

IT - Business Strategic Alignment and Organizational Agility: The Moderating Role of Environmental Uncertainty

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Abstract. This study investigates the effect of IT-business strategic alignment on organizational agility by considering the effects of IT flexibility and IT capability on strategic alignment. Also this study investigates the moderating role of environmental uncertainty on the relationship between strategic alignment and organizational agility. This research is an applied research based on purpose and descriptive-survey in terms of data collection. The statistical population consists of 330 people who work in Telecommunication Company. In this research, library method and researcher-made questionnaire were used for data collection. Its validity was confirmed by content related validity and using confirmatory factor analysis. Also Cronbach's alpha coefficient was used for its reliability. AMOS software was used to examine the relationships between the structures that formed the research hypotheses. For analyzing the moderator, Hierarchical regression analysis was used

by SPSS. Finally, the results stated that IT capability and IT flexibility have a significant impact on IT-Business strategic alignment and IT-business strategic alignment has a significant impact on organizational agility, but hypothesis 4, which related to the moderating role of environmental uncertainty on the relationship between strategic alignment and organizational agility, was not confirmed.

Keywords: IT Flexibility; IT Capability; IT-Business Strategic Alignment; Environmental Uncertainty; Organizational Agility

1. Introduction

Today, information technology has become an important tool for executing business strategies, and the success of organizations depends on orienting all parts of the organization along its strategic path. The alignment between organization's business strategy and IT strategy and the dimensions of IT that affect this alignment is important. There are important factors (i.e., some aspects of IT flexibility and IT capability) for maintaining strategic alignment (Tallon, 2009). With the advent of the 21st century, it is more difficult for an organization to be successful and survive, and this is because of the emergence of a new commercial era that one of the main characteristics is change (Rashidi et al., 2019). Thus, alongside strategic alignment, organizational agility must be investigated as a business necessity that is defined as the ability of the organization to detect rapid response to unexpected changes in customer demand, competitor strategy, business environment, and so on. Agile organization responds to market changings fast and efficiently (Heydari, 2019). One of the most important achievements of management knowledge has been the simultaneous attention to both internal & external environments of organizations. This approach, known as strategic management, provides a suitable response to ever increasing complexities in organizational competition (Hoseini shakib, 2013). Regarding the relationship between IT-business strategic alignment and organizational agility, external factors such as environmental uncertainty are among the issues that should be considered as moderating role. When the external environmental is uncertain, companies must anticipate imminent changes and adapt their organization strategies to environmental fluctuations (Panda and Rath, 2018). Therefore, this

study also considers the moderating role of environmental uncertainty on the relationship between strategic alignment and organizational agility. This research intends to investigate the relationship between IT-business strategic alignment and organizational agility for developing knowledge contribution from the perspective of IT capability and IT flexibility in the telecommunication company which its main structure is IT that have not been investigated in previous studies. Also, agility research is often done in private companies, especially in manufacturing industries, but agility is also important in government organizations (such as telecommunication company), because the results and successes of government agencies are fascinating and impressive. That is the reason of investigating agility in a government organization to develop and increase the knowledge contribution in this study.

2. Literature review

In order to succeed in today's competitive business environment, a firm should have a clear business strategy that is supported by other organizational strategies (Al-Surmi et al., 2020). Strategic alignment has become one of the most important subjects of strategic literature in recent years and various methods of research and study have been defined by researchers. Many studies have been conducted on the alignment of tasks and policies. Others focus on the relevance and alignment of strategic priorities at different organizational hierarchical levels including corporate, business unit and operational level. Some researchers suggest that strategic priorities at the operational level are aligned and supportive of the business unit level. Others have defined alignment as strategic agreement or organizational fit (Hosseini shakib and Behfar, 2015). Deploying IT in a purposeful way and to save time and money in aligning with the strategies, needs and goals of the organization is a strategic alignment (Luftman et al., 2015). Luftman presented a comprehensive model for measuring strategic alignment maturity with five levels, and defined six criteria for all five levels of strategic alignment maturity: Communication, Competency/Value measurements, Governance, Partnership, Scope and Architecture, skills.

Factors affecting IT-business strategic alignment have been investigated in numerous research studies, mostly in developed countries including

Western Europe and North America (Abdolvand and Sepehri, 2016). One of the most important factors affecting the strategic alignment of business-information technology is IT capability and IT flexibility. However, no comprehensive study investigated IT capability dimensions (i.e., IT architecture, IT infrastructure, IT human resources and IT relationship resources) with relation to strategic alignment. Additionally, there are limitations regarding the link between some of IT capability dimensions and strategic alignment in developing countries, especially in Iran. For more explanation, no study empirically investigated the relationship between IT infrastructure and strategic alignment, as well as IT architecture and strategic alignment. Furthermore, IT relationship resource has been investigated in relation to strategic alignment from internal perspective only (i.e. the link between business and IT departments), and no study has investigated this relationship from an external perspective (i.e., the link of the firm with customers, suppliers and other firms). Thus, this study goes beyond prior studies by investigating the dimensions of IT capability in relation to strategic alignment (Jorfi et al., 2017). From strategic alignment perspective, where IT supports business strategy; there is a major challenge for IT to keep pace with the swift changes made by firms in their business strategies. If firms use legacy information systems, then IT reacts to changes more slowly and cannot offer sustainable advantage; Thus, there has been a rise in interest about flexible IT, which has ability to rapidly react to business changes and align with the business strategies (Tallon, 2009). In general, the IT lacked flexibility, resulting in a gap between emerging strategic directions and the ability of IT to support them (Fink and Neumann 2009). Mostly, IT flexibility is described by three dimensions i.e., connectivity, compatibility and modularity (Ness, 2005). Despite the importance of IT flexibility dimensions for IT-business alignment, most studies have only investigated IT flexibility as one construct in relation to strategic alignment, especially in developing countries. Thus, empirical evidence shows the lack of the relationships between IT elements and strategic alignment in developing countries, so there is an opportunity to fill this gap by proposing the hypotheses of this study. Today's business environment is becoming increasingly dynamic, and the concept of agility is gaining attention in the corporate world and in academia (Harsch and Festing, 2020). Organizational

agility is delineated as a crucial competence of an organization to cope with unprecedented business environmental changes, high market competition, etc. and thrives toward global success. To successfully deal with volatile external and internal changes, agility offers firms swift and easy business process refinement approaches (Dove, 2001). This paper investigates two types of agilities, namely, business process and market responsive agilities. Business process agility (BPA) is an important form of organizational agility, that represents the extent to which firms utilize their internal business processes easily and promptly to adjust in a changing market environment. It underlines the necessity for a firm to identify possible environmental changes, threats and opportunities with suitable reconfiguring abilities of resources, as well as business processes, and provides quick and decisive responses to clients and other stakeholders (Chen et al., 2014). Another type of organizational agility is known as Market responsive agility (MRA), that highlights a competitive and growth-oriented entrepreneurial state of mind to convey strategic decision making in unstable market environments (Ying Lu and Ramamurthy, 2011). Agility in market responsiveness leads to continuous monitoring and rapid improvement of organizational products and services responding to uncertain business circumstances. IT plays a great role in enabling a firm to line up flexibly its internal business operations, fulfilling the demands and preferences of the customers and assists in modifying operational strategies, while adapting to change market conditions. Tallon and Pinsonneault introduced dual perspectives on the relationship between alignment and agility. The first perspective stated that Alignment enables agility. knowledge sharing helps in improving coordination between IT and business executives by means of effective communication and collaboration, thus making it simpler for firms to identify change before they could jointly decide as to how to efficiently respond. This facilitates agility in terms of augmented innovation and adaptiveness. In a broader scenario, the act of knowledge sharing may be extended to customers, suppliers, and business partners to create further IT and business opportunities, which represents comprehensive decision making and therefore, fully supports agility. The second perspective stated that Alignment impedes agility. knowledge sharing and shared understanding facilitates alignment, the existing body of knowledge possessed by the IT and business executives may be

greatly influenced by the past, where market volatility might not be an issue. Hence, if organizations are operating in a highly unstable environment, predicting future based on past knowledge might not be beneficial for them (Tallon and Pinsonneault, 2011). In a sustainable environment, organizations may not need agility because they have nothing to gain or lose. If the external environment of the organization is predictable, companies do not have to respond to any changes. But if the external environment is uncertain, organizations must anticipate imminent changes quickly. Larger environmental fluctuations in the event of a need for high IT alignment, forcing companies to restructure their internal business processes with a proper overhaul of IT assets to facilitate market performance. Newkirk and Lederer have identified and studied the environmental uncertainties in three dimensions that the current research has used in these three dimensions. These three dimensions are: environmental dynamics, environmental diversity, and environmental hostility (Newkirk and Lederer 2006). Panda and Rath in their studies mentioned that when the environmental uncertainty is higher, alignment shows positive effect on MRA, while a negative effect on BPA (Panda and Rath, 2018). In this paper, after reviewing the literature, it will be examined whether the IT-business strategic alignment with regard to the flexibility and capability of IT affects organizational agility with the moderating role of environmental uncertainty? In this regard, main research hypotheses are proposed as follows: IT capability has a significant impact on IT-Business strategic alignment. IT flexibility has a significant impact on IT-Business strategic alignment. IT- Business strategic alignment has a significant impact on Organizational Agility. IT- Business strategic alignment has a significant impact on Organizational Agility with moderating role of environmental uncertainty.

Given the above hypothesis, the conceptual model is shown in Figure 1.

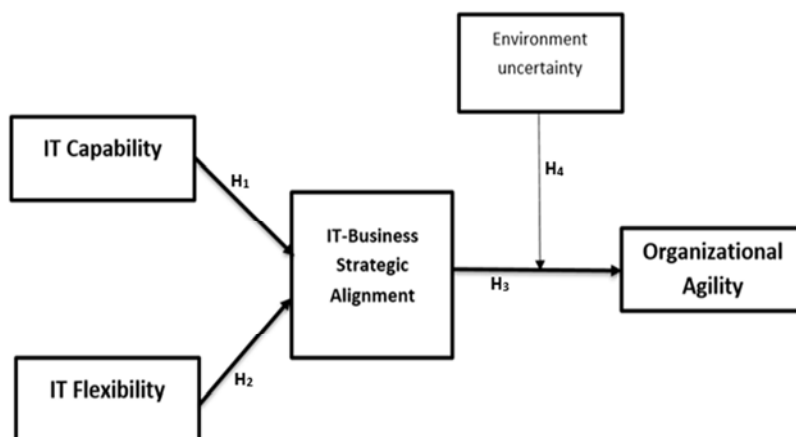


Fig. 1. The conceptual model

3. Method

This study is an applied research, because it seeks to develop applied knowledge to address the IT-business strategic alignment, organizational agility, and environmental uncertainty. Also in terms of data gathering, the present research is a descriptive-survey study. Two methods have been used for data collection tools. Therefore, this research is based on library studies and based on questionnaires and expert opinion polls. To construct the questionnaire, the indices of the dimensions of all the variables included in this study, were first extracted by studying Previous articles that are presented in Table 1.

Table 1. Frequency of indices used for each variable in previous research

Variable	Dimension	Index	Item Code	Reference
IT-Business Strategic Alignment	Communication	Ability to exchange ideas between IT and business units	IBSAC1	(Jorfi et al., 2011)
		Ability to share knowledge and information between IT and business units	IBSAC2	(Yayla & Hu, 2012)
		Communication effectiveness	IBSAC3	(Luftman et al., 2015)
	Competency/Value measurements	Effective use of measurement standards to describe IT business participation	IBSAV1	(Jorfi et al. 2017)
		Continuous improvement	IBSAV2	(Panda &
	Governance	Integrate and adjustment IT strategies with the organization's strategic plans	IBSAG1 IBSAG2	

Variable	Dimension	Index	Item Code	Reference
		Align IT goals, investments and costs with business goals and priorities	IBSAG3 IBSAG4	Rath, 2018) , (Koçu, 2018)
		Align IT with business needs and changes	IBSAG5 IBSAG6	
	Partnership	Level of relationship / trust between IT and business units	IBSAP1	
		The Role of IT in Business and vice versa	IBSAP2	
		Common goals, risks, rewards and penalties	IBSAP3	
	IT Capability	IT infrastructure	Communication devices and services for database access (WAN, LAN,...)	
Applied Infrastructure Services (IT Operations / Servicing)			ITINF2 ITINF3	
Security services (such as firewalls)			ITINF4	
IT architecture		Detailed description of hardware and software systems and technology life cycle	ITARC1 ITARC2	
		A detailed description of the business specifications, processes and systems critical to mission performance	ITARC3 ITARC4	
		Clarity of IT policies regarding the organization and how IT partnerships and business value	ITARC5 ITARC6	
IT human resources		Understand IT personnel's policies and programs	ITHU1	
		IT personnel skills in software and hardware development	ITHU2	
		IT personnel awareness of business functions and interpretation of business practices	ITHU3 ITHU4	
IT relationship resources		Close relationship with internal stakeholders (management, business sector, other organizational departments)	I TRR1	
		Multidisciplinary teams combine business expertise and technology	I TRR2	
		Close relationship with external stakeholders (customers, suppliers, foreign companies)	I TRR3	

Variable	Dimension	Index	Item Code	Reference
IT Flexibility	Connectivity	Electronic communications between systems across the organization	CON1 CON2	(Ness, 2005) , (Fink & Neumann, 2009) , (Jorfi et al., 2011) , (Jorfi et al. 2017)
		Existing electronic links with external parties (customers, suppliers)	CON3	
		Use different protocols to access the database (such as SQL)	CON4	
		Easy and remote access for users to centralized information	CON5	
		Open network mechanisms to enhance connectivity and communication	CON6	
	Compatibility	Easily move applications and integrate them across platforms	COM1 COM2	
		User access to all platforms and applications	COM3	
		Existence of multiple interfaces or entry points (e.g., web access, EDI) for external suppliers and customers to share all kinds of information.	COM4	
		Using a common operating system across the organization	COM5	
	Modularity	Easily add, modify, delete and reuse software modules	MDU1	
		easily adapts to various vendors' database management systems (DBMS) protocols and standards	MDU2	
		Easily add features to important applications upon request	MDU3	
		Non-application of data rules and relationships (tax rules, pricing) to hardware programs	MDU4	
Organizational Agility	Business Process Agility	Customization	BPA1	(Tallon, 2008)
		Change the scale of diversification and density of demand for products / services	BPA2 BPA3	, (Ying Lu & Ramamurthy, 2011)
		Introducing New Pricing Plans	BPA4	,
		Change suppliers if needed	BPA5	,
		Expanding to new international markets	BPA6	(Chen et al., 2014)
	Market Responsive Agility	Quick and effective response to changes	MRA1 MRA2	, (Panda & Rath, 2016)
		Rapid development and marketing of new goods / services	MRA3	,

Variable	Dimension	Index	Item Code	Reference
		re-engineering	MRA4	(Panda & Rath, 2018)
Environmental Uncertainty	environmental dynamics	Variation in customer buying behavior	ENV D1	(Newkirk & Lederer, 2006), (Yayla & Hu, 2012), (Chen et al., 2014), (Panda & Rath, 2018)
		Variation in service / product lines	ENV D2	
		Diversity in the distribution channel	ENV D3	
	environmental diversity	Changes and unpredictability of technology	ENV Y1 ENV Y2	
		Changes in customer preferences	ENV Y3	
		Changes and unpredictability of competitors' strategies	ENV Y4	
		Environmental changes in the market	ENV Y5	
	environmental hostility	Threats from lack of resources and materials	ENV H1 ENV H2	
		Price and quality threats from competitors	ENV H3 ENV H4	
		Threats from differentiating services / products in an operational environment	ENV H5	

Then, based on the set indices, the relevant questions were extracted from the studied articles and a selection of several questions for each index was presented as a new question (phrase) in the questionnaire for this research. Finally, a questionnaire with 69 questions was presented. The statistical population of the study includes all managers, heads, senior and ICT experts, network, business and system planners and business managers of Alborz province Telecommunication Centers (12 Centers) who are 330 persons and Cochran formula is used to determine the sample size. Therefore, using the Cochran formula, according to the 330 persons and classified cluster sampling, the sample size is 178 persons. Finally, a complete questionnaire was collected from the identified sample size. In this research, for confirming the validity of questionnaire the content related validity is used. The designed questionnaire was given to a number of academic experts in this field as well as to a number of managers and heads of Alborz Telecommunication Company. Confirmatory factor analysis was also used for the validity of questionnaire and research constructs. In order to

determine the reliability of the questionnaire at this stage, a pre-test for the selected questionnaires out of all questionnaires was used by Cronbach's alpha method for the main research constructs by SPSS software. As shown in Table 2. the Cronbach's alpha value was greater than 0.7 for all variables, the reliability of the questionnaire was confirmed.

Table 2. The values of Cronbach's alpha

Variable	Number of Questions	Cronbach's alpha
IT Capability	17	0.849
IT Flexibility	15	0.790
IT-Business Strategic Alignment	14	0.818
Organizational Agility	10	0.909
Environmental Uncertainty	13	0.836

Finally, structural equation modeling and AMOS software were used for confirmatory factor analysis of factors and indices and fitting the research model.

4. Findings

After collecting data, structural equation method is used with AMOS software to verify the validity of the theoretical model of research. The structural model obtained from the software output is based on the standard coefficient estimation mode as shown in Fig. 2. Investigating the structural relationships between Latent variables becomes more rational and meaningful, when the measurement of latent structures is accepted according to scientific criteria and the structural model proposed in the study that is well-suited. The goodness of fit of the model means how much a theoretical model is compatible with an experimental model. Model fit indices in this study are presented in

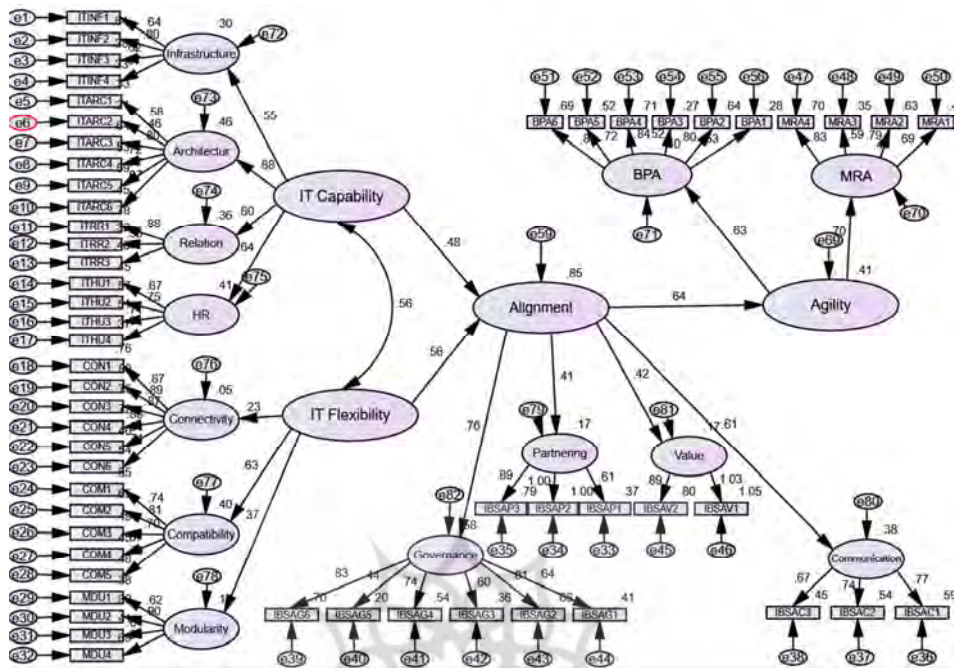


Fig. 2. Research model in standard coefficient estimation mode

Table 3 as can be seen, some of the fit indices are not within the acceptable range and the model needs to be modified and some indices have to be eliminated.

Table 3. Model fit indices

Fit indices	Allowed value	Obtained value	Result
X2/df	<3	1.560	Accepted
RMSEA	<0.08	0.056	Accepted
RMR	<0.1	0.104	Rejected
PNFI	>0.5	0.628	Accepted
PCFI	>0.5	0.802	Accepted
GFI	>0.8	0.699	Rejected
AGFI	>0.8	0.673	Rejected
TLI	>0.9	0.834	Rejected
CFI	>0.9	0.842	Rejected
IFI	>0.9	0.844	Rejected

In order to evaluate the conformity of the developed model with the theoretical criteria and the empirical background, the fit of the indices is evaluated. To remain a question in the model, questions must have two conditions:

The first condition is that their factor loadings must be above 0.5 and the second requirement is that the T-Value must be greater than the absolute value of 1.96 (Khamseh and Vosough, 2017). In this study, the ITARC2 and IBSAG5 items have a factor load of less than 0.5, so the questions are removed at this stage. Also, the items ITINF3, ITINF4, ITARC6, ITHU4 were weaker than the other items of their respective constructs, causing problems for the validity and reliability of the questionnaire and had to be eliminated. The second condition (T-Value) is also valid for all indicators. The modified model of research using Amos software can be seen after eliminating 6 indices with weak factor loadings, in Fig. 3.

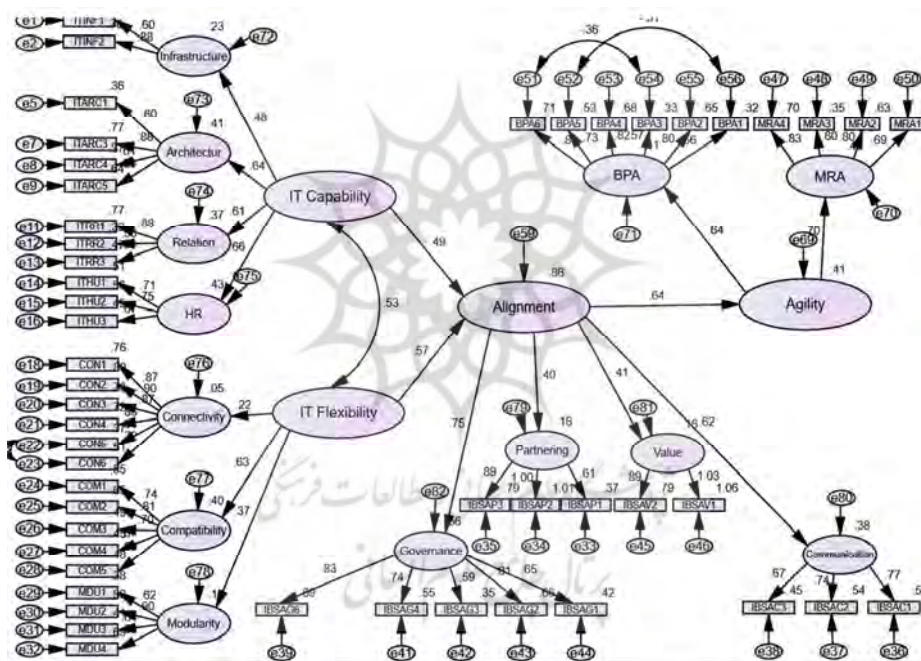


Fig. 3. Modified model of research in estimation of standard coefficients

After model correction, the results of model fit are presented in Table 4. and, as can be seen, all fit indices are within the permissible range and are confirmed. In other words, after the modification, the model is well-fitted, which means that this research can be generalized to a larger community.

Table 4. Model fit indices after modification

Fit indices	Allowed value	Obtained value	Result
X2/df	<3	1.216	Accepted
RMSEA	<0.08	0.035	Accepted
RMR	<0.1	0.063	Accepted
PNFI	>0.5	0.728	Accepted
PCFI	>0.5	0.863	Accepted
GFI	>0.8	0.835	Accepted
AGFI	>0.8	0.806	Accepted
TLI	>0.9	0.954	Accepted
CFI	>0.9	0.959	Accepted
IFI	>0.9	0.960	Accepted

According to Table 5., the software output shows the necessary criteria for construct validity and composite reliability of the research model. According to the results, the research model has also appropriate structural validity and composite reliability.

Table 5. Validity and reliability indices obtained for research structures

Variable	Dimensions	CR	AVE	MSV	ASV
IT-Business Strategic Alignment	Communications	0.771	0.530	0.269	0.078
	Value measurements	0.962	0.928	0.201	0.037
	Governance	0.850	0.535	0.269	0.097
	Partnership	0.881	0.719	0.137	0.041
IT Flexibility	Connectivity	0.918	0.656	0.327	0.037
	Compatibility	0.846	0.525	0.242	0.059
	Modularity	0.839	0.571	0.327	0.040
IT Capability	IT Infrastructure	0.708	0.552	0.145	0.057
	IT Architecture	0.818	0.536	0.183	0.070
	IT Relationship Resource	0.757	0.517	0.216	0.077
	IT Human Resource	0.755	0.507	0.216	0.083
Organizational Agility	Business Process Agility	0.871	0.536	0.201	0.074
	Market Responsive Agility	0.822	0.540	0.201	0.059
Environmental Uncertainty	Environmental Dynamism	0.975	0.929	0.087	0.027
	Environmental Diversity	0.821	0.630	0.082	0.032
	Environmental Hostility	0.812	0.590	0.096	0.023

T-Value Test and P-statistic were also used to examine the significant relationships of the first three hypotheses of this study. According to the results presented in Table 6., the significance of all three hypotheses was accepted.

Table 6. Results of the significant test of research hypotheses

Hypothesis	P	T-Value	Non-standard estimates	Result
IT Capability → IT-Business Strategic Alignment	0.015	2.431	0.556	Accepted
IT Flexibility → IT-Business Strategic Alignment	0.043	2.025	0.769	Accepted
IT-Business Strategic Alignment → Organizational Agility	***	3.993	0.722	Accepted

Cohen's test was used to evaluate the moderation test. The hierarchical multiple regression was used to test the role of environmental uncertainty that proposed by Cohen's test on the relationship between IT-business strategic alignment and organizational agility. Adjustment analysis requires the independent and moderating variables be centralized and standardized to reduce the probability of occurrence of multiple linearity by reducing the correlation of the independent and moderating variables with the interactive variable (multiplicative variable). Also another precondition of this test is confirmation of the relationship between independent and dependent variables which is established. Then the interactive variable is created by multiplying independent variables and standardized moderator to provide the basics of regression analysis. For this purpose, the predictor and moderator variables in the first step and the interactive variable in the second step entered the regression model. Table 7., presents the results of the study moderating effect. As can be seen, the moderating variable of environmental uncertainty in the relationship between strategic alignment and organizational agility was not significant, because the P value is greater than 0.05 ,So the hypothesis 4 is not confirmed.

Table 7. Results of the moderator analysis using hierarchical multiple regression

Interactive variable	Investigating the Moderation Role				Investigation the Regression Models		Result
	B (Non-standard coefficient)	Standard error	β (Standard coefficient)	P	R ²	ΔR^2	
Uncertainty×Alignment	0.047	0.045	0.072	0.307	0.162	0.005	Rejected

5. Conclusions

In this study, we investigated the relationship between IT-business strategic alignment on organizational agility by considering the effects of IT flexibility and IT capability on strategic alignment, then the effect of environmental uncertainty on the relationship between strategic alignment and organizational agility was investigated.

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