How to improve the vision and competitive advantage of a new product by ICT and OLC?

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ABSTRACT Human resources and capital are the basis of any successful organization but nowadays, organizations that learn and are based on innovation are more successful. The purpose of this study is to investigate the impact of information and communication technology (ICT) on new product competitive advantage (NPCA) and new product vision (NPV) through the partial mediating role of organizational learning capability (OLC) by structural equation modeling (SEM). Iran's Automobile Industry was selected as the statistical population. The results show that ICT has a significant effect on OLC and OLC has a significant effect on NPCA and NPV, which indicates the indirect effect of ICT on NPCA and NPV and confirms the mediating role of OLC. ICT also has a significant direct effect on NPCA and NPV, which confirms the partial mediating role of OLC. Finally, NPCA and NPV can be improved through OLC by using and implementing ICT.

KEYWORDS: ICT, OLC, NPCA, NPV, SEM

1. INTRODUCTION

Great improvement in information and communication technology (ICT) and its widespread use is one of the characteristics of 21st century (UNCTAD, 2010). This improvement provided people with more possibilities and opportunities and increased their self-sufficiency. This technology also facilitated access and management of information and provided our ability in accessing knowledge and business opportunities worldwide (Fathi and Motlagh, 2010). Information and communication technology is an extensive domain that includes hardware (portable computers, computing technologies, automated event record tools), software (multimedia data sources) and information system technology (Intranet and Internet) (Brown and Maccormac, 2009). Information and communication technology has great potential in changing most common activities (Otieno, 2012). Prasad believes that information and communication technology is a tool for mass customization passed on customer demands, automation of the sales department, improving marketing

decision-making systems and cooperation and communication with customers (Prasad et al., 2001). Many organizations are facing a competitive environment in which maintaining their competitive abilities is one of the main concerns (Knudsen et al., 2021). competitive advantage means a company has attained superior performance relative to other competitors (Lazzarini, 2015; Schilke, 2014; Kahupi et al., 2021) by for example achieving cost leadership or being differentiated in what it offers, or having developed a strategy that is value-creating and not being implemented by competitors (Barney, 1991). According to Nevo and Wade (2010) and Chatterjee (2021) value refers to the ability of a firm's resource to support strategies such as exploiting market opportunities; rarity refers to what extent a firm's resource is unavailable to competitors; inimitability relates to the costs and difficulties of duplicating the resource; and non-substitutability refers to the nonexistence of equivalent resources. Among the characteristics of a competitive environment are spread of novel technologies, quicker obsolescence or products and changes in customers' needs

(Knudsen et al., 2021). Managers also noticed that one of the sources of profit in organizations is their human resources. Therefore, organizations must provide a continuous stream of novel and innovative products and expand their markets in order to maintain their success which necessitates organizational learning (Gomes and Wojahn, 2017). Novel organizational approaches consider learning to be an organizational culture and seek to integrate personal, group and organizational learning. In this approach, in order to pay attention to external challenges and proper use of opportunities, an organization needs certain internal abilities and capabilities that use different styles of learning to acquire novel ideals from organization's environment and institutionalize these ideas in the organization (Ashton and Thorn, 2007). The concept of organizational learning capability emphasizes the importance of factors facilitating learning or trend toward learning in the organization (Kalmuk and Acar, 2015). In fact, organizational learning capability shows the capacity for creating and implementation of ideas in order to deal with various organizational barriers using innovations and management methods (Nwankpa and Roumani, 2014). Organizational learning alone is not enough, but its ultimate goal of improving performance and gaining, maintaining and enhancing competitive advantage must be achieved. Organizational learning is an important and vital component for innovation through which a new product is developed (Sutanto, 2017). Before an organization can improve its innovation behavior, management must analyze the learning that is common in the organization (Petra et al., 2002). In fact, organizational learning has become an important strategy to create competitive advantage in organizations because qualified employees are considered valuable resources for the organization (Saro, 2007). Organizational learning can also help the organization to achieve its vision and performance goals (Gah, 2003). Therefore, it is important to pay attention to the concept of learning and measure its capability in organizations (Onağ et al., 2014). Innovation is possible by acquiring knowledge from various sources and applying it in the organization. Organizations therefore seek to enhance the performance of innovation by improving their knowledge base, by adapting to customer needs, and by rapid learning (Gilbert et al., 2007). In other words, this task requires flexible product development processes, the ability to acquire existing knowledge and competencies,

and knowledge development, i.e. the concepts that underlie organizational learning capability. Based on this, it can be said that organizational learning is an important factor that can lead to the success of a new product (Callanton, 2002). Organizations must cope with an increasingly changing environment. Such a change derives essentially from the evolution and changes in customers' needs, technological advances to satisfy those needs and the evolution in business management (Lee et al., 2013). Therefore, the business ability to build and defend a competitive position in the market depends to a great extent on the capacity to invest and use information (Weber and Kantamneni, 2002; Mithas and Rust, 2016). In this regard we can consider information technology to be a key factor for the organization's success. The literature considers information technologies to be an important source of competitive advantages for the company (Gil-Saura et al., 2009; Amuna, 2017). ICT industry plays an essential role in most countries (Ministry and Pitner 2014; Talib et al. 2013). ICT industry can be classified into ICT manufacturing and ICT service. In both sectors, various fields of related technologies may emerge and provide products and services with new functions and values. Unlike other industries, ICT-based industries show the most diverse characteristics of convergence (An et al. 2016). ICT industry leads to sustainable national competitiveness because it creates greater linkage effects than any other industry and accelerates innovation in related sectors (Xing et al. 2011). For this reason, the ICT industry plays a pivotal role in increasing the productivity of the entire economy (Asikainen and Mangiarotti 2017). Given that the Automobile Industry has a vital role in the economic development of a country and is considered as one of its economic infrastructures, Iran also seeks to become strong in this industry. Given that Automobile Industry in Iran is developing, this industry seeks to increase its market share, especially in the Middle East, by launching new products. In this regard, paying attention to factors such as vision and competitive advantage in new products can lead to the growth of this industry. For this reason, the Automobile Industry in Iran has been studied. On the other hand, so far no research has been done on the role of information and communication technology and organizational learning capability in improving the new product vision and competitive advantage, and the present study will fill this gap. Accordingly, the purpose of this study is to investigate the effect of information and

communication technology on the new product competitive advantage and new product vision by considering the partial mediating role of organizational learning capability. The results of present research can help government or managers and contribute to future relevant researches.

2. LITERATURE REVIEW

2.1 Information and communication technology

At the start of the millennium, information and communication technology has affected the entire world and has changed the foundations of many systems (Jerez-Gomez, Céspedes-Lorente, and Valle-Cabrera, 2005). ICT is considered as a "major tool for building knowledge societies" (Sar and Misra, 2020). The ICT also stimulates initiative and creativity (Chai, Koh, and Tsai, 2010; ómez-Fernández and Mediavilla, 2021), enables individualization and flexibilization of education (Abell, 2006) and makes knowledge acquisition more accessible (Brush, Glazewski, and Hew, 2008). ICTs are an important part of every country's national infrastructure. Technological readiness refers to the speed with which an economy utilizes existing technologies to improve the productivity of its industries, with specific emphasis on utilization of ICTs in daily activities and production processes to achieve increased efficiency and competitiveness (Salehan, Kim and Lee, 2018). ICT profoundly affects economic and social development (Wang, Zhou, and Wang, 2021). Using information and communication technology in many aspects of human life had turned the world into what is known as an information society. The rapid emergence of modern ICT has substantially changed the type of skills that are needed to successfully participate, communicate, and work in a modern society (Gnambs, 2021). Today, access to internet and other information sources is increasing exponentially and all societies try to use these new technologies by creating the necessary infrastructures. ICTs may have promoted and advanced an individual's (and a community's) radicalization process (Parra, Gupta, and Mikalef, 2021). The application of ICT across different sectors of the global economy has become a game changer in boosting work efficiency and productivity (Ayisi Nyarko and Kozári, 2021). All experts and policy-makers state that information and communication technology creates great potential for social, financial, cultural and political development. To this end, many countries have defined specific strategies for development of information and communication technologies (Hennessy, Ruthven, and Brindley, 2005) and many nations consider ICT to be a strategic tool for improving welfare, wealth, equity and competitiveness (Sharifi et al., 2013). In new categorizations and definitions, countries with better access to information are considered to be wealthier. This means that today, the main power of countries is not based on polluting factories or destructive war machines but instead based on having access to more information in a timely manner (Pelgrum, 2001). In fact, ICT emphasizes the role of information and information processing, storage, transfer and retrieval facilities. It is worthy to note that other than communicative infrastructure, other forms of media such as radio and television also play important roles as information transfer channels (Colecchia and Schreyer, 2002). From another point of view, ICT is the set of tools, machines, know-how, methods and skills used in creating, trading, processing, retrieval, transfer and use of information and includes all levels of information processes from simplest to the most complex (Akshay and Dhirubhai, 2005). In general, ICT is the use of information management tools services used for creating, processing, storage, distribution and transfer of information (Rama Rao, 2004). Studies show that one of the factors separating organizations from each other is information technology and the extent of its use in them. Many factors affect the use of ICT in organizations (Alexandru, 2006) some of which are investigated in this study which include the following factors: Personal factors (Hosnat, 2008; Mirghani et al., 2010); Attitude factors (Alam Beigi et al., 2009; Mooij and Smeets, 2005); Training factors (Alam Beigi et al., 2009); Economic factors (Allan, Yuen, and Wong, 2009); Environmental factors (Khuong, 2008); Human and managerial factors (Ruiz-Molina et al., 2015).

2.2 Organizational learning capability

Organizational learning is a process through which organizations learn new information. According to experts, organizational learning is an essential process for every organization in today's competitive environment and is the sum of all organizational and management characteristics that facilitates learning in

the organization (Fernández-Mesa and Alegre, 2015; Sutanto, 2017). Many experts state that there is no consensus about measures of organizational learning; this is mostly due to the fact that organizational learning is the result of several stages, each with its own measures of success (Birchall and Giambona, 2010). The concept of organizational learning emphasizes the importance of factors facilitating the natural inclination or tendency of the organization toward learning (Goh, 2003; Nwankpa and Roumani, 2014). An organization's learning capacity is one of its organizational and management characteristics and defines the conditions in which it is possible for the organization to learn (Alam Beigi et al., 2009). It can be said that factors facilitating learning in an organization are the same as measures of its learning capacity. The learning capacity of an organization is the result of individual and group learning in the organization, carried out in order to reach the organizational goals. Specific management actions or conditions can facilitate or hinder this process. Therefore, if one can determine the management actions that facilitate learning (Nwankpa and Roumani, 2014), then it is possible to measure the organization's learning capacity. This information can help managers focus on efforts that facilitate organizational learning (Chiva, Alegre and Lapiedra, 2007). Organization's learning capacity is the intrinsic ability of the organization in creating, developing and use of new knowledge in order to compete with its competitors and is in fact difficult to implement (Jerez-Gomez, Céspedes-Lorente, and Valle-Cabrera, 2005). In order to create the capacity to learn in an organization it is necessary to have an effective innovation process through activities such as experimentation, constant improvement, team work and group problem solving, observing the activities of other employees and Participatory decision-making (Goh, 2003). In his study, Chiva (2004) tried to determine the factors facilitating organizational learning. In this later work, Chiva et al. (2007) developed their measurement tool for organizational learning capacity and determined that organizational learning has several dimensions including 1-Experimentation, 2-Rrisk-taking (Jerez-Gomez, Céspedes-Lorente, and Valle-Cabrera, 2005), 3-Interaction with external environment (Chiva, Alegre and Lapiedra, 2007), 4-Dialogue (Chiva, Alegre and Lapiedra, 2007) and 5-Participatory decision-making (Bapuji and Grossan, 2007; Scatt-ladd and Chan, 2004).

2.3 New Product Competitive Advantage

Competitive advantage of a firm serves as a pivotal determinant to its performance and survival(Barnett & McKendrick, 2004; Barney, 2001; Leiblein et al., 2017). How firms obtain and sustain competitive advantage is the fundamental question (Wang and Gao, 2021). firms must consider decisive factors that may enable firms to create unique competitive advantages in terms of product image, sales, market share, and new market opportunities (Liao, Kuo, and Ding, 2017). According to the Resource-based View (RBV) theory, a firm's competitive advantage is attributable to the valuable and rare resources that it currently possesses (Cao et al., 2021); firms sustain their competitive advantage provided that the resources are non-tradable or imitated by other firms (Barney, 1991; Barney and Clark, 2007; Chadwick et al., 2015). Globalization of markets, development of dynamic technologies, shortening of product life cycle and rapid changes in customer demands; All of this means that companies' competitiveness strongly depends on their ability to meet customer demands and needs by creating more value in products and services. These forces companies to upgrade their ability and capacity to create and deliver value to stakeholders, especially customers. In dynamic global markets, companies face varying degrees of competition. Rapid technological changes, shortening the product life cycle, and the increasing complexity of technology have forced companies to outsource their technical development (Banrent and Tishirki, 2004). In a product development environment with new technology, decision making is difficult due to complexity and uncertainty. Competitive advantage includes strategies that companies use to perform better than competitors in product markets. The environmental competitive advantage can be further categorized into cost and differentiation advantage (López-Gamero et al., 2016; Miotto et al., 2020). Organizations can gain competitive advantage if they can create value for customers. Launching new products is one of the strategic sources of value creation (Miles and Covin, 2000; Walsh and Dodds, 2017). So the competitive advantage of a new product is actually the advantage that the new product has over the competitors' products. Competitive advantage requires companies to have particular control over production costs to ensure that their products are priced competitively. Dunk (2004) showed that competitive

advantage has a positive role on the extent to which organizations use the cost of product life cycle. Organizations will have a competitive advantage when they produce and deliver their goods and services better than competitors. In this study, the competitive advantage of the new product is measured by following the research of Singh and Sang (2007) with seven indicators.

2.4 New Product Vision

Shared vision is defined as the members' collective value and beliefs regarding a firm's objectives and mission (Oswald et al., 1994). Proactive Environmental Strategy (PES) entails organizational members' support, involvement and commitment in attaining sustainability goals of an organization (Albertini, 2019; Journeault 2016). Thereby, shared vision is critical in fostering employees' participation and commitment in environmental decision making and actions (Aragón-Correa et al., 2013; García-Morales et al., 2011). It facilitates effective communication of sustainability-integrated goals, strategies, practices and technologies among organizational members (Johnson, 2017) and develops a sense of collectivism and a sustainability-driven working culture (Ketprapakorn and Kantabutra, 2019). In addition, it provides goal clarity and strategic directions by mitigating ambiguities and conflicting interests (Alt et al., 2015). According to the above description, it can be expressed that the new product vision is in fact a goal and strategic direction that is considered for the product launched to the market. Vision requires analyzing the future markets, the sector and industry in which the company competes, and how to create value for future customers. All of these factors set the company apart from its competitors (Abel, 2006). In new organizations, psychological differences between departments affect the performance and development of a new product. For example, if a subsidiary feels that the parent company has a clear picture of a common goal, then it will perform better in competition. The new product vision creates a psychologically safe work environment for teams and also clearly explains development goals to members. Lane and Akgon (2001) define the product vision as collaboration and support for the group's clear and sustainable goals. Organizations and their internal departments, with a particular insight into customers and market situations, have to interact with and coordinate with external marketing trends, especially when products and systems require specific modifications. All members of the new product development team must have the same vision for the product so that they can create a kind of synergy between different departments and organizations. In modern business environments, the success of new product development depends on collaboration between suppliers, research and development, production, sales, marketing, sales channels, and management support (Chen and James Lane, 2011). In this study, the new product vision is measured by following Tsarola's (2007) research with three indicators.

3. FRAMEWORK AND HYPOTHESES DEVELOPMENT

Figure 1 shows the conceptual framework of this study which is investigated in the following hypotheses.

3.1 ICT and OLC

Information technologies have improved knowledge sharing, and speed up the flow of information and communication. In addition, the continuous development of information technologies constantly poses new challenges for people so that they improve, learn and adapt. Information technologies significantly affect the communication within an organization, and communication plays a significant role in all organizations (Mitić et al., 2017). Companies need to invest in organizational learning, and master the capabilities of knowledge generation, appropriation and exploitation. Learning has become valuable because knowledge is an important resource (Mai, Do and Phan, 2022; Canbaloğlu, Treur and Roelofsma, 2022). Productivity and competitiveness are a function of knowledge generation and information processing and so modern information and communication technology (ICT) acts as a catalyst in organizational learning (Altınay, Dagli, and Altınay, 2016). According to Teece (2000), ICT might support knowledge-sharing. Consequently, technology is important for facilitating knowledge-sharing between organization members. Knowledge-sharing can be neither forced nor controlled (Hortovanyi and Ferincz, 2015). One of the biggest challenges for managers wishing to help their organization become a learning one is to find ways to encourage members to share and transfer their knowledge (Bock et al., 2005). According to
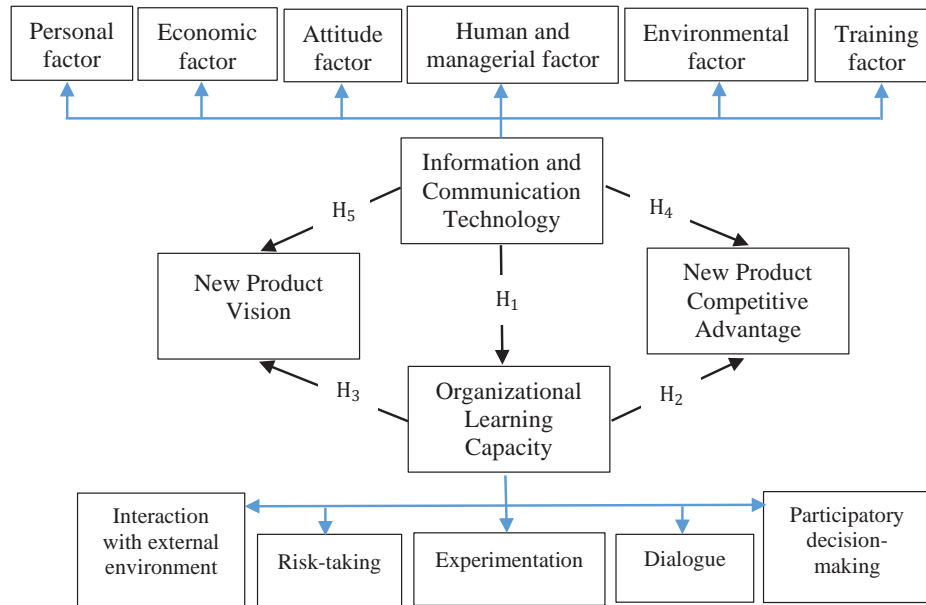
Personal factor	Economic factor	Attitude factor	Human and managerial factor	Environmental factor	Training factor

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                    Information and
                    Communication
                     Technology
         H₅                              H₄
    New Product                              New Product
      Vision                                 Competitive
                          H₁                  Advantage
              H₃                         H₂
                    Organizational
                      Learning
                      Capacity
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Interaction with external environment	Risk-taking	Experimentation	Dialogue	Participatory decision-making

Figure 1 Conceptual Framework.

Dewett and Jones (2001), information technology can help organizations to be more efficient and innovative by making knowledge "visible" and accessible; encouraging sharing and application of the stored knowledge and finally; and providing a mechanism that is efficient and effective to dismantle communication barriers across space and time. Also Van den Hooff and de Ridder (2004) emphasized that the use of IT systems influences the knowledge transfer process. Technology can play a central part in providing the media and infrastructure for learning in and between knowledge communities. They identified a context supportive of learning and knowledge transfer and integrated ICT development and usage as key characteristics of a successful knowledge community. Bennet and Shane Tomblin (2006) emphasized that organizational learning is also concerned with knowledge and the use of ICT helps modern organizations respond faster, be more efficient, be better coordinated, and create more and varied links between human and knowledge resources in modern OL and KM efforts. Based on the discussion above, this study offers the following hypothesis.

Hypothesis 1 Information and communication technology affects organizational learning capability.

3.2 OLC and NPCA

The results of studies on organizational learning show that learning capabilities can lead to competitive advantage (Gah and Ryan,

2008) and organizational learning capabilities are in fact a set of organizational and managerial characteristics that, Facilitates the organizational learning process and allows the organization to learn and play a vital role in the learning process (Chiva et al., 2007). In today's global marketplace, maintaining a competitive position is a constant concern. Technological innovations and economic uncertainty have changed the face of competition and made the survival of organizations dependent on the competitive advantage of their new products (Isper et al., 2007). For this reason, organizations should seek to ensure the competitive advantage of their new products by learning and acquiring new knowledge of the environment (Winklen, 2010; Onağ, Tepeci, and Başalp, 2014). Based on the discussion above, this study offers the following hypothesis.

Hypothesis 2 Organizational learning capability affects new product competitive advantage.

3.3 OLC and NPV

Companies are looking for ways to reduce product development time while at the same time developing quality and reducing costs (Yeh et al., 2010). New product development is a strategic and key activity for many companies through which new products will have a significant share in sales and profits (Kaftros et al., 2005). In fact, new products are an important factor for the success of organizations in the market (Gonzalez and Palacios, 2002). More

organizational learning capability can increase the possibility of providing a clear statement of objectives along with the mechanism of providing a path for the rapid development of new products in the form of product vision (Winklen, 2010). Based on the discussion above, this study offers the following hypothesis.

Hypothesis 3 Organizational learning capability affects new product vision.

3.4 ICT and NPCA

Technology, defined as 'know-how', has been recognized as a primary driver of competitive advantage (Chadee and Kumar, 2001). ICTs are an important part of every country's national infrastructure (Salehan, Kim and Lee, 2018). ICT related research has suggested that information processing capability is associated with firm performance (Wang, 2003). Information processing capability as an essential component of company's ICT has a significant effect on company performances (Premkumar et al., 2005; Wang et al., 2013) and asset productivity and business growth (Chen et al., 2015). Recently, practice-oriented research suggests that information processing capability based on business analytics is likely to help companies to gain competitive advantage (e.g. Davenport et al., 2001; Kiron & Shockley, 2011; Kiron et al., 2012; Cao et al., 2019). Nevertheless, a direct link between ICT-related capability and competitive advantage seems highly plausible and has been supported by a number of studies underpinned by the RBV in a variety of research areas (e.g. Bharadwaj, 2000; Barua et al., 2004; Mithas et al., 2012). For example, Collins and Clark (2003) show that a company's information capability affects its competitive advantage in American high technology companies; Sook-Ling, Ismail, and Yee-Yen, (2015) demonstrate that information processing capability is positively related to competitive advantage while Lim, Stratopoulos, and Wirjanto, (2012), based on a sample of large US firms, show that senior IT executives help develop superior IT capability, which in turn has a positive impact on competitive advantage. Gunasekaran, Subramanian and Papadopoulos (2017); Saeidi et al. (2019) and Mao et al. (2016) also state that information technology can lead to a competitive advantage. Also competitive advantage requires companies to have particular control over production costs to ensure that their products are priced competitively (Liao, Kuo and Ding, 2017). Technological readiness refers to the speed with which an economy utilizes existing technologies to improve the productivity of its industries, with specific emphasis on utilization of ICTs in daily activities and production processes to achieve increased efficiency and competitiveness (Salehan, Kim and Lee, 2018). Also, according to Cao et al. (2021) competitive advantage can be achieved by introducing new technology-based products. Based on the discussion above, this study offers the following hypothesis.

Hypothesis 4 Information and communication technology affects new product competitive advantage.

3.5 ICT and NPV

Over the last decade, competition has intensified and companies have found the need to restructure and improve their business practices to find new and more efficient ways to obtain competitive advantage in order to survive. In this context, ICT offers benefits for a wide range of business processes and improves information and knowledge management within the firm, leading to better performance (Gargallo-Castel and Galve-Górriz, 2012). Information and communication technology can promote the economic development of a nation (Wang et al., 2021; Huang et al., 2019; Keller and Heiko, 2014; Yu, Lin, and Liao, 2017; Torkayesh and Torkayesh, 2021). Also information and communication technology affects organization productivity (Garicano, 2010). Information technologies significantly affect the communication within an organization, and communication plays a significant role in all organizations. Information technologies are a key tool in the process of knowledge management (Mitić et al., 2017). White, Vanc, and Stafford (2010) investigated how employees in large companies observe communication. For employees at all levels direct interaction is the best accepted, but employees believe that communication by e-mail is an efficient way of sharing information. Information and communication technology can optimize production process and enable capital to replacing labor (Acemoglu and Restrepo, 2020; Autor et al., 2003). Vision is an organizational aim that guides strategy, policies, and tasks; it is also a key source of cultural formation and sustainable management. Vision plays a crucial role in an enterprise's development, acting as a bright light directing the business towards its mission (Liao and Huang, 2016). Jagersma (2003) found that vision and strategy are

correlated and that a clarified vision helps foster business strategy. Thus, the extent to which organizational members support and understand the vision is a key factor affecting performance (Balduck et al., 2010; James and Lahti 2011). The adoption of information and communication technologies (ICTs) in organizations promises to better connect managers with people, increase public participation in decision making, improve the efficiency of service delivery, decrease uncertainty, and improve information dissemination (Welch and Feeney, 2014). As described above, ICT can help create a clear vision for new products by improving knowledge sharing, speeding up the flow of information and communication, reducing uncertainty, and improving information dissemination. Based on the discussion above, this study offers the following hypothesis.

Hypothesis 5 Information and communication technology affects new product vision.

4. RESEARCH METHODOLOGY

The main method in examining the hypotheses in the present study is the structural equation modeling method. SEM can provide a more quantitative and conceptually appropriate or satisfying understanding of the relationships among key variables (Pollman, 2014; Yang et al., 2018; Hair et al., 2014). SEM development differs from other modeling approaches in that it tests both the direct and indirect effects on a presumed causal relationship (Fan et al., 2016). The advantage of SEM is the ability to incorporate unobserved latent factors whose implied values can be estimated from multiple observed indicators. Since these indicators are assumed to be caused by the latent factor or factors (Taucher and Oschlies, 2011; Chin, Marcolin, & Newsted, 2003).

4.1 Data Collection and Statistical population

Data gathering methods are divided into two categories: A) Library methods, B) Field methods. The statistical population of this study include managers of companies active in Automobile industry in Iran.

4.2 Sampling method and Sample-size

In this study, simple random sampling method was used which was carried out from among managers. Sample size was calculated to be 203 managers of companies active in Automobile industry in Iran.

4.3. Measures and Instrument development

Information and communication technology was the independent variable. In this study, Alam Beighi et al. (2009) questionnaire was used to measure the ICT. It measures six aspects included personal factors, attitude factors, training factors, economic factors, environmental factors and human and managerial factors. Organizational learning capability was the Mediator. In this study. Chiva et al. (2007) questionnaire was used to measure the OLC. It measures five aspects included experimentation, risk-taking, interaction with external environment, dialogue and participative decision making. In this study, the new product competitive advantage and new product vision were dependent variables. New product competitive advantage was measured by following the research of Singh and Sang (2007) with seven indicators and new product vision was measured by following Tsarola's (2007) research with three indicators.

Based on prior literature, the present research utilizes a 5-point Likert-type rating scale, containing both the extreme points as 1 = 'strongly disagree' and 5 = 'strongly agree' to accumulate responses for the multi-item constructs. All these studied measures have been adapted from prior researches which establish their validity, however, to check their validity in context to this study a series of tests relating to construct validity and reliability have been performed.

5. EMPIRICAL ANALYSIS AND RESULTS

Partial Least Square–Structural Equation Modeling (PLS-SEM) is a non-parametric approach that makes no distributional assumptions and can evaluate small sample sizes (Hamdollah and Baghaei, 2016). It is a research instrument utilized to quantify dynamic cause-effect relationship models with latent variables in various disciplines (Cepeda-Carrion et al., 2019). Hair et al. (2014) claimed that PLS-SEM's methodological toolbox could accommodate more complex model structures and handle data inadequacies such as heterogeneity. This emerging statistical approach

could substantially provide higher statistical power, making it a better alternative to covariance-based structural equation modeling, as supported by Leguina (2015). PLS-SEM has now become a popular statistical technique (Kumar and Purani, 2018). The analysis of this approach can be aided by Smart PLS, a robust software application with an accessible graphical user interface (Sarstedt and Cheah, 2019). An SEM model combines the attributes of two sub-models: a measurement model that reflects the multivariate relationship between latent variables and the measured variables and a structural model that reflects relationships among the latent variables. The measurement model and the structural model together show the overall model of the research (Zhang et al., 2022). An SEM model can first aggregate the observed variables into several common factors through confirmatory factor analysis, and then analyze the direct and indirect relationships between variables through path analysis (Ignacio et al., 2019).

5.1 Measurement model fit, Reliability, Validity and descriptive statistics

The measurement model defines how latent variables are measured through observed variables (Kang and Ahn, 2021; Abuzaid, Moeilak, and Alzaatreh, 2022). Each construct contains a set of indicators (Lin et al., 2005). To evaluate the measurement model, three cases of index reliability, convergent validity and divergent validity are used. The reliability of the index is measured by three criteria: 1- Cronbach's alpha (Cronbach, 1951; Cronbach and Shavelson, 2004), 2- Composite reliability (CR) (Bagozzi & Yi, 1988; Cho, 2016), 3- Factor loadings coefficients. At first, the factor loading coefficient of each criterion must be checked and if this coefficient is less than 0.4, the criteria must be deleted. The factor loading coefficients of X15=0.382, NPV3=0.260, NPV2=0.165, CA6=0.382, and OLC11=0.084 are less than 0.4 so they must be deleted. Figure 2 shows the coefficients of factor loadings after removing the indices with a factor loading less than 0.4.

Reliability indicates the internal consistency of the items and evaluates the extent to which these items are free from random error (Rahman, 2022; Kuei and Madu, 2001). According to Hair, Black, Babin, and Anderson (2010); Al-Refaie (2011); Kim et al. (2020); Basak et al. (2021) and Al-Refaie et al. (2011), the composite reliability and Cronbach's α values ideally reflect the internal consistency of the unique and distinct items assigned under each construct. After the analysis, as shown in Table 1, the calculated composite reliability and Cronbach's α values were found to be above
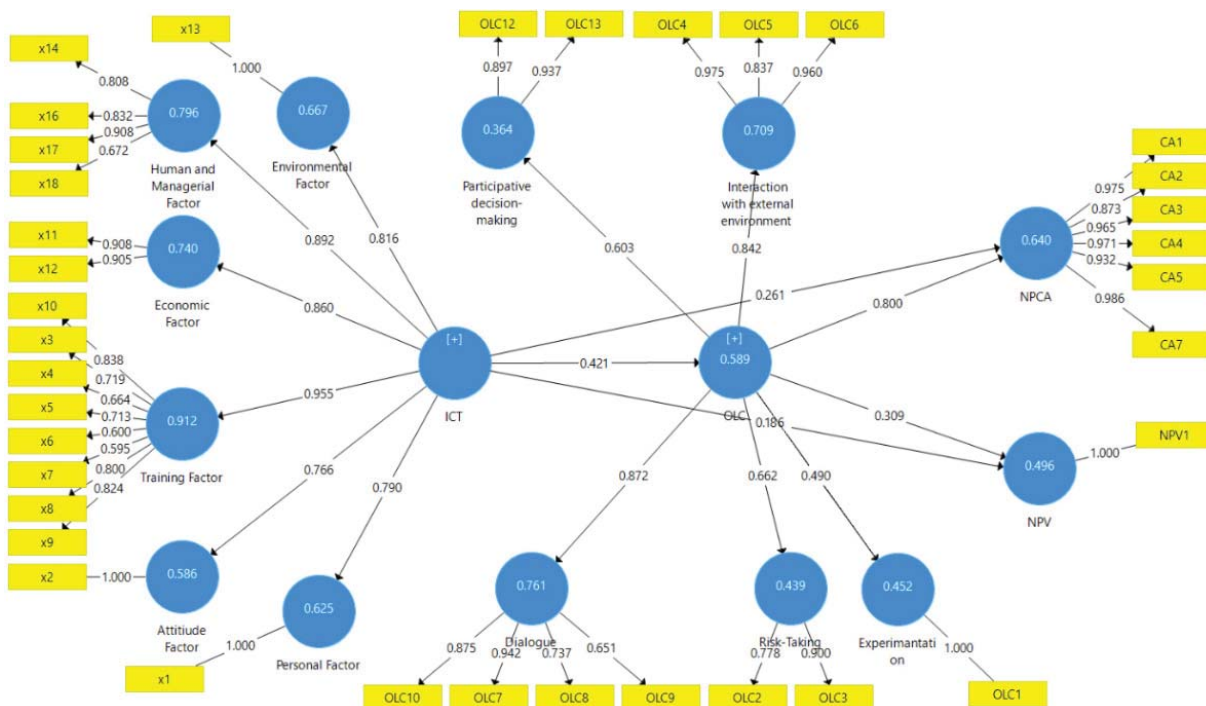

Figure 2 Standard factor loading coefficient (Path coefficient).

the recommended value of 0.7 and thereby, confirms the higher reliability of the items studied under each construct (Cronbach and Shavelson, 2004). Similar test has also been conducted by Lu and Ramamurthy (2011) to examine the reliability of their studied variables. The instrument's validity is determined by how well it measures the construct it was designed to test for (Field, 2009). For construct validity test, two separate tests such as the convergent and discriminant validity of items have been conducted.

1. Test for convergent validity: Following Hair et al. (2010) and Kim et al. (2020),

the estimated average variance extracted (AVE) values for each latent construct greater than the standard value of 0.5 confirms the convergent validity of the items. The AVE denotes the mean amount of variation explained by a construct in its criterion variables compared to the total variance of its criterions (Henseler et al., 2014). A test of significance, that is a t-test has also been conducted to determine the t-statistics values which are found to be significant (since, all $p < .05$) for all the factor loadings and thereby, establish the convergent validity criterion. Similar test has

Table 1 Cronbach's α, CR, AVE and Descriptive Statistics for latent constructs.

Latent constructs	Cronbach's α	CR	AVE	Mean	SD	S.E. mean
Experimentation	1.000	1.000	1.000	4.6495	.47961	.04870
Risk-Taking	0.759	0.828	0.707	4.5155	.45331	.04603
Interaction with External Environment	0.916	0.947	0.857	4.1478	.64365	.06535
Dialogue	0.817	0.881	0.655	4.1005	.47001	.04772
Participative decision-making	0.814	0.914	0.841	4.1718	.66686	.06771
Personal Factor	1.000	1.000	1.000	3.0722	1.13878	.11563
Attitude Factor	1.000	1.000	1.000	3.7938	1.07953	.10961
Training Factor	0.868	0.884	0.525	3.3879	.73098	.07422
Economic Factor	0.783	0.902	0.822	3.0515	1.03954	.10555
Environmental Factor	1.000	1.000	1.000	3.3196	1.02618	.10419
Human and Managerial Factor	0.822	0.883	0.656	3.3938	1.27654	.12961
NPCA	0.979	0.983	0.905	3.8823	.88759	.06690
NPV	1.000	1.000	1.000	3.9811	.31212	.02353
ICT	0.938	0.9389	0.720	3.3365	.86555	.08788
OLC	0.791	0.8428	0.5172	4.3170	.29751	.03021

Table 2 Discriminant validity (Fornell-Larker Criterion).

	A-F	D	Ec-F	En-F	E	H&M-F	I	NPCA	NPV	P-D	P-F	R	T-F
A-F	1.000												
D	0.049	0.809											
Ec-F	0.552	0.074	0.907										
En-F	0.615	0.058	0.595	1.000									
E	0.101	0.045	0.068	0.87	1.000								
H&M-F	0.634	0.080	0.741	0741	0.048	0.810							
I	0.004	0.772	0.132	0171	0.108	0.094	0.926						
NPCA	0.018	0.584	0.013	0.081	0.423	0.098	0.511	0.951					
NPV	0.050	0144	0.016	0.104	0.057	0.039	0.039	0.645	1.000				
P-D	0.014	0.394	0.069	0.035	0.365	0.086	0.210	0.780	0.682	0.917			
P-F	0.555	0.016	0.695	0.631	0.068	0.667	0.085	0.029	0.008	0.090	1.000		
R	0.089	0.305	0.061	0.040	0.720	0.107	0.408	0.638	0.308	0.434	0.007	0.841	
T-F	0.725	0.035	0.784	0.735	0.082	0.760	0.080	0.001	0.002	0.006	0.712	0.016	0.725

Fornell-Larker Criterion is estimated for first-order latent constructs.
E = Experimentation; R = Risk-Taking; I = Interaction with External Environment; D = Dialogue; P-D= Participative decision-making; P-F = Personal Factor; A-F = Attitude Factor; T-F = Training Factor; Ec-F = Economic Factor; En-F = Environmental Factor; H&M-F = Human and Managerial Factor.

also been conducted by Bi et al. (2013) and Tamilmani et al. (2020).

2. Test for discriminant validity: Following Fornell and Larcker (1981), discriminant validity is estimated when the distinctive and unique values of the individual measures converge at their specific accurate scores. The AVE values represent the discriminant validity of the constructs and according to Gefen, Straub, and Boudreau (2000) and Henseler et al. (2015), the square root of the AVE for each construct should be greater than the inter-construct correlation. Table 2 ascertains that all the studied constructs satisfy the discriminant validity criterion. Similar test has also been conducted by Panda and Rath (2016) to examine the discriminant validity of constructs.

5.2 Structural model fit

After confirming the optimal fit of the validity and reliability of the measurement sections, it is time to examine the structural part of the model. In this section, the most common criterion for measuring the link between constructs in the model (structural part) is the significant t-value (T-Statistics) (Mai et al., 2021). If the t-value exceeds 1.96, it indicates the significant link between the constructs. The second criterion for measuring the structural model fit is R^2. Following Khunsoonthornkit

and Panjakajornsak (2018) and Wang et al. (2022), R^2 is a criterion used to connect the measurement part and the structural part of model and shows the effect that an exogenous variable has on an endogenous variable. 0.19, 0.33 and 0.67 are introduced as the values for weak, medium and strong values of R^2. The third criterion is Q^2. This criterion determines the predictive power of the model and if it is equal to or greater than 0.15, it indicates the appropriate predictive power of the independent variable. Table 3 ascertains that the structural model fit is at the appropriate level.

5.3 Overall model fit

To evaluate the overall model fit, the GOF criterion is used. Goodness-of-fit measures how well the researcher's model reproduces the actual phenomenon presented in the data (Kang and Ahn, 2021). Wetzels et al. (2009) have introduced three values of 0.01, 0.25 and 0.36 as weak, medium and strong values for GOF[1]. Similar test has also been conducted by Kim et al. (2005); Schermelleh-Engel et al. (2003); Spitale et al. (2009) and Zhang et al. (2022) to examine the GOF criterion. A value of 0.65 for GOF indicates a very strong overall fit of the research model.

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[1] Goodness of Fit

Table 3 R^2 and Q^2 coefficients and T-Statistics to measure the structural model fit.

latent constructs	R^2	Q^2	T-Statistics
Experimentation	0.452	0.222	
Risk-Taking	0.439	0.283	
Interaction with External Environment	0.709	0.616	
Dialogue	0.761	0.50	
Participative decision-making	0.364	0.188	
Personal Factor	0.625	0.619	
Attitude Factor	0.586	0.566	
Training Factor	0.912	0.453	
Economic Factor	0.740	0.598	
Environmental Factor	0.667	0.644	
Human and Managerial Factor	0.796	0.430	
NPCA	0.640	0.465	
NPV	0.496	0.308	
ICT	-	-	
OLC	0.589	0.415	
ICT --> OLC			3.028
OLC --> NPCA			13.320
OLC --> NPV			3.087
ICT --> NPCA			3.110
ICT --> NPV			2.010

R^2 and Q^2 coefficients are not calculated for the independent variables.

Table 4. Hypothesis testing results

Hypotheses	Path coefficient	T-value	P-value	Test results
Information and communication technology affects organizational learning capability	0.421	3.028	0.000*	Supported
Organizational learning capability affects new product competitive advantage	0.800	13.320	0.000*	Supported
Organizational learning capability affects new product vision	0.309	3.087	0.000*	Supported
Information and communication technology affects new product competitive advantage	0.261	3.110	0.000*	Supported
Information and communication technology affects new product vision	0.186	2.010	0.000*	Supported

*p < 0.05.

5.4 Hypothesis testing results

The current study has used the SEM approach to test the formulated hypotheses (Chin et al., 2003; Hair et al., 2014; Henseler et al., 2015), where the results are derived on the basis of the path coefficients (Kim et al., 2020). A significance level of 0.05 is adopted to test all hypotheses. Similar significance level has also been considered by Al-Refaie (2015), Eriksson (2017) and Guzman (2022) to test their studied hypotheses. The present research has both direct and indirect effects similar to Foerstl et al. (2016) research.

T-value for ICT to OLC is 3.028 which is higher than the critical t-value of 1.96. this means that in confidence limit of 95%, there is a significant impact of information and communication technology on organizational learning capacity. Furthermore, the standard factor loading coefficient shows the changes in organizational learning capacity due to changes in information and communication technology and is equal to 0.421 as can be seen in figure 3. This means that 42.1% of changes in organizational learning capacity is due to changes in information and communication technology. There is a similar analysis and interpretation for other hypotheses, which is presented in the conclusion section.

6. DISCUSSION

At information and communication age, phenomenal development of communication and information technology changes the world (Nazemi et al., 2005; Shahzad et al., 2020; Niu, Wang, and Zhang, 2021; Zhang, van Donk, and Jayaram, 2020). This technology by enhancing the information exchange process and cost reduction has been presented as inducement for increasing productivity and efficiency,

competition and growth in every human activity (Hafkin and Tagart, 2004; Tong, Yang, and Teo, 2013; Arvanitis and Loukis, 2009). The exploration on how to manage organizational resources and capabilities to sustain competitive advantages remains the intriguing unit of research of strategic management science (Čirjevskis., 2016). It is especially through for information and communication technologies Industry where technologies developing with astonishing speed and where the life cycles of cutting-edge products are becoming shorter and shorter, and brand-new products of firms are routinely being imitated by others (Yun et al. 2016). Therefore, the rapidly changing economic landscape, coupled with transformational advances in information and communication technologies, presents many challenges to managers of large and small enterprises alike (Amit and Zott 2016). So ICT is significant as comprehensive phenomenon in personal application to political and economic activities because it is multifunctional and flexible instrument that supplies proper solution in personal and local applications to satisfy various needs (Castelz, 2001). Granroos (2000) indicates that ICT can cause organizational interaction promotion, cost reduction of management and social interaction promotion of an organization so pay attention to ICT and evaluate its level is fundamental and very important. Knowledge changes makes new imbalance. Knowledge flow changes organizations so organizations must change continuously. But do organizations know suitable resources for maximizing the innovation? Researchers pay attention to factors which develop organizational innovation and introduce organizational learning as core instrument for making innovation, economic growth, organization survivability and also factor for employees' productivity and organizational performance improvement (Arango et al., 2007;

Cegarra-Navarro et al., 2020). In past, fundamental building of organizations was workforce and capital but nowadays organizations which learn and be innovative and service-oriented are successful. Relatively, resources for controlling an organization was outside but in present new resources which are intangible are inside. Intangible resources create knowledge and organizational learning is basic method for knowledge creation. Organizational learning is not sufficient lonely because its ultimate goal is performance improvement and competitive advantage obtainability, retain ability and improvement. Saban introduce organizational learning as important and critical component for innovation that has been developed through new product. He supposed that before on organization can improve innovation behavior, management must analyze common learning in organization (Petrra et al., 2002). In fact, organization learning is important strategy for creating competitive advantage in organizations because competent employees are valuable resources for organizations (Saru, 2007). Also, organizational learning can help organizations achieve their performance goals and vision (Goh, 2003).

7. CONCLUSION

Information and communication technology (ICT) actively promotes development of emerging industries in the global market and has an influence in the process of an economy's structural change, since it catalyzes the creation of some new markets and disappearance of others (Li, Lee, and Kong, 2019). Typically, the financial technology industry, the convergence of traditional financial industry and ICT, has become a hot topic in the world economy and attracted increasingly huge investment. Firm-level investment in ICT increased the performance and value of the firms (Chadee and Pang, 2008, Kudyba and Diwan, 2002), and ICT firms had higher profit ratios and lower cost ratios than non-ICT firms (Santhanam and Hartono, 2003). The ICT-enabled financial services include P2P, online banking, e-wallets. That is to say, ICT has penetrated the traditional financial market through innovative technological activities, transforming and upgrading the traditional financial industry to a more internet- and technology-based structure. The ICT industry is an enabler and a driver of economic development and growth, it is imperative to gain knowledge on the functioning of ICT in other industries at different levels (Li, Lee, and Kong, 2019). Organizational learning capability is considered as factors and managerial and organizational characteristics which facilitate organizational learning process and permit it to learn. Also ICT affects on OLC and has significant role in identifying the level of OLC. The results showed that the path significance coefficient for ICT to OLC is 3.028 which is higher than the critical value of 1.96 which shows a significant path and effect of ICT on OLC. Furthermore, the standard factor loading coefficient shows the changes in OLC due to changes in ICT and is equal to 0.421. This means that 42.1% of changes in OLC is due to changes ICT or in other words, ICT determines 42.1% of changes in OLC. The path significance coefficient and the standard factor loading coefficient, respectively, for the impact of ICT on NPV are 2.010 and 0.186, ICT on NPCA are 3.110 and 0.261, OLC on NPV are 3.087 and 0.309, OLC on NPCA are 13.320 and 0.800. All coefficients presented confirm all hypotheses. Finally, it can be stated that information and communication technology, in addition to having a significant effect on organizational learning capability, can directly and indirectly affect the competitive advantage of the new product and the new product vision and play a significant role in determining the level of each these variables.

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64

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