau (1996, 1999). Operational flexibility is still one of the most important and attractive topics for many researchers all over the world because of its importance to industrial companies, so we can find many approaches to operational flexibility, and each one takes into consideration different aspects of flexibility Yu et al. (2015). Moreover, many researchers have investigated the relationship between operational flexibility and performance; Saenz et al. (2018), for example, mentioned that operational flexibility strongly effects performance in terms of a greater dynamism of products within changing customer preferences. In a logistics context, Grawe, et al, (2011) noted that operational flexibility leads to higher levels of performance.

Operational flexibility is a critical mechanism which improves business performance Slack (1983); Swamidass and Newell (1987); Slack and Correa (1992); Vokurka and O'Leary-Kelly (2000); Yu, Cadeaux and Nanfeng (2015), Chahal et al. (2018). Swamidass and Newell (1987) have found that flexibility positively affects financial performance and growth, whereas Pagell and Krause (1999), and Fiegenbaum and Karnani (1991) did not find any relationship between flexibility and performance. Moreover, Pagell and Krause (2001), and Fiegenbaum and Karnani (1991) could not find any direct relationship between the level of flexibility and financial performance.

Considering what has been discussed above, this paper takes into consideration three types of operational flexibility (volume, mix and new product flexibility), and aims to verify the extent operational flexibility is applied, and its effects on operational and financial performance of small and medium-sized industrial companies in Jordan.

1. LITERATURE REVIEW

1.1 Operational flexibility

The concept of "operational flexibility" is more comprehensive than that of "manufacturing flexibility", and includes all the operations which take place at the company, not only the manufacturing ones. However, in the literature, the term "manufacturing flexibility" is often used to refer to *all* the operations involved in the manufacture of a product De Toni and Tonchia (2005). Moreover, operational flexibility has become an essential capability which an organization seeks to have be-

cause it enables companies to respond quickly and effectively to dynamic environments. In all dimensions, operational flexibility refers to a company's capability to respond to uncertainty in their business environment, either proactively or reactively; this capability has many dimensions which may differ in importance across various environments Stevenson and Spring (2007)

1.2.1 Volume flexibility

Companies have to face different situations, depending on order fluctuations, i.e. sometimes they have to produce more than or less than their normal production amounts, something which is mainly dependent on the uncertain demands of customers. In this case, volume flexibility is required, which means a company's ability to respond to and meet the changes in the volumes of customers' orders. Volume flexibility enables the company to produce more than or less than its capacity in response to demand fluctuations. According to Toni and Tonchia (1998) volume flexibility is required when the situation is characterized by a high level of uncertainty and a low level of variety. In simple terms, Chod et al. (2012) defined volume flexibility as the ability to change production volume. In this meaning there are two main poles of flexibility, firstly upside flexibility, which refers to the ability to increase production profitably above capacity, and secondly, downside flexibility, which refers to the ability to decrease production profitably below capacity Goyal and Netessine (2011). Suarez et al. (1996) defined volume flexibility as the ability to operate profitably at different production volumes.

Expressing it differently, Sethi and Sethi (1990) argued that volume flexibility means the ability to operate profitably at different overall output levels. Goyal and Netessine (2005) pointed out that volume flexibility enables companies to alter the amount of output without incurring high costs, and that it is considered very important for a company in the light of demand uncertainty. From a customer care perspective, volume flexibility allows companies to increase production in response to unexpected customer preferences and reduce waiting times when demand levels are volatile and enhance customer satisfaction with company performance Sáenz et al. (2018).

1.2.2 Mix Flexibility

Customer's preferences are continually changing, and there is no chance for companies to control these changes, so they find themselves forced to be customer orientated, which means continually searching for customers' needs and providing a wide range of products which meet customers' preferences, either by producing different kinds of products or providing the same product in different ways. In this case, mix flexibility will be a good solution for a company since it indicates a company's ability to change the mix of products rapidly to match market trends while maintaining cost-effectiveness Berry and Cooper (1999); Zhang et al. (2003), Salvador et al. (2007). Mix flexibility helps a company to produce items with the required features and according to customers' preferences, and also to offer a wide variety of products without delays Zhang et al, (2003), Sáenz et al. (2018).

In the same context, Beamon (1999) defined mix flexibility as the ability to change the variety of products produced. Mix flexibility is also known as product flexibility, and is the ability to change the production mix Chod et al. (2012). Slack (1991) clarified that mix flexibility can be measured either by the number of different products that can be produced within a given time period (product mix flexibility range), or by the time required to produce a new product mix (product mix flexibility response). So we can conclude that the cornerstone of mix flexibility is the diversification of products produced.

1.2.3 New Product Flexibility

In a competitive landscape, companies seek to achieve competitive advantage by better performance compared to other competitors who work in the same domain March and Sutton, (1997). Changes in market trends and new technology motivate companies to create new products to keep up with new trends and preferences. New product flexibility is the ability to produce new products, although perhaps not always completely new products, since it also includes a company's ability to improve existing products and introduce them in a new way Beamon (1999). New product flexibility refers to the amount of new products which are produced without incurring massive volatility in performance results Koste and Malhotra (1999). In the same context, Oke (2005) defined new product flexibility as the capability to introduce and produce new products or alter existing products. Suarez et al. (1996) mentioned that new product flexibility has the most important direct effect on a company's competitive position in the market.

Moreover, Cousenset et al. (2009); Scherreret et al. (2014) mentioned that new product flexibility is considered an essential support for manufacturing capabilities. Other authors refer to it as product development flexibility, which refers to the ability to introduce and launch new products and to modify existing products quickly and perform effectively Slack (1987), Cox (1989), Sethi and Sethi (1990), Hyun (1993), Zang et al, (2002). Consequently, new product flexibility means the ability to provide totally new products or modify current products and provide them in a new way.

1.3 Performance

Firm performance is an indicator expressing the extent to which the company runs its business, and is an essential measurement used to estimate the success or possibility of survival of the company (Chan et al. 2017). In the present study, we considered both operational and financial performance. From the perspective of Venkatraman and Ramanujam (1986), both financial performance and operational performance are the main determinants of the effectiveness of a company. While financial performance involves indicators such as sales growth, profitability and earnings per share, among others, operational performance relates to measures such as market share, the introduction of new products, product quality and value added in manufacturing, among others (Silva and Ferreira, 2017).

1.4 The industrial sector in Jordan

The world today is witnessing the phenomena of globalization and the accompanying liberalization of trade and the intensification of international competition, so companies should be ready to catch the available opportunities. In Jordan, the interaction between economic sectors works to keep abreast of developments and exploit opportunities, and to enhance Jordanian products and encourage exports (ASE, 2018). The Jordanian economy was able to achieve positive growth rates in 2016 and achieved 2% growth compared to 2015, with a growth of 2.4% (ASE, 2018).

The industrial sector is one of the most important sectors contributing to economic growth in Jordan. Its contribution to GDP increased from 18% in the late 1980s to 24% by 2016. The industrial sector employs about 11.2% of the Jordanian labor force. Jordan is a neutral and attractive environment for investment because of its security, stability, strategic geographical location, investment legislation based on international best practices, and government initiatives to create an enabling environment for investors (Ministry of Industry, Trade and Supply in Jordan, 2018). Moreover, the government has established industrial cities, free zones, and economic and development zones which provide a package of incentives, exemptions and facilities. The availability of infrastructure networks helps economic, and especially industrial, activities to advance the economy, as well as encouraging educated and trained human resources that help to promote economic growth (Jordan chamber of industry, 2018).

Figure 1. The market value of Jordanian companies by sector

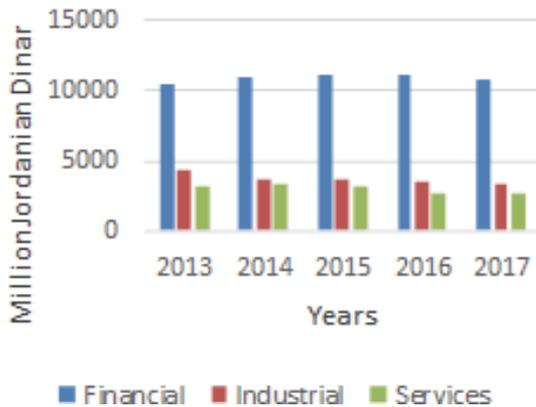
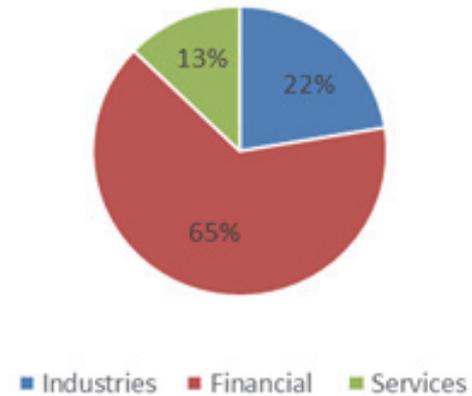


Figure 2 . Contributions of the sectors to GDP



Source: Created by the author

Figure 1 shows the market value of the listed company's divided in to three sectors: financial, industrial and services. It shows that the financial sector has the highest market value compared to services and industries, especially in 2015, with a value of 11132 million JD's, while the industrial sector was ranked second, with 4395 million JD's in 2013, and the services sector was third. Figure 2 show that the financial sector makes the highest percentage contribution to the Jordanian economy, at 65%, while the industrial and service sectors contribute 13% and 22%, respectively.

2. PROBLEM STATEMENT AND HYPOTHESES OF RESEARCH

According to Gerwin and Tarondeau (1982), Thompson (1967) and Zang and Doll (2001), environmental uncertainty relates to market changes, emerging technological developments, and the evolving competitive situation. So managers must be aware of these sources of uncertainty and find the best way to control the changes which occur in their business environment. Moreover, the instability of markets due to demand volatility has highlighted the uncertainty of customers' preferences for products and services. This has led to the emergence of many new products and changing demand, so companies are attempting to cope with changes in their business environment by applying operational flexibility as a mechanism to cope with uncertainties and improve performance.

Flexibility as a mechanism to cope with uncertainty in the business environment enables companies to cope with these uncertainties by providing new products to meet changes in customer preferences (new product flexibility), producing the amount of products which meets fluctuations in demand (volume flexibility) and also providing variety types of products to meet needs of most customers (mix flexibility). This study investigates the effects of operational flexibility on the performance of Small and Medium-sized Industrial Companies in Jordan, in order to enhance the competitive position of these companies in the market through the exercise of operational flexibility which helps to improve performance.

Main and sub-hypotheses:

H1: Operational flexibility positively affects the operational performance of small and medium-sized industrial companies in Jordan

H1 a: Volume flexibility positively affects the operational performance small and medium-sized industrial companies in Jordan.

H1 b: Mix flexibility positively affects the operational performance of small and medium-sized industrial companies in Jordan.

H1 c: New product flexibility positively affects the operational performance of small and medium-sized industrial companies in Jordan.

H2: Operational flexibility positively affects the financial performance of small and medium-sized industrial companies in Jordan

H2 a: Volume flexibility positively affects the financial performance of small and medium-sized industrial companies in Jordan.

H2 b: Mix flexibility positively affects the financial performance of small and medium-sized industrial companies in Jordan.

H2c: New product flexibility positively affects the financial performance of small and medium-sized industrial companies in Jordan.

3. METHODOLOGY

This research aims to investigate the relationship between operational flexibility and performance at small and medium-sized industrial companies in Jordan, and then draw the attention of the managers at these companies to the importance of operational flexibility and how it affects performance.

The target population of the study consists of Jordanian industrial public shareholding companies which are listed in ASE for the year 2018. The sample chosen depends on the size of the companies; we chose small and medium companies which have less than 200 employees, so the target sample consisted of 90 small and medium industrial companies from different industrial fields. The questionnaire has been developed for and distributed to senior managers, operations managers, product development, financial and marketing managers. The number of respondents was 612, while 75 were excluded because of the lack of validity and completeness of the data. The final number of valid responses for statistical analysis was 537.

Operational flexibility is a wide area of research in operational management literature, and many researchers have studied it from different perspectives, involving a variety of dimensions, including Scherrer et al, (2014), Suarez et al. (1996), Sáenz et al. (2017), De Toni and Tonchia (2005), Grawe et al., (2011) and Yu et al, (2015). We can note that operational and manufacturing flexibility are used reciprocally to refer to the same concept and express the same variables, and that normally manufacturing is included in operations management, so if we consult the operation management literature we will clearly find that manufacturing research is included.

Seth and Seth (1991) defined eleven types of flexibility in manufacturing systems (Machine flexibility, Material handling, Operation, Process, Product, Routing, Volume, Expansion, Program, Production and Market flexibility) and other researchers started to use these different types in different ways and modify them to match their researches purposes. In this study, volume flexibility, mix flexibility and new product flexibility are considered to be elements of operational flexibility, whereas performance is divided into operational and financial performance.

Data collection

It is a field study, and a questionnaire tool with a Likert 5 point scale is used to collect data. Operational flexibility (volume, mix and new product flexibility) is measured using the Manders (2010) model, whereas performance (operational and financial performance) is measured using the models devised by Flynn, Huo and Zhao (2010) and Narasimhan and Kim (2002). The questionnaire was forwarded by email to the senior managers at the companies involved. The study is

a cross-sectional study conducted during 2018, of 90 small and medium-sized industrial companies from different sectors in Jordan. The final scale for the manufacturing flexibility items was a five-point, Likert-type scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. For operational performance the same five-point Likert-type scale was used, and for financial performance the five point scale was 1 = weak (low), 2= average, 3= good, 4 = very good, 5= excellent.

For the pre-test, copies of the revised measurement items were examined by 20 managers who were included in the sample and had experience of operations management. They had the opportunity to recommend changes and modifications if they felt that existing questions did not cover the domain of the questionnaire construct.

4. STATISTICAL ANALYSES

4.1 Reliability and validity

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. Typically, reliability coefficients of 0.70 or higher are considered adequate (Li et al, 2010). We note from Table1 that Cronbach's alpha values of all factors are higher than 0.70.

A loading of 0.7 or more is the suggested level for item loadings on established scales (Fornell and Larcker, 1981, Li et al. 2010). Li et al, (2010) state that the permissible loading can be slightly lower (>0.60) for new scales. Of the 25 items in Table 1, six are below 0.7, but three of these are over 0.6, and one is below 0.6 but over 0.5, so it was not taken into consideration. The results show the statistical significance of the relationships between the items and constructs and the reliability of individual items.

Table 1. Standard estimates and coefficient alpha

	<i>Loading</i>	<i>Alpha</i>
Volume Flexibility		.874
Operate efficiently at different levels of output	.732	
Operate profitably at different production volumes	.766	
Run various batch sizes economically	.676	
Change the quantities for our products produced quickly	.767	
Variation of aggregate output from one period to the next	.704	
Change the production volume of a manufacturing process easily	.735	
Mix Flexibility		.857
Produce a wide variety of products in our plants	.744	
Produce different product types without major changeover	.691	
Build different products in the same plants at the same time	.685	
Produce, simultaneously or periodically, multiple products in a steady-state operating mode	.649	
Variation of product combinations from one period to the next	.741	
Quick change over from one product to another	.731	
New Product Flexibility		.864
Introduce a new product into the market quickly	.768	
Take the lead in new product introduction	.736	
Substitute new products for those currently being produced quickly	.748	
Launch new products easily	.796	

Launch new products inexpensively	.676	
Operational Performance		.874
Respond to changes in market demand quickly	.714	
Have an outstanding on-time delivery record to customers	.807	
The lead time for fulfilling customers' orders is short	.813	
Provide a high level of customer service to customers	.806	
Financial Performance		.749
Growth in sales	.619	
Growth in profit	.758	
Growth in market share	.761	
Growth in return on investments	.701	
Growth in return on sales	x	

Source: Created by the author

4.2 Data analysis and results

The descriptive statistics in Table 2 show the basic information on each factor and the correlations among these factors. According to Ratner (2009), values between 0.3 and 0.7 (0.3 and -0.7) indicate a moderate positive (negative) linear relationship. As Table 2 shows, correlations are moderate between independent and dependent factors, except for that between volume flexibility and financial performance.

Table 2. Descriptive statistics and correlation matrix

		Mean	St.D.	1	2	3	4
1	Volume Flexibility	4.06	.58				
2	Mix Flexibility	4.10	.54	.31			
3	New Product Flexibility	4.12	.57	.043	.689**		
4	Operational performance	3.96	.579	.033	.651**	.695**	
5	Financial Performance	3.74	.62	.028	.534**	.556**	.576**

Source: Created by the author

(**p<0.01)

The regression analysis method is used to test our hypothesis. Table 3 shows the results of regression

Table 3. Regression analysis results

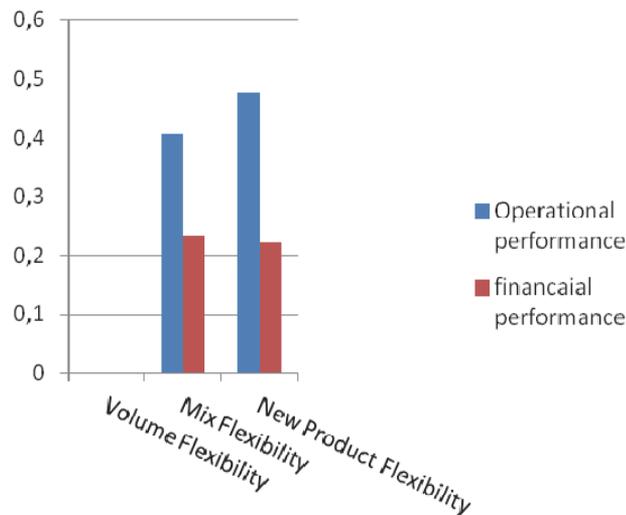
Dependent Variables	Independent Variables								
	Volume Flexibility			Mix Flexibility			New Product Flexibility		
	R	Adjusted R ²	Sig.	R	Adjusted R ²	Sig.	R	Adjusted R ²	Sig.
Operational Performance	.006	.000	.881	.638	.407	.000	.691	.477	.000
Financial Performance	.013	.000	.762	.484	.235	.000	.471	.222	.000
**p < .01 (N=537)									

Source: Created by the author

On the basis of Table 3: We reject both hypotheses (H1 a, H2 a), because the values of sig are .881, .762 > 0.05. So we can note that volume flexibility affects neither operational performance nor financial performance, and we can say that volume flexibility does not affect the operational and financial performance of industrial companies in Jordan. Mix flexibility positively affects operational performance (sig.>0.05), and financial performance (sig.>0.05). Moreover, mix flexibility explains 40.7% of the changes in operational performance and 23.5% of the changes in financial performance. So both hypothesis H1 b and hypothesis H2 bare supported, which allows us to say that mix flexibility positively affects the operational and financial performance of industrial companies in Jordan. New product flexibility positively affects operational performance (sig.>0.05), and financial performance (sig.>0.05). Moreover, new product flexibility explains 47.7% of the changes in operational performance and 22.2% of the changes in financial performance. So both hypothesis H1 c and hypothesis H2 care supported, and we can say that new product flexibility positively affects the operational and financial performance of industrial companies in Jordan.

Figure 3 shows the affect of (volume flexibility, mix flexibility, new product flexibility) on operational and financial performance of Small and Medium-sized Industrial Companies in Jordan, both of mix flexibility and new product flexibility affect the operational and financial performance of those companies. Whereas, volume flexibility does not affect the operational and financial performance of those companies.

Figure 3. Shows the affect of (volume flexibility, mix flexibility, new product flexibility) on operational and financial performance



Source: Created by the author

Table 4. Regression analysis results

Dependent Variables	Independent Variable		
	Operational Flexibility		
	R2	Adjusted R ²	Sig.
Operational Performance	.743	.539	.000
Financial Performance	.526	.277	.000
**p <.01 (N=537)			

Source: Created by the author

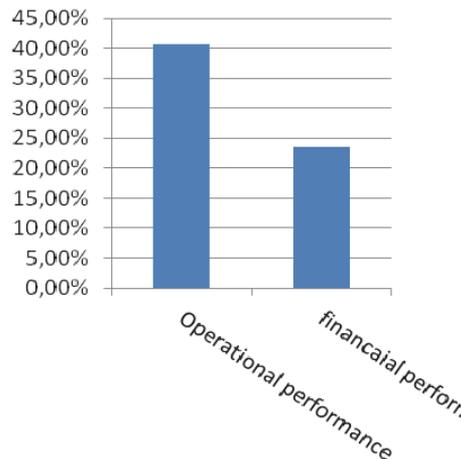
On the basis of Table 4:

We accept the first main hypothesis **H1, because (sig. >0.05)**. Operational flexibility explains 53.9% of changes in operational performance. So we can say that operational flexibility positively affects the operational performance of industrial companies in Jordan.

We accept the second main hypothesis **H2, because (sig. >0.05)**. Operational flexibility explains 27.7% of changes in financial performance. So we can say that operational flexibility positively affects the financial performance of industrial companies in Jordan.

Table 4 shows that the effect of operational flexibility on operational performance higher than its effect on the financial performance of Small and Medium-sized Industrial Companies in Jordan (figure 3), and it is a logical result, because implementation of flexibility accompanying with high costs (Das, 1995).

Figure 4. The effect of operational flexibility on performance



Source: Created by the author

Table 5. Coefficients

Unstandardized Coefficients				
	B	Sig.	B	Sig.
(Constant)	1.125	.000	.645	.000
Volume Flexibility	-.005	.894	-.020	.488
Mix Flexibility	.350	.000	.346	.000
New Product Flexibility	.291	.000	.481	.000
**p <.01 (N=537)				

Source: Created by the author

According to table 5 **Coefficients** the Unstandardized Coefficients values (Table 4) we can form regression formulas in the following way:

$$Y1 = .645 + .346X1 + .481X2$$

Y1: Operational Performance, X1: Mix Flexibility, X2: New Product Flexibility

$$Y2 = 1.125 + .350X1 + .291X2$$

Y2: Financial Performance, X1: Mix Flexibility, X2: New Product Flexibility

4.3 Discussion

This study has shown that operational flexibility positively affects the performance of small and medium industrial companies in Jordan in the light of the dynamism of the business environment in Jordan.

The result matches other results provided by other researchers in other countries and with other companies; for example, Sáenz et al, (2018) found a strong positive effect of operational flexibility on performance in the light of the higher dynamism of products within a context of customer preferences changing. Grawe, et al, (2011) also argued that operational flexibility leads to higher levels of performance in the context of logistics. In the same context many researchers agreed on the effects of operational flexibility on performance and they described it as a critical mechanism which improves business performance Slack (1983); Swamidass and Newell (1987); Slack and Correa (1992); Vokurka and O'Leary-Kelly (2000); Yu, Cadeaux, and Nanfeng (2015), Chahal et al, (2018).

According to Nadkarni and Narayanan (2007), flexibility affects business performance positively. For more specific results, our study showed that operational flexibility positively affects the financial performance of small and medium-sized industrial companies in Jordan, and this specific result matches the results provided by Swamidass and Newell (1987) who found that flexibility positively affects financial performance and growth. However, it does not match the results provided by Pagell and Krause (1999) or Fiegenbaum and Karnani (1991) who did not find any relationship between flexibility and performance. Also, our results showed that volume flexibility affects the financial performance of the companies taken into consideration, but this result does not match the results of Pagell and Krause (2004) or Fiegenbaum and Karnani (1991), who could not find any direct relationship between volume flexibility and financial performance. This study sheds light on new factors such as mix flexibility, new product flexibility and volume flexibility, which all affect the performance of small and medium industrial companies in Jordan.

Despite the fact that these factors are well established in academic and empirical studies, within the Jordanian industrial environment they are still considered novel, modern techniques when dealing with a dynamic business environment, and this encourages researchers to conduct a series of studies into strategic and operational flexibility as mechanisms which may help Jordanian companies to improve their performance and acquire a competitive advantage by using mechanisms like these.

CONCLUSION

In a complex and dynamic business environment companies cannot control environmental circumstances, but they can adapt to these changes by being flexible and attempting to control unexpected situations as much as possible. Flexibility depends on two basic elements; firstly, a fast response, and secondly, the amount of information available in an uncertain context. The results in general indicate the positive effects of operational flexibility on the performance of industrial companies in Jordan. More specifically, volume flexibility affects neither the operational nor the financial performance of industrial companies, which can be explained by the high cost of flexibility in general, so companies which seek to implement flexibility should take into consideration the high potential costs associated with implementing it. Mix flexibility has a positive effect on both operational and financial performance, and new product flexibility positively affects the operational and financial performance of small and medium industrial companies in Jordan. Finally, operational flexibility is an essential factor for successful firms; however, it is not the magic key, just one of the mechanisms which companies can use to improve their performance

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