

Artículo de investigación

## The Effect of Customer Agility on Performance of Software Companies in Iran

El efecto de la agilidad del cliente sobre el rendimiento de las empresas de software en Irán

O efeito da agilidade do cliente sobre o desempenho de empresas de software no Irã

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### Abstract

Agility consists of two distinctive capabilities of customer sensing and customer responding. As alignment of the two capabilities is greatly important, the present research tried to determine the effect the capabilities' alignment on business performance and to investigate the effect of responding as moderator variable. This is a descriptive study conducted through a correlation-survey method. Research statistical population included software companies. Research sample included 77 first- and second-ranked software companies in Iran. Research data were collected through questionnaires and were analyzed using regression and correlation tests. Relying on the data collected from software firms directors, research hypotheses were examined in term of alignment. Findings showed that both capabilities significantly influence business performance. If the two capabilities are alignment, business performance would be the best comparing in alignment capabilities.

**Keywords:** Customer-driven agility, Customer sensing capability, Customer responding capability, Alignment.

### Resumen

La agilidad involucra dos capacidades distintivas: detección y respuesta del cliente. Como la alineación de las dos capacidades es muy importante, la presente investigación intentó determinar el efecto de la alineación de las capacidades en el rendimiento del negocio e investigar el efecto de la respuesta como variable moderadora. Este es un estudio descriptivo realizado a través de un método de correlación-encuesta. La población estadística de investigación incluyó empresas de software. La muestra de investigación incluyó 77 compañías de software clasificadas primero y segundo en Irán. Los datos de investigación se recolectaron a través de cuestionarios y se analizaron mediante pruebas de regresión y correlación. Basándose en los datos recopilados de los directores de las empresas de software, las hipótesis de investigación se examinaron en términos de alineación. Los resultados mostraron que ambas capacidades influyen significativamente en el rendimiento del negocio. Si las dos capacidades son la alineación, el rendimiento del negocio sería la mejor comparación en capacidades de alineación.

**Palabras clave:** agilidad impulsada por el cliente, capacidad de detección del cliente, capacidad de respuesta del cliente, alineación.

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## Resumo

A agilidade consiste em duas capacidades distintas de detecção do cliente e resposta do cliente. Como o alinhamento das duas capacidades é muito importante, a presente investigação procurou determinar o efeito do alinhamento das capacidades no desempenho empresarial e investigar o efeito da resposta como variável moderadora. Trata-se de um estudo descritivo realizado por meio de um método de levantamento de correlação. A população de pesquisa estatística incluiu empresas de software. A amostra da pesquisa incluiu 77 empresas de software em primeiro e segundo lugar no Irã. Os dados da pesquisa foram coletados por meio de questionários e analisados por testes de regressão e correlação. Com base nos dados coletados dos diretores das empresas de software, as hipóteses de pesquisa foram examinadas em termos de alinhamento. Os resultados mostraram que ambas as capacidades influenciam significativamente o desempenho dos negócios. Se os dois recursos forem de alinhamento, o desempenho do negócio será a melhor comparação em recursos de alinhamento.

**Palavras-chave:** agilidade orientada para o cliente, capacidade de detecção de clientes, capacidade de resposta do cliente, alinhamento.

## Introduction

Agility is emerging as a critical dynamic feature in business environments. Many industries were operating in static environments are now involved in greatly aggressive contexts where giant industries are threatened by agile corporations throughout the world. Indeed, the issue of how organizations may succeed in a dynamic, unpredictable environment is known as today's global challenge. Various solutions, however, including timely production, reengineering, virtual organizations (online), and networking have been introduced, the most important of which is agility. In such environments, customer-oriented agility is a significant capability largely influences business performance. To create competitive advantage, businesses must have alertness and rapid responding to changes in customer preferences; in other words, customer oriented agility contains intuition and rapid responding to customer-driven opportunities for innovation and competitive performance necessary for organization achievement and survival. Despite the agreed significance of customer-driven agility, companies which compete in dynamic customer-driven industries, lack the adequate knowledge of customer agility conceptual framework. According to the literature, alertness and recognition of customer requirements and preferences as well as timely response are critical elements for business performance and survival. Regarding the software companies, they face with high competition and variety in product, the firms are subjected to the pressures to decrease production time and to meet customer needs of customization and diversity in products. Therefore, if the organizations intend to survive and operate in such dynamic environment, they would necessarily require seeking for increased agility in meeting customers' needs. This is true for software companies in Iran. Thus, these companies must have a high alignment level of alertness and responsiveness together i.e. the alignment is a critical factor. Hence, the objective of the present research is to measure business agility in responding to change in customers' needs.

## Literature review

There are several different definitions of organization agility and customer-driven agility. Sharifi and Zhang (1999) defined business agility as business ability to grow in a competitive market with constant unpredicted changes and timely, rapid response to the markets based on customer-driven values, as well as customer preferences-based goods and service production. Overby et al (2006) implied organization agility as firms' intuition of environmental changes and rapid response. According to Setia et al (2008), Agility is the organization ability in 1. Exploring new opportunities as competitive advantage, 2. Utilization of the extant knowledge, property, and relationships to attain the opportunities, and 3. Adaptation with sudden business changes.

Sambourti et al (2003) explained customer-driven agility as the ability to learn from customers, to identify new business opportunities and to utilize them along customers. Bloom et al (2013) assert that organization agility is a competitive advantage leading to increased efficiency. Further, according to Cheng and Young (2014), organization agility includes increased revenue and profit.

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Thus, a comprehensive useful definition is obtained, according to the aforementioned, as follows: agility results from an inclusive awareness to changes (opportunities and challenges) both inside and outside, which is efficient through timely and flexible response to the changes. Success needs both alertness and responsiveness; in addition, both must be aligned if the organization attempts to achieve higher competitive advantage. According to this definition, Holsapple presented a model as seen in Figure 1.

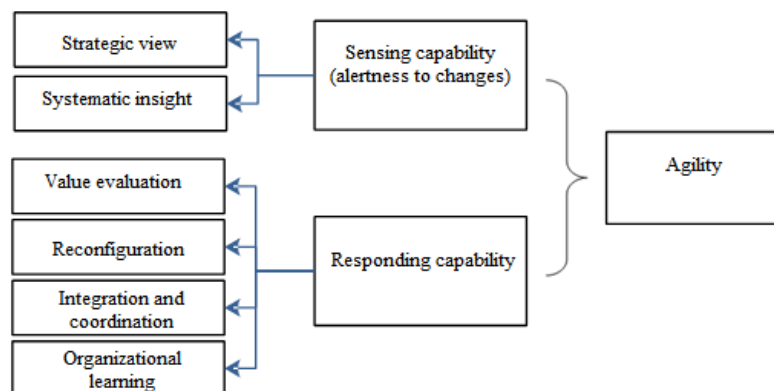


Fig. 1. Holsapple agility components (2007)

In a study, performed by Yousuf and Adele (2002), a significant relationship was found between competitive capabilities and performance measurement for agile companies comparing non-agile companies. Agile compatibilities including market speed, trust, and confidence are significantly related to performance measurement (including sales turnover, market ratio, turnover percentage, and customized loyalty), which causes better performance of agile companies than non-agile.

Some scholars (Ganguly, Nilchiani, and Farr, 2009; and Bottani, 2009) claim that agility is a fundamental feature for competition and survival. However, the ability to develop and measure agility may not be rapidly predicted since management and higher organizational agility technology are still developing (Sharp, 1999; Zhang and Sharifi, 2007). Several studies were conducted on the agility. In 1980, most studies concentrated on flexibility. In early 1990, new solutions for a dynamic and evolving environment were associated with agility. Kumar and Motwani (1995), for instance, identified five major factors of material and information flow instruction, technology status, specific functions, quality, and flexibility influencing organization responding capability. The factors and sub-factors were applied by a strategic framework to evaluate effectiveness of agility dimensions.

Yousuf et al (1999) characterized the notion of agility with 32 features including foundation of an agile organization. The 32 characteristics were classified in 10 areas of decision making, integration, competence, team making, technology and quality, change, participation, market, training, and welfare. Wallavaniss and Surollis (2002) divided agility dimensions measurement criteria into four classes of manufacturing infrastructure, market infrastructure, labor, and information infrastructure.

The research investigated various models of organization agility and customer-driven agility; of which Daw (2001), Sharifi and Zhang (1999), and Seng and Lin (2011) studied organizational agility. Halt et al (2005), Jayachandran, Kaufman and Hoot (2004), and Robert and Graver (2011) reviewed customer-driven agility, which are presented in the following.

Lin et al (2011) proposed a particular model of agile organizations such that it has been used in further studies. As seen in Figure 2, the model consists of three main elements of agility incentives, agility capability or potential, and agility empowerments to show how agile are the institutions. Lin et al considered agility in organization performance such as cost, activity, time, and organization empowerment, which finally lead to customers' satisfaction. The main purpose of an organization is to enrich and satisfy customers and employees. In general, an organization embraces a set of capabilities to properly respond to any change in business environment. However, many companies faced with volatile unpredictable demands because of business conditions; hence, rapid enhancing of the agility is a necessity.

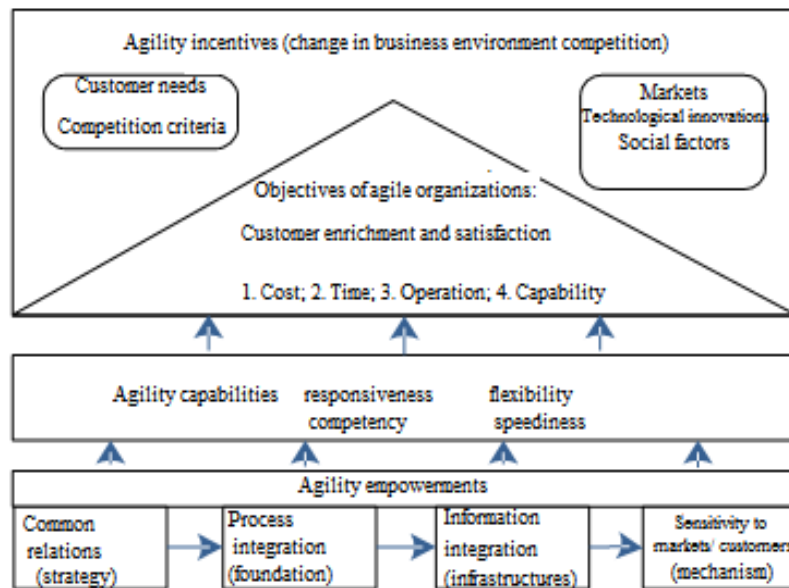


Fig. 2. Conceptual model of agile organization (Lin et al, 2011)

Jayachandran, Hewett, and Kaufman (2004) analyzed the effect of customer knowledge process and senior management risk appetite on responding capability and business performance. The research conceptual model is illustrated in Figure 3.

Regarding the ongoing change of customers' needs in markets and considering that an organization may require a special expert and knowledge of identifying needs and effective rapid responding to the requirements to achieve a sustain competitive advantage, an organization with customer responding capability is competent to draw customers' attention through effective and rapid responses, which is critical for sustained achievement. This study investigated how customer knowledge process may influence customer responding capability; in addition, two dimensions of customer responding capability and timely rapid responding were also highlighted.

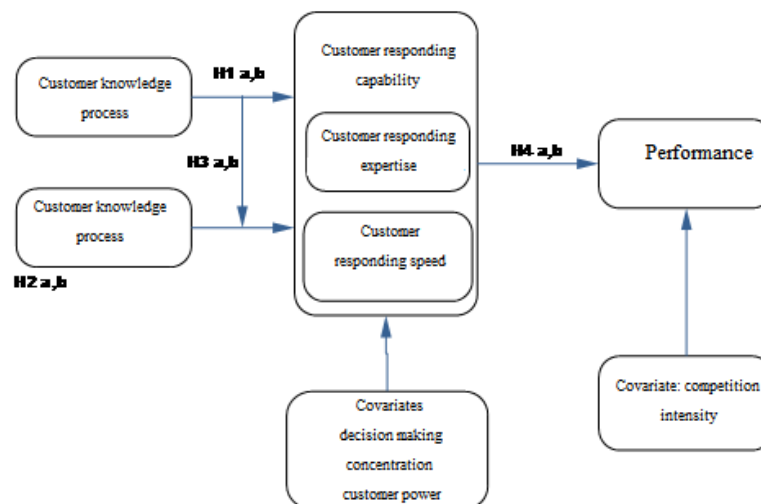
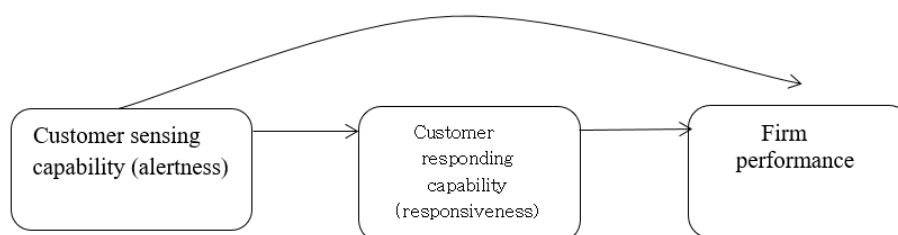


Fig. 3. Jayachandran, Hewett, and Kaufman conceptual model (2004)

According to research hypotheses results, there was a positive significant relationship between customer knowledge process and customer responding capability (expertise and speed). Moreover, management risk taking also showed a positive significant relationship with customer responding capability. Whereas, there was seen no positive significant relationship between customer knowledge process and risk taking. And finally, customer responding expertise is positively and significantly related to performance speed.

Robert and Grover (2011) discussed agility from customer perspective and finally revealed that the two research variables of customer sensing capability and customer responding capability may enhance business performance if they are alignment and aligned; business performance may decrease otherwise. Finally, of agility models, Robert and Grover model was taken as research model due to its marketing view measuring agility from customer perspective. The model mentioned to two customer sensing and customer responding agility compatibilities. The research tried to determine the alignment between customer sensing and responding capabilities and the effect on business performance through literature review. Research model obtained from Robert and Grover (2011) represents the present research variables according to the figure 4.



**Fig. 4. Research conceptual model**

According to the research conceptual model, research hypotheses are as follows:

Customer agility alignment is positively related to business performance such that:

**H1.** Customer sensing capability is positively affects the customer responding capability.

**H2.** Customer responding capability as moderator increases the effect of customer sensing capability on business performance.

### Research methodology

This is an applied study in term of purpose. Furthermore, responders were interviewed through a questionnaire; hence, it is a survey. Research statistical population included 400 software companies listed in software domain in Tehran. Responders were software companies' managers; research sample obtained 77 companies through Cochran formula.

$Z = 1.96, P = q = 0.5, N = 400, d = 0.1$

$$n = \frac{Nz^2pq}{Nd^2 + z^2pq}$$

### Reliability and validity

Once factors extracted from earlier published studies, 10 questionnaires were distributed among marketing professors, supervisor, and advisor, as well as software firm managers for content analysis, translation accuracy, and compliance with national software companies. The questionnaire reliability was verified by Cronbach's alpha coefficient using experimentally distributing 29 questionnaires through SPSS. It equaled 74% indicating that the questionnaire is adequately reliable. It was also analyzed using the items related with research conceptual model of various prior literatures.

### Research findings

#### Descriptive statistics

Education, work experience at software industry, and work experience at company data of the responders including software companies' senior managers and executives. 54% of the responders had bachelor degree, 38% hold master degree, and 8% were PhD. 12% of the responders had less than 5 years of working experience at software industry; 74% were between 5-10 years, and 14% enjoyed over 10 years of software industry working experience. Respecting work experience at company, 35% of the responders had less than 5 years of

working experience, 61% within 5-10 years, and 4% worked over ten years in understudied company. Then, some data such as number of employees, number of experts, as well as company age. Respecting expert labor, 21% of the companies had less than 5 experts; 53% between 5-10 individuals; and 26% of the companies enjoyed over 10 software experts. 26% of understudied companies had less than 10 labors; 65% were within 10-50 employees; and 9% had over 50 labors. And finally, 22% of understudied companies were less than 5 years old; 59% showed 5-10 years; and 9% of understudied companies were older than 10 years.

### Inferential statistics

Kolmogorov- Smirnov test was initially implemented and data normality was tested. The results uncovered data normality. The test was conducted at confidence level 95% and error 5%. According to the output and as significance level of all variables was larger than 5%,  $H_0$  is maintained and research questionnaire data distribution normality assumption is confirmed. Table I shows the Kolmogorov – Smirnov test.

		Sensing capability	Responding capability	Performance	Third section items
	Number	77	77	77	77
Normal parameters	Mean	16.7123	17.3151	12.4247	28.0822
	Standard deviation	3.62660	3.34945	2.80336	4.43081
Absolute difference	Absolute	.146	.143	.110	.095
	Positive	.100	.081	.078	.079
	Negative	-.146	-.143	-.110	-.095
Kolmogorov- Smirnov Z		1.244	1.219	.941	0.815
Significance level		.091	.102	.338	.521

### Research findings

**H1.** Customer sensing capability is positively affects the customer responding capability.

One-way Pearson correlation test was conducted at confidence level 95% and 5% error. The results are shown in Table 4-1 by a correlation matrix. Sensing capability showed an impartial positive correlation with responding capability at correlation coefficient of 55%; further, it is significant at 0.000. As the significance level is smaller than 5%; therefore, the correlation is significant and statistical H1. and research hypothesis are confirmed as shown in table 2.

		omer sensing capability	omer responding capability
sensing capability	Pearson correlation coefficient	1	.555
	Significance level (one-way)		.000
	Number	77	77
responding capability	Pearson correlation coefficient	.555	1
	Significance level (one-way)	.000	
	Number	77	77

**H2.** Customer responding capability as moderator increases the effect of customer sensing capability on business performance.

One-way Pearson correlation test was conducted at confidence level 95% (5%). The findings are shown in a correlation matrix in Table 3. Sensing capability shows a partial positive correlation with business performance at correlation coefficient of 33.7% and it is significant at 0.002. As the significance level is less than 5%; hence,

the correlation is significant and not random. Thus, statistical hypothesis of  $H_1$  and research hypothesis are maintained.

**Table 3. Correlation matrix of customer sensing capability with business performance**

		Customer sensing capability	Responding capability
Sensing capability	Pearson correlation coefficient	1	.337
	(One-way) significance level		.002
	Number	77	77
Responding capability	Pearson correlation coefficient	.337	1
	(One-way) significance level	.002	
	Number	77	77

**H3.** There is a positive significant relationship between customer responding capability and business performance.

One-way Pearson correlation test was carried out at the significance level 95% (5% error). The results are provided through a correlation matrix in Table 4. Responding capability shows a positive partial correlation with business performance at correlation coefficient 41.8%. It is significant at 0.003, which is smaller than 5%. Therefore, the correlation is significant and not random.  $H_1$  statistical hypothesis, and consequently, research hypothesis are maintained.

**Table 4. Correlation matrix of responding capability with business performance**

		Responding capability	Business performance
Responding capability	Pearson correlation coefficient	1	.418
	(One-way) significance level		.003
	Number	77	77 (significant)
Business performance	Pearson correlation coefficient	.418	1
	(One-way) significance level	.003	
	Number	77 (significant)	77

Table 5. Sensing capability and business performance correlation matrix with moderator

Control variables		Sensing capability	Business performance	Responding capability	
Without moderator	Sensing capability	Correlation	1.000	.337	.555
		(One-way) significance level	0	.002	.000
		Degree of freedom	0	75	75
	Performance	Correlation	.337	1.000	.418
		(One-way) significance level	.002	0	.003
		Degree of freedom	75	0	75
With responding moderator	Responding capability	Correlation	.555	.418	1.000
		(One-way) significance level	.000	.003	0
		Degree of freedom	75	75	0
	Sensing capability	Correlation	1.000	.204	
		(One-way) significance level	0	.043	
		Degree of freedom	0	75	
Performance		Correlation	.204	1.000	
		(One-way) significance level	.043	0	
		Degree of freedom	74	0	

**H4.** Customer sensing capability in alignment with customer responding capability has more significant effect on business performance.

Regarding the effect of responding capability variable as moderator, the correlation between sensing capability and business performance equals 20.4%, which is significant at 5%. Thus, the correlation is significant and not random. Therefore, H<sub>1</sub> statistical hypothesis as well as research hypothesis is confirmed as shown in table 5.

### Regression Analysis

**Hypothesis:** Sensing capability is expressed through business performance, which is positively correlated.

 Table 6. Coefficients of independent variables in the model <sup>a</sup>

Model	Non-standard coefficients		Standard coefficients		t-statistic	Significance level
	Non-standard coefficients	Standard error	Standard coefficients			
Constant (value)	8.067	1.476			5.464	.000
Sensing capability	.261	.086		.337	3.019	.004
Performance dependent variable						.a

Regression equation is as follows:

$$\hat{y} = 8.067 + .261x$$

Variable scales may vary in non-standard coefficients; whereas, in standard coefficients, variable scales are homogenized and compared. Therefore, the effect of independent variables on dependent variable is compared using standard coefficients. Any change in sensing variable may cause 33.7% change in the dependent performance variable, given all other variables are constant.

**Hypothesis:** Responding capability is explained through business performance, which is positively correlated.

Regression equation is as follows:

$$\hat{y} = 7.811 + .266x$$

Variable scales may vary in non-standard coefficients; whereas, in standard coefficients, variable scales are homogenized and compared. Therefore, the effect of independent variables on dependent variable is compared



using standard coefficients. Any change in the independent variable of responding may lead to 31.8% change in the dependent variable of performance according to table 7, given all other variables are constant.

Model	Non-standard coefficients		Standard coefficients		t-statistic	Significance level
	Non-standard coefficients	Standard error	Standard coefficients			
Constant	7.811	1.660			4.705	.000
Responding	.266	.094	.318		2.830	.006

a. dependent variable: performance

**Hypothesis:** Customer sensing capability and responding capability are explained through business performance, which are positively correlated.

Model	Non-standard coefficients		Standard coefficients		t-statistic	Significance level
	B	Standard error	Beta			
Constant	6.680	1.761			3.793	.000
Sensing capability	.179	.103	.232		1.740	.086
Responding capability	.159	.112	.189		1.421	.160

a. dependent variable: performance

Table 8 declares regression equation coefficients. In multiple regression, standard coefficients are used to compare the variables. In column B, regression coefficients and constant value are represented, respectively. Thus, regression equation is  $\hat{y} = 6.680 + .179x_1 + .159x_2$ . According to the values in column B, it may not be concluded that the variable with larger coefficient shows higher impact in the dependent variable as variable measurement scales vary. Therefore, Beta standard coefficients are used to compare the effect of variables. As observed in the table and regarding standard coefficients, customer sensing variable has the greatest effect due to 23.2% change in business performance per any change in the variable. Respecting significance level of the regression coefficients, it may be stated that as significance level for equation constant value equals 0.000, which is smaller than 5%; hence,  $H_1$  hypothesis of no zero value is maintained. Respecting to the significance of independent variable coefficients (Bs) in the present regression equation, it may be proclaimed that  $H_1$  is maintained for the factors with significance level of less than 5%; and  $H_0$  is maintained for the factors with significance level of 5%.

Finally, research sub-hypotheses were tested, which are as follows:

There is a significant relationship between firm size and sensing capability.

There is a significant relationship between firm size and responding capability.

There is a significant relationship between firm size and business performance.

There is a significant relationship between firm age and sensing capability.

There is a significant relationship between firm age and responding capability.

There is a significant relationship between firm age and business performance.

Of the aforementioned, only the significant relationship between business performance and firm size was confirmed such that firm size with a correlation coefficient of 20.4% shows a partial positive correlation with business performance. Other hypotheses showed no significant relationship.

## Conclusion and recommendations

Multiple regression analysis results reveal that the proposed model is proper for explaining business performance adjustments by independent variables. 32.2% and 18.9% of business performance adjustments are explained through sensing capability variable and responding variable respectively. Regarding that sensing capability variable shows higher effect than responding capability, it is necessary to be largely noticed by the software companies. On the other side, results demonstrate that variables of responding and sensing capabilities in alignment together explained a higher percentage of performance adjustments.

According to the research results, customer-driven agility is significantly related to business performance; further, the alignment between customer sensing capability and customer responding capability influences business performance. It is required that customer agility is aligned with business performance as alignment between customer sensing and responding capabilities may result in higher business performance than in aligned capabilities.

Therefore, business performance is great when both sensing and responding values are high comparing with low values. Respecting to the effects of independent variables, business performance is the highest. However, when customer responding capability is moderate and customer sensing capability is high, business performance would be large but not as large as the performance where both capabilities are high. It indicates that high sensing capability and moderate responding capability may enhance business performance; however, large responding capability followed by sensing capability show the largest effect on business performance. This finding is in accordance with the results of Robert and Grover (2012).

### **Research sub-findings**

Of research sub-hypotheses, only the relationship between business performance and firm size was significant; and other hypotheses showed no significant relationship. It may be assumed that there is no observed relationship between firm size and age with sensing and responding capabilities in software companies in Iran. Thus, probably, a smaller size and less experienced software company may be more agile to sensing and responding to customer requirements; or vice versa.

### **Research implications for software companies**

According to the questionnaire analysis, it is observed that companies with high and moderate sensing and responding capability also provide better or stable business performance. On contrary, poor capabilities influenced business performance causing lost market share. Software companies are suggested to try to increase consistency of customer sensing and responding capabilities as higher alignment may result in positive effect on business performance. In other word, firm management is recommended to also consider enhanced expertise and peripheral capabilities such as marketing, market analysis, and identifying customer needs in addition to intensified specialized capability in meeting customer requirements.

Software companies are advised to concentrate on increased customer sensing capability in order to properly enhance business performance in competitive market. As evident in findings, this capability critically influenced business performance; whereas, in the current case study sensing capability was evaluated smaller than moderate required to be improved through more training of sales and marketing staff and or recruiting experts. Business performance compared results uncover that software companies have almost low alertness to changes in customer needs in spite of efficient facilities, infrastructures and capabilities in responding customer needs. The inconsistency leads to weak performance. Therefore, firms are recommended to benefit marketing advisors to recognize customer behavior and demands, and to be prepared for timely responding to the changes before rivals.

According to the obtained results, customer responding capability as moderator variable may increase the effect of sensing capability on business performance. Hence, if the two capabilities are align, they would have larger impact on business performance. Results demonstrated that managers must align sensing and responding capabilities. So, it is suggested that firms in addition to gathering and processing information on market-product gaps, provide required resources to concentrate on the gaps. It calls for an organized process that timely and rapidly recognizes the information related to the necessary market adjustments and proper responses.

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