Research Journal of Business and Management
Year: 2017 Volume: 4 Issue: 2

TYPES OF INFORMATION TECHNOLOGY CAPABILITY AND THEIR IMPACTS ON COMPETITIVENESS

DOI: 10.17261/Pressacademia.2017.477
RJBM- V.4-ISS.2-2017()-p.201-210

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To cite this document
Bakan, I. and Z.H.Sekkeli, (2017). Types of information technology capability and their impacts on competitiveness. Research Journal of Business and Management (RJBM), V.4, Iss.2, p.201-210.
Permemant link to this document: http://doi.org/10.17261/Pressacademia.2017.477

ABSTRACT

Purpose- This paper aims to examine the impacts of IT Capability and its four sub-dimensions on the firm competitiveness at the logistics sector. IT capabilities have four sub-dimensions as IT infrastructure, IT business experience, IT relationship resources and IT human resources. IT infrastructure capability refers to the combinate hardware, software, network resources and services. IT business experience, is an ability to unify IT strategy and business strategy. IT relationship resource, is a capability to compound IT functions with business units and IT resources. IT human resources stand for an organizational resource and capability.

Methodology- The data was collected from the national industry of logistics service providers associated in the international forwarding associations UND by questionnaire method. 450 questionnaires were distributed, 428 of them was returned (a response rate of 95%).

Findings- All data was analysed by SPSS programme. First of all demographic characteristics of the respondents were presented by the frequency analysis. Then correlation analyse was used and it was found significant and positive relationships among IT Capability, its four sub-dimensions and competitiveness. At last regression analyses were used.

Conclusion- The results of analyses showed that a firm's IT capability and its sub dimensions have positive effects on competitiveness, as proposed for this study.

Keywords: IT capability, IT infrastructure, IT business experience, IT relationship resources, IT human resources, Competitiveness
JEL Codes: O30, L80, M10

1. INTRODUCTION

In this modern day and age, information technology plays a big role. With the introduction of computers, the business world was changed forever. Technology has become a major portion of everyday life. Using information technology, businesses have the ability to view changes and respond them far faster than they usually do in the global markets.

With improvements in information technology (IT) , globalization has increased. The world is brought closer; linguistic and geographic boundaries are torn down and Information can be shared easier, cheaper and faster. IT became very important factor in increasing the efficiency and competitiveness.Especially at logistics activities, IT capability speeds up the seamless flow of information. IT capability is defined as an ability that combinations of IT-based resources and with other resources implement in value-adding ways to achieve operation goals.

This study focused on IT capabilities as four sub-dimensions: IT infrastructure, IT business experience, IT relationship resources and IT human resources. IT infrastructure provides the foundation for companies to deliver business applications as servers, networks, laptops, customer knowledge, help desk etc. IT business experience is a company's skill to unify IT strategy with business strategy. IT relationship resources are defined as the company's ability to integrate IT functions into business units and utilize IT resources. IT human resources are the most important item of the IT asset base, and represent a strategic organizational resource and a crucial organizational capability.

Therefore, Information technology (IT) is one of the most popular technological innovations in the supply chain. Successfully implementing and utilizing the information technologies are critical to improve competitiveness. Due to all these reasons, IT capabilities and their role in creating competitiveness are investigated in this study.

2. LITERATURE REVIEW

At the study there are two main variables (IT capability, Competitiveness and four sub- dimentions (IT infrastructure, IT business experience, IT relationship resources, IT human resources).

2.1. IT Capability

Firms are allowed to keep up with consumer's supply and demand, to develop aggressively and to achieve competitiveness rapidly by information technology. By using IT, businesses could respond changes in the global markets more quickly than they do in general. Accordingly the strategic importance, how to build efficient IT capability, has been identified as a critical management issue to obtain to solve it as soon as possible (https://blog.udemy.com/importance-of-information-technology/). Information technology (IT) is widely thought as a leverage for a firm to survive and grow. The role of IT capability is to leverage the value of other resources and capability indeed (Bharadwaj, 2000; cited by Chen vd., 2014:326). If there is not any IT resources, the firms cannot survive. For this reason, a large number of firms that invested intensively in IT assets is to guarantee success (Aduloju, 2014:3).

The definition of IT capability is combinations of IT-based resources and with other resources implement in value-adding ways (Chen vd., 2015:645; Fink, 2011:17). Many researches have been conducted about IT capability from different viewpoints. At first concept, IT capability is defined by Ross etc. (1996), as the ability to control its IT expense and cost, and deliver in time to realize the firm's targets. Then Bharadwaj (2000) defines organizational IT capability as a firm's ability to mobilize and deploy IT based resources. Sambamurthy and Zmud (2000) define IT Capability as unification of IT-based assets and routines that support business conduct in value-adding methods. Zeng and Huang (2003) defined IT capability as a competence that a firm mobilizes its related IT resources to achieve operation goals. Santhanam and Hartono (2003) define IT capability as an aggregate concept/feature of the firm (Fink and Neumann, 2007:441; Guo et.al, 2008:89; Lim et al., 2012:23; Fink, 2011:17).

IT capability has four sub-dimensions as IT infrastructure, IT business experience, IT relationship resources and IT human resources. IT infrastructure includes communication technologies for firms to share information across varying functions, and react to changes in the market. IT business experience is a competence to integrate IT strategy and business strategy. IT relationship resources are abilities to associate IT functions into business units and IT resources. Also, IT human resources represent an organizational resource and capability (Chen and Tsou; 2012).

This study focused on IT capability and its four sub-dimensions called, IT infrastructure, IT business experience, IT relationship resources and IT human resources. In this study, the scales, about an integrated measurement system for IT capability and its sub-dimensions, are adapted by Chen and Tsou (2012).

2.2.Competitiveness

Because of economic, social and technological alterations, the ongoing globalization, disappeared borders are between countries, improved communication and transportation technologies, firms are competing much more difficult than they used to be. Thus to achieve a sustainable competitive position, firms need to manage their resources efficiently, try to have a larger share of growing markets and convert threats to opportunities (Bakan and Doğan, 2012:441).

According to technologic developments, information technology (IT) has become the most important resource and information technology (IT) capability has become the most important capability of firms to achieve the competitiveness. Competitiveness is defined as a "integration of assets and processes, where assets are inherited (e.g. natural resources) or created (e.g. infrastructure) and processes convert assets to achieve economic incomes from sales to customers". In simple terms, competitiveness is the capability to compete and a multidimensional concept to identify economic strength of a country or industry or firm (Ambastha and Momaya, 2003:47)

The competitiveness concept contains various disciplines, such as the price competitiveness perspective, the strategy and management perspective, and the historical and socio cultural perspectives or the firm stage, microeconomic stage for industries and the macroeconomic stage for national economies. This variety of approaches and stages of this concept show that competitiveness has actually wide applications. In fact, competitiveness is also included in the factors lead to being competitive, as well as it can be attained. (Man and Chan, 2002:124).

To be as main criteria for valuation the achievement of countries, industries and firms, competitiveness is very popular subject for businesses. Since Porter published his book "Competitive Advantage of Nations" in 1990 and create a base for developing national policies on competitiveness, there are many studies have been applied to many industries about

competitiveness. Some of them are Waheeduzzaman and Ryans (1996), Hove and Masocha (2014), Ortega et al. (2014), Sutherland (2014) , Yunna and Yisheng (2014), Zeng et al.,(2008), Mathooko and Ogutu (2015), Ozer and Saldamli (2015), Bakan and Doğan (2012), Muniret al. (2011), Oraman et al. (2011), Renko et al. (2011), Ross et al. (2011), Cernusca et al. (2012), Abereijo et al., (2009), Oduol and Franzel (2014), Flor and Oltra, (2005), Jones and Crack (2001), Lopez and Garcia (2005), Powell and Dent-Micallef (1997); etc. (Uluğbeyli, 2017:35-36; Peña-Vinces, Cepeda-Carrión, Chin, 2012:1046; Man and Chan, 2002:126).

3. RESEARCH METHODOLOGY

3.1.Aim of the Study

The aim of this study is to examine impacts IT Capability and its four sub-dimensions on competitiveness. For the study, the data were collected by means of a questionnaire. Then, all obtained questionnaire data were analysed with the Statistical Package for the Social Sciences (SPSS) for Windows. Frequency, correlation and regression analyses were used to assay the participant's opinions for each questionnaire items.

3.2.Sample and Data Collection

At the study, data was collected from managers in the national industry of logistics service providers firms, which are members of the international forwarding associations (UND) by the questionnaire method. 450 questionnaires were distributed to third part logistics (3PL) firms in the 9 cities of Turkey; 428 usable questionnaires were returned and analysed.

Since 1974, the international forwarding association (UND) has been working for the purpose of produce solution nationally and internationally problems at logistics sector. The associations have nearly 1200 members around the Turkey. To be a member of the association, firm must have relevant qualification documents from government. Distribution of member firms shown at Table 1. As regional distribution, the highest number of member firms (396) are in Marmara region and the lowest number of members (21) in Doğu Anadolu Region. Because of the low number of members, Iğdır has been neglected. As urban distribution, the highest number of member firms are in İstanbul (371), and with 21 member firms, Iğdır is the lowest city. According to this distribution, 428 questionnaires are distributed to 9 cities at 6 regions in Turkey proportionally, as can be seen from the Table 1.

Table1: Registered Firms and Distributed Questionnaires

Region	1.City	Numbers of firms	2.City	Numbers of firms	Total number of Firm	Number of distributed questionnaires
Marmara	İstanbul	371	Kocaeli	25	396	180
Akdeniz	Mersin	195	-	-	195	106
Karadeniz	Trabzon	37	Bolu	28	65	39
İç Anadolu	Ankara	47	Kayseri	39	86	41
Güneydoğu Anadolu	Gaziantep	70	-	-	70	51
Ege	İzmir	33	-	-	33	11
Doğu Anadolu	Iğdır	21	-	-	21	0
Total		1185				

3.3.Measures of the Study Variables

A questionnaire was designed based on the various related studies on academic literature. IT capability, IT infrastructure, IT business experience, IT relationship resources, and IT human resources were measured by using Chen and Tsou (2012) scales. The multiple item scale was used for each components. Competitiveness items were taken and adapted to this study from Ginnis et al. (2011). Likert-type scale is used on the questionnaire, that ranged from (1) "strongly disagree" to (5) "strongly agree".

The reliability analysis was conducted at the beginning. It is shown at the Table 2. Reliability coefficients are more than 0.64. As a result, the scales for all variables are reliable.

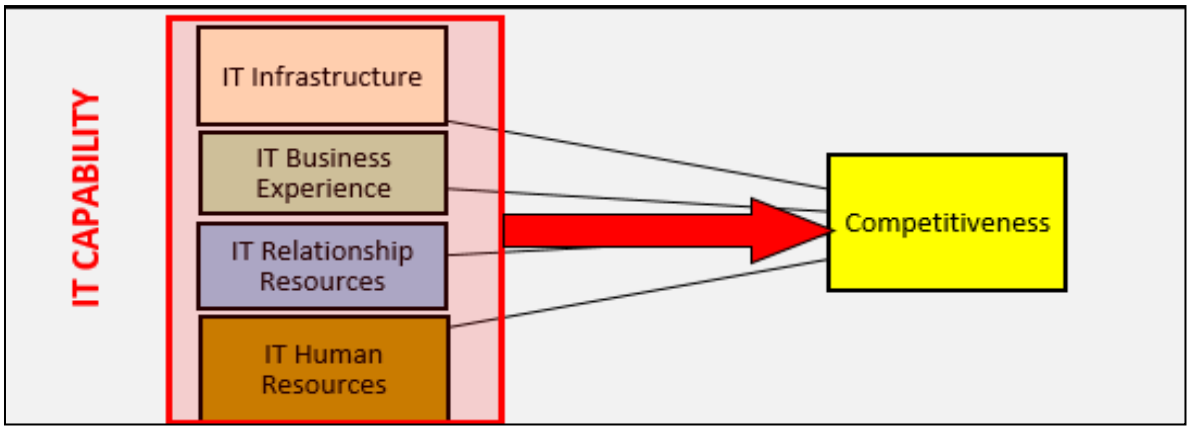
Table 2: Sample Alpha of the Study Variables

Variables	Number of Items	Sample Alpha
IT Capability	13	0,964
IT Infrastructure	2	0,875
IT Business Experience	4	0,891
IT Relationship Resources	4	0,924
IT Human Resources	3	0,850
Competitiveness	4	0,649

4. RESEARCH MODEL AND HYPOTHESES

After literature review, the research model suggested as shown at Figure 1, and hypotheses have been developed for analysis 1.

Figure 1: Research Model



In accordance with the model, the following research hypotheses were illustrated;

H1: IT Capability effects competitiveness positively.
H2: IT infrastructure effects competitiveness positively.
H3: IT business experience effects competitiveness positively.
H4: IT relationship resources effect competitiveness positively.
H5: IT human resources effect competitiveness positively.

5. THE RESULTS OF THE EMPIRICAL STUDY

5.1.Sample Characteristics

The characteristics of the respondents and the firms participated in this study are shown at Table 3. According to the descriptive statistics, 85,2 percent were male and 14,8 percent were female. It was found that 74,6 percent of the respondents were married, while 25,4 percent single. The age of 58,4% of the respondents are between 31 and 40 years. Regarding educational attainment, the majority (62,1%) of the participants have high school degree. The position of the respondents in the firms are mostly (77,6%) middle level manager. The work tenure of the respondent is as the following: under 1 year (2,6%); 1 and 3 years (18,6%), 4-6 years (32,5%), 7-9 years (27,1%) and more than 10 years (19.3%).

[1]There were different variables at the modal. For this congress to shorten the article, the modal was analyzed as two main parts, and presented in two papers: one of them is "IT capability and Logistics capability" and the other part is "IT capability and competitiveness". Both part includes the same demographical data.

78,8% of the firms, data collected, are employing between 1 and 500 employees. The participant firms are the mostly local capital (96,2%) and the mostly limited (97,8%). The participant firms are managed by family members (87,6%), out of family members (4,1%) and professional managers (8,4%).

Table 3: Characteristics of Respondents and Firms

		Frequency	*Valid percent*			*Frequency*	*Valid percent*
Gender	*Female*	62	14,8	**Marital status**	*Married*	306	74,6
	Male	357	85,2		*Single*	104	25,4
Age	*20-30*	106	24,9	**Education attainment**	*Elementary*	16	3,9
	31-40	249	58,4		*High school*	259	62,1
	41-50	57	13,4		*Associate Degree*	51	12,2
	51 ≤	14	3,3		*Bachelor degree*	79	18,9
					Post-graduate degree	11	2,6
					Doctoral degree	1	0,2
Position	*Senior manager*	85	20,0	**The Work Tenure Of Respondents**	*<1 year*	11	2,6
	Middle level manager				*1-3 year*	79	18,6
	Lower level manager	330	77,6		*4-6 year*	138	32,5
					7-9 year	115	27,1
		10	2,4		*10 year ≤*	82	19,3
Management Type	*Family Members*	366	87,6	**Establishment**	*<1 year*	1	0,2
	Out of Family	17	4,1		*1-5 year*	28	6,6
	Professional Managers				*6-10 year*	112	26,5
		35	8,4		*11-20 year*	188	44,5
					21 year < up	93	22,2
Commercial Title	*Incorporated*	7	1,7	**Number of Employees**	*<10*	9	2,1
	Limited	398	97,8		*10-50*	330	78,8
	Unlimited	2	0,5		*51-250*	71	16,9
					251-500	5	1,2
					501 ≤	4	1,0
The capital structure	*Local capital*	352	96,2				
	Local&Foreign capital	7	1,9				
	Foreign capital						
		7	1,9				

5.2. Analytic Procedure (Statistical Analysis)

At first, all questionnaire data were entered into the Statistical Package for the Social Sciences (SPSS) for Windows. Then, sequentially to find out the respondent's opinions for each questionnaire items, frequency analysis was done. After all, correlation analysis was used to indicate the relationship between IT capability, IT infrastructure, IT business experience, IT relationship resources, and IT human resources (which are four sub dimensions of IT capability) and competitiveness. At last, regression analysis was performed to achieve the fundamental purpose of the study.

5.3.Correlations Results

The correlations between IT infrastructure, IT business experience, IT relationship resources, IT human resources, competitiveness are also presented in Table 4.

Table 4: Results of Correlation

	IT CAP	ITI	ITBE	ITRR	ITHR	Competitiveness
IT CAP	1	,898	,963	,962	,893	,413
ITI	,898	1	,844**	,807**	,753**	,336**
ITBE	,963	,844**	1	,904**	,798**	,416**
ITRR	,962	,807**	,904**	1	,826**	,414**
ITHR	,893	,753**	,798**	,826**	1	,340**
Competitiveness	,413	,336**	,416**	,414**	,340**	1

**. Correlation is significant at the 0.01 level (2-tailed).

As shown at the Table 4; the significant relationships are found between IT capability, IT infrastructure, IT business experience, IT relationship resources, IT human resources and competitiveness. There are the strongest relationships

between IT capability and IT business experience (0,963; p<0.01) and the weakest relationships between IT infrastructure and competitiveness (0,336; p<0.01)

5.4.Regression Results of the Study

After an intensive literature review, the research model was developed and related hypotheses were offered. Regression analysis was used to test the research hypotheses.

IT Capability and Competitiveness

In the linear regression model, the direct link between IT capability and competitiveness is significant (t = 9,326, p<0.01). It explained 16,9 % of the competitiveness by the adjusted R^2 value. According to the analyze results, the first hypothesis "H1: IT Capability effects competitiveness positively" is supported.

Table 5: Regression Results of IT Capability and Competitiveness

Independent variable	β	t	p	R^2	Adjusted R^2	F
IT Capability (ITC)	0,413	9,326	0,00	0,171	0,169	86,980
Dependent variable: Competitiveness *p<0,001						

IT Infrastructure and Competitiveness

Regarding the effect of IT infrastructure on competitiveness (H2), Table 6 shows an adjusted R^2 of 0,111, indicating that IT infrastructure explains about 11,1% of competitiveness. The overall F-statistic of 53,896 is significant at the 0.01 level. Thus "H2: IT infrastructure effects competitiveness positively" is supported

Table 6: Regression Results of IT Infrastructure and Competitiveness

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Independent variable	β	t	p	R^2	Adjusted R^2	F
IT Infrastructure(ITI)	0,336	7341	0,00	0,113	0,111	53,896
Dependent variable: Competitiveness *p<0,001						

IT Business Experience and Competitiveness

In the correlations analysis, a significant relation is detected between IT business experience and competitiveness. As a result of the regression analysis, the model is significant with F value of 88,710 (p<0.01) and explained 17,1 % of the competitiveness by the adjusted R^2 value. Hence, the third hypothesis of the research "H3: IT business experience effects competitiveness positively" is supported.

Table 7: Regression Results of IT Business Experience and Competitiveness

Independent variable	β	t	p	R^2	Adjusted R^2	F
IT Business Experience (ITBE)	0,416	9.419	0,00	0,173	0,171	88,710
Dependent variable: Competitiveness *p<0,001						

IT Relationship Resources and Competitiveness

In order to test the forth hypothesis of the research, the regression analyze is applied. The results show that ITRR and Competitiveness received contribute significantly, with an overall F value of 87,298; p<0.01) and the adjusted R-square value is 0.171. This means that IT infrastructure explains approximately 17,1% of the competitiveness. Thus, the fourth hypothesis of the research (H4) is supported.

Table 8: Regression Results of IT Relationship Resources and Competitiveness

Independent variable	β	t	p	R^2	Adjusted R^2	F
IT Relationship Resources (ITRR)	0,414	9.343	0,00	0,171	0,169	87,298
Dependent variable: Competitiveness *p<0,001						

IT Human Resources and Competitiveness

In the correlations analysis, a statistically significant relationship is detected between IT human resource and competitiveness. IT human resources explain about 11,3% of competitiveness (R^2 value of 0,116, and adjusted R^2 of 0,113). The overall F-statistic of 55,107 is significant at the 0.01 level. Therefore, the last hypothesis "IT human resources positively affect competitiveness" is also supported.

Table 9: Regression Results of IT Human Resources and Competitiveness

Independent variable	β	t	p	R^2	Adjusted R^2	F
IT Human Resources (ITHR)	0,340	7,423	0,00	0,116	0,113	55,107
Dependent variable: Competitiveness *p<0,001						

6.CONCLUSION

At the study, there are five independent variables and one dependent variable. Independent variables are IT Capability and its four dimensions that are called: IT infrastructure, IT business experience, IT relationship resources and IT human resources. Dependent variable is competitiveness. In order to understand the relationship between IT capability, sub dimensions of IT capability and competitiveness detailed, we analysed the effects of both IT capability and sub dimensions of IT capability on competitiveness, separately.

The empirical data were analysed by the Statistical Package for the Social Sciences (SPSS) for Windows. The results of analyses showed that a firm's IT capability and its sub dimensions have positive effects on competitiveness. Among the four dimensions of IT capability, IT Business Experience (ITBE) is the most effective factor (17,1%) and IT infrastructure is the less effective factor (%11,1) regarding their effects on competitiveness.

In last 20-30 years, technological improvements influence all activities of businesses and today they are ongoing to influence more and more, as known. Hence, to cope with the changing business environment, firms are obligated to invest in IT processes to develop IT capabilities. To develop their own IT capability, firm must manage and coordinate IT infrastructure, IT business experience, IT relationship resources, and IT human resources effectively. Firms can be more effectiveness and competitiveness by investment and development of IT capability.

This study also has some limitations. 3PL managers answered our questionnaires, because they were the best positioned and related to the all management process as technology management. Thus, the results may not be sensitive enough. Future research can collect the data from the IT managers that work at logistics sector; and by using this data, the results will be more sensitive. 428 3PL firms' managers among 9 cities in Turkey were investigated. Future studies should investigate 3PL firms in other cities in Turkey and at the other countries to generalize the findings.

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