



Intellectual Capital as Key Asset in Iranian Automotive Industry

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Abstract

The importance of organisational innovation has received much attention in academic and industrial literature over the years. The ability to innovate in products, services and process is a vital key in generating and sustaining competitive advantage in an increasingly crowded and complex marketplace. The present study is mainly aimed at examining the effects of intellectual capital on the performance quality of Iranian auto part manufacturing companies. To this end, this study adopted the quantitative research approach together with the survey technique in order to collect required data from a total of 275 Iranian auto part manufacturing companies. The data gathered were subjected to analysis with the use of the structural equation modelling (SEM) on the basis of the Partial Least Squares (PLS) technique. According to obtained empirical results, intellectual capital significantly affects the organisational performance and the organisational innovation capability has a great impact on infusion of the independent factors significance. The resource-based theory can be relevantly applied to the Iranian manufacturing context; it can be also improved by various dimensions of innovation capability. From a practical perspective, Iranian auto part manufacturing companies need to be further engaged in the enhancement of their own innovation capabilities.

Keywords: Intellectual Capital, Innovation Capability, Automotive Industry, Iran

1 Introduction

Numerous scholars and many practitioners have discussed the significant role of innovation in facilitating the business development [1]. The same relationship exists between innovation and the automotive industry. During the past century, the automotive industry has experienced a considerable development. According to Statista's reports, the global sales of passenger cars have remarkably grown (around 79 million as reported in case of the year 2017). In this regard, the US and China have accounted for the leading market for car manufacturing and sales [2]. In 2016, the major automobile producers were the multinational car manufacturers like Toyota, Daimler, Ford, and Volkswagen. In the domain of automotive parts supplying, big companies like Bosch, Denso, Magna, and Continental have been dominating.

Regarding the employment, the European automotive market has succeeded to provide approximately 12 million jobs, whereas Japan and the US have recorded over 5 million and 8 million jobs [2-3]. Such huge employment opportunity provided by the automotive industry is correlated with the way it has performed its business over time. Based on Felton

and Reinhart's report, the automotive industry achieved as high as EUR41 billion profit in 2007, which surged up to EUR 54 billion in 2012 [4]. Mohr et al. suggested that the profitability will increase to EUR79 billion by 2020 [5]. A geographic comparative analysis in 2007 indicates the dominance of the BRICS countries, i.e., Brazil, Russia, India, China and South Africa and the rest of the world (RoW); they accounted for over 30% of global automotive profits of EUR12 billion. It increased to roughly 60% (or EUR31 billion). It means that these countries developed even more than Europe, Japan, North America, and South Korea in terms of automotive industry [5].

1.1 Iranian Automotive Industry

The imminent benefit of being fully engaged in the automotive industry has long been recognised by Iran. In the 1960s, western companies were widely invited to start a local automotive industry in Iran to provide an appropriate context for the development of the automotive industry. The Industrial Development and Renovation Organisation of Iran (IDRO) discussed the high significance of establishing domestic car manufacturing companies in this country, e.g., Iran Khodro and SAIPA, which owned 46% and 54% of

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Iran's market as of 2008 [6]. The Iranian automotive industry has contributed to economic development of the country accounting for 4% of Iran's GDP. It has employed around 12% of Iran's workforce [7].

According to reports released by the International Organisation of Motor Vehicle Manufacturers (OICA), Iran ranked 13th in 2011 and dramatically dropped to 18th place out of 20 world's biggest car manufacturing countries as of 2018. However, Iran's domestic automakers in collaboration with government are still control of domestic market with two big company named as Iran KHordo and SIAPA, but low export potential because of innovation capacity within this industry [8].

1.2 Aim of Research

Three research objectives have been defined for the present paper: 1) examining the intellectual capital that influences the organizational innovation capability of the Iranian auto-part manufacturers; 2) investigating the impacts of intellectual capital upon the organizational performance of Iranian auto-part manufacturers; and 3) examining the mediating effects of organizational innovation capability upon the relationships between intellectual capital and organizational performance in Iranian-auto-part manufacturers. A total of three hypotheses were established to support the research objectives.

2 Literature Review

2.1 Intellectual capital

Most scholars defined the intellectual capital as the carrier of knowledge [9-10-11]. Intellectual capital (IC) is commonly defined as intangible assets of companies that are not explicitly listed in the balance sheets, can affect the financial performance of a company through disclosing the relationships among employees, knowledge, ability, and activity [12]. In cases where financial capital and physical assets cannot facilitate the competitive advantages, then, it is time for IC to become the only connection between physical and nonphysical resources exist in an organization [13]. Not only, companies viewed intellectual capital (IC) as an important factor in raising their level of competitiveness and achievement, it has also attracted the attention of academics and professionals alike [14-15]. IC, according to Stewart and Stephanie, can be classified into three dimensions, namely human capital, structural capital, and customer capital, which is well-known to many scholars and known as the H-S-C structure [16-12]. On the other hand, in [17-18-19], IC is divided into human capital, organizational capital (or structural capital), and relational capital.

To operationalize the three dimension of intellectual capital, nineteen measures have been exercised. The questions are adopted and developed and validated by Bontis [20].

2.1.1 Human Capital

Human capital as one characteristic of intellectual capital refers to employees' skills, cumulative tacit knowledge, experience and experts' skills to add value shared in organizations [21], and the talents and innovativeness of individuals [22] also as valuable asset or liability in organizations [23]. It is not possible to own the

human capital; it can only be rented [24]; likewise, only individuals can generate knowledge, but organizations cannot do that [25]. When a new member joins a given organization, s/he carries human capital [26]. As a result, individuals' departure from an organization leads to loss of organizational memory, which in turn may result in a significant threat to the whole organization. It is due to the fact that organizational members take away their knowledge, tacit, skills, and talent when leaving the organization [26]. The aforementioned reasons clearly show the high level of human capital importance to every organization.

One of the problems of the automotive industry in Iran is the imposition of manpower in this sector. The appointment of senior executives and even middle managers in the corporate structure of domestic automotive companies is commonplace. In addition, as the majority of the shares of these companies belong to governmental and quasi-governmental organizations and therefore these organizations have a direct involvement in the selection of senior directors, so the government's assistance and support from automakers will certainly meet expectations from them. These expectations are sometimes even ordered for recruitment at engineer and technician levels. While famous automotive brands in the world account for over 4% of their total sales value for research and development (R&D), they are rapidly seeking to diversify and expand their products. On average, domestic car makers account for less than half a percent of sales. This has caused the major difference between the production of a domestic car over the years to be limited to modest changes in parts such as lights or car mirrors. For example, Hyundai Motor has 7 research and development centres for its international markets, with 3 centres in South Korea and 4 centres in Germany, Japan, India and the largest research and development centre in the state of California, USA, focuses solely on the United States market.

2.1.2 Structure Capital

Structural capital refers to the organization capacity for meeting demand [27]. According to recent studies, the high performance in organization will achieve by good structure organization with competent staff [28]. Also, Cabrita and Bontis [29] defined structural capital as foundation and glue of the organization is a valuable strategic asset, which including non-human asset like procedures, methods, information systems and database.

Structural capital is also referred to as the knowledge and learning enacted during the whole organizational activities. When individuals left the organization at the end of the day, there remains an appreciable wide, deep pool of knowledge in the organization [26]. Structural capital as the steady framework for human capital, arrangements with the components and structures of associations such as databases, schedules, authoritative culture and anything that makes an incentive for associations that can help people as they continued looking for ideal scholarly execution [20-26]. Iranian automakers typically account for less than half a percentage of sales to R&D and learning. This has caused the major difference between the productions of an interior car over the years to limit the appearance of the vehicle. In

other words, the structural capital of automobile companies is not well-suited.

2.1.3 Relational Capital

Relational capital refers to all relationships, including power relationships, market relationships, and cooperation, which are established amongst the individuals, companies, and institutions. All these relationships come from a robust sense of belonging and a high capacity for cooperation, which can be easily found in contexts containing individuals and institutions with similarity in their cultural background [30]. Relational dependency can be found in either horizontal or vertical shapes, either down or upstream. Such dependency forms various types of cooperation/collaboration mechanisms in a variety of settings. Regional and industrial economists have significant conceptual differences when they are discussing the relational capital. Literature consists of a number of studies that have applied empirical, quantitative, and econometric techniques to the verification of the relational capital existence and to conveying its significance to innovation activities performed in companies. There are also proxies representing the channels through which knowledge can be developed locally; that means, it is formed by relational capital in an indirect way.

This study has two objectives: 1) underlining the most important conceptual differences between regional and industrial economists; and 2) verifying the actuality and significance of relational capital to companies' innovation activities through adopting a quantitative empirical approach together with econometric techniques. Various sectoral, regional, and company features are also analysed in this study to investigate their relationship with the effects the relational capital has upon innovation. In fact, it can be reasonably expected that relational capital will exert different impacts in different sectoral, regional contexts of various companies.

Relational capital or social capital can help companies to achieve innovation through sharing knowledge and information [31]. Instances of relational capital include: the unwaveringness of important clients because of understanding their requirements and satisfying them reliably; the common trust and responsibility offered by the major providers; the dependability and dependence association from unified accomplices; the notoriety and connections that an association has created after some time in its encompassing network; the information of laws and guidelines just as the campaigning and systems administration aptitudes; and the basic comprehension and insight in regard to competitors.

Relational capital in Iranian automobile companies is better than other stock companies, and the statistics on the volume of trading and stock prices of car companies are good. These results show that car companies have relatively loyal and stable customers. One of the reasons for this is government support for these stocks.

2.2 Innovation Capability

Organizational innovation capability been proposed to be a multi-faceted develop. There is no regular method for

investigation by which to study, because of different viewpoint about innovation management [32]. According to Laforet [33], innovation takes place just in cases where a company enjoys the capability to innovation. As suggested by Martinez-Roman et al. [34], innovation capability is consisted of three different elements: knowledge, organization, and human elements. The term OIC was pioneered by Perdimio-Ortiz et al. [32] for the definition of the most important factors that have influence on success of the innovation practices. Such critical factors can be translated as OIC elements, and the ability can be evaluated with the elements.

Innovation capability in this study is categorized into seven components, pursuing Saunila and Ukko [35] study. The components are presented in the following. The present study takes into account this definition since it widely encompasses the significant elements of innovation capability. Companies that hold a high capacity of innovation holds to some extent such elements, which are explained below.

- a. The *participatory leadership culture* element is identified an organizational culture which helps to improve innovative activities. The dimension mirrors the general climate of a firm that patronages and persuades innovation and a leadership culture that encourages innovation.
- b. The *ideation and arranging structures* measurement incorporate the structures and frameworks that effective innovation requires. This incorporates the creation, advancement, and usage of thoughts, and the methods in which the associations work activities are organized.
- c. The *work climate and well-being* dimension, which involves well-being of employees working in the company and the work climate made ready in the company in such a way that innovative activities, which include collaboration and values, can be simply done.
- d. The *know-how development* dimension, which indicates that employees' expertise is an essential part in the generating of the OIC. This incorporates knowledge and in addition change in employee aptitudes
- e. The *regeneration* element replicates the firm's ability to gain as a matter of fact and to utilize that knowhow to make and create innovations.
- f. The *external knowledge* element underscores the significance of misusing outer systems and information for the general OIC. Accordingly, the element reflects the association's interior ability to utilize external knowledge in creating development capacity.
- g. The *individual activity* element communicates that workers' individual innovation capacity and action are expected to shape the association's general innovation ability. This measurement incorporates the attributes connected with higher innovation capacity and individual's inspiration to encourage innovations.

To operationalize the seven dimension of organizational innovation capability thirty-four measures have been exercised. The questions are adopted and validated according to culture assessment instrument (OCAI) developed by Saunila et al, [36].

2.3 Organizational Performance

The performance of a company, as a dependent variable, is of a high significance those scholars who work on any area of management. Such extensive construct allows both managers and scholars to make necessary assessments on the company over time and to establish an effective and inclusive setting for comparison of the company with its rivals. Briefly, the key criterion applicable to the evaluation of companies and their activities and environments is the organizational performance [37]. As discussed by Sink et al. [38], the classical approach to performance evaluation indicates that organizational performance is in fact a complicated interrelationship amongst six performance criteria, i.e., efficiency, effectiveness, productivity, quality, profitability, and innovation [39]. In this study firm performance was measured from subjective view. To evaluate firm performance thirteen items were taken into consideration. The measures considered here were extracted from research previously carried out in this area of study.

2.4 Proposal Research Model

The theoretical model of the study has been formalized by inculcating the hypothesis formulations' point in Figure 1.

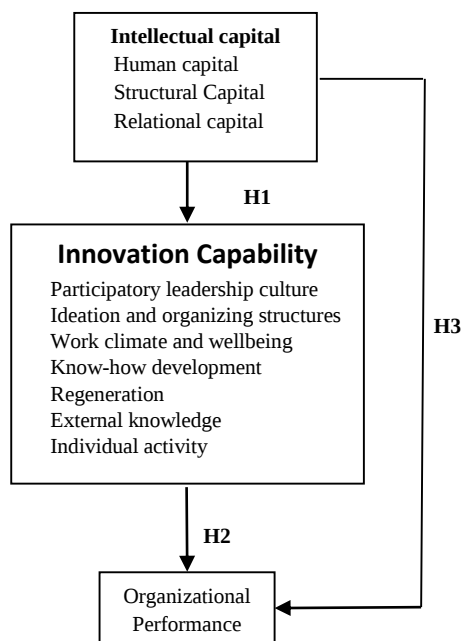


Figure 1: Proposal Framework

2.5 Development of Hypothesis

The hypotheses of this research are discussed in this sub section:

2.5.1 Intellectual Capital and Organizational Innovation Capability

Intellectual capital is known as a strategic resource for an organisation [40]. In late 1990s, management scholars categorized intellectual capital into human capital, relational capital and structural capital [41]. Human capital indeed refers to the knowledge that exists implicitly in the staff's

minds. This has been recognized as a significant innovation/creation source in a given organization. It can be described as a combination of qualities and thinking trend of the staff [42]. Staff creativity enable them the use their knowledge and innovation continuously and innovation, thus improve business processes and new services, leading to competitive advantage [43]. Relational capital is referred to as the knowledge value that is deposited within the marketing channels in an organization; this knowledge is essentially formed by business trends [44]. This capital has higher direct effects on gaining corporate value and has increasingly turned into an important factor in business [45]. Thus, customer capital creates connections between the firm and the competition world and will enable the firm to take part in competitions [46]. Structural capital can be regarded as a culture, organizational structure, operational processes, and information systems.

A review of literature confirmed lack of empirical research into the effects of intellectual capital on performance of the Iranian automotive industry. This research conceptualize that intellectual capital related activities done by the Iranian auto part manufacturing firms can assist the firms to push organisational innovation capacity by way of new products, designs and parts. The Iranian firms' initiatives toward structural (e.g. establishment of organisation structure to fit creativity and innovation), relational (e.g. management of supply chain) and human capital (e.g. training and development to foster innovation) would assist the auto part firms to innovate to achieve growth. In this context the succeeding assumption is expressed:

H1: There is a positive relationship between intellectual capital and organizational innovation capability

2.5.2 Organizational Innovation Capability and Organizational Performance

Greater part of past research on the connection between advancement ability and authoritative execution concurs that capacity and hierarchical has beneficial outcome on hierarchical execution [47]. Beforehand, the vast majority of the investigations utilized R&D use as the chief advancement measure. Be that as it may, R&D use experiences a few inadequacies when utilized as a development measure. For instance, the propensity towards the modest representation of the truth of R&D in littler firms constrains the relevance of such a measure to catch the condition of advancement. This has brought about another age of research that reviews the impact of advancement capacity on authoritative execution by concentrating on the complexities of development ability as contributions of hierarchical execution [47]. Firms with an abnormal state of advancement capacity have more elevated amounts of profitability and monetary development than firms with a low degree of development ability. The examination by Rhee et al. [48] reasoned that development capacity affects execution. These outcomes demonstrate that presentation can be gotten from the inclination for advancement. Sanz-Valle et al. [49], announced a positive and huge connection between authoritative development ability and hierarchical execution. Studies have likewise proposed that hierarchical development capacity is a significant determinant of

authoritative presentation builds, for example, benefits [50]. It has been discovered that there exists a reasonable contrast in gainfulness between firms with abnormal state authoritative development ability and firms with a low degree of advancement capacity [51]. Notwithstanding generally speaking execution and benefit, the impacts of development ability on operational execution have been considered. Developments ability themselves affect operational execution as to efficiency, lead times, quality, and adaptability [52].

Advancement capacity is likewise essentially identified with volume adaptability, item blend adaptability, unit assembling cost, and speed of new item presentation [53]. Murat Ar and Baki [54] affirmed that item and procedure advancement prompted better execution, when estimated by deals, productivity, and piece of the overall industry. The relationship was more grounded with item advancement than procedure development. There are thinks about that have inspected the impact of hierarchical development ability on corporate execution, yet there are just a couple of concentrates that have examined the connection between advancement capacity and execution in SMEs. It has been expressed that SMEs with solid advancement capacity will pick up aggressiveness against contenders, empowering them to accomplish prevalent execution [55].

The contention on development capacity prompting authoritative development is plainly obvious in the writing as talked about before. Iranian car part assembling firms would almost certainly harvest authoritative development if their advancement ability is consistently diffused over the business. The current automobile part makers ought to participate in higher request development capacity creation inside the business with a perspective on introducing development opportunities. In accordance with this contention, it is posited that:

H2: There is a positive relationship between organizational innovation capability and organizational performance.

2.5.3 Intellectual Capital and Organizational Performance

Intellectual capital (IC) has been recognized widely as a key factor in the enhancement of the organizational performance. The factor causing a given business to succeed is dependent on the quality of the knowledge accessible for the construction and expansion of products/services of a high reliability, which are well matched with specific individuals' needs. IC can be taken into consideration to measure the capacity of a company for wealth production. Remember that IC is not concrete and physical by nature; however, it is an incomprehensible asset attained using the assets that are connected to human resources, organizational performance, as well as the relationships that may be created outside the organization. All such characteristics help to create value which cannot be sold or bought because it is a totally intrinsic phenomenon. The literature suggests that the company's performance is connected to its intellectual capital [56]. In addition, Chen et al. [57] succeeded to explore imperative relationships among the four IC elements, i.e., innovation, customer, structural and human capital, and the business performance. Moreover, they explored a remarkable relationship among the IC elements.

To end with, Tseng and Goo [58] made a number of analyses on connections between value creation and IC. A firm's value is often based on the unintelligible intellectual capital owned by the company. Therefore, it is expected that efficacy of intellectual capital affects the performance of organization in a direct way.

If a company holds a robust structural capital, it will be capable of providing appropriate settings required to make use of human capital. It helps the company to effectively captivate customers and generate novel products [59]. Literature makes available sufficient evidence indicating the positive influence of IC on performance quality of companies. According to Bontis et al. [60], IC is positively correlated with the company's performance and market values. As a result, majority of companies tend to dedicate enough resources in order to manage efficiently their available IC such that a higher quality performance could be achieved. A number of researchers have confirmed a positive relationship between IC and a firm's performance; on the other hand, some others support a negative relationship. For example, Marvridis [61] found that the Japanese banks that have better performance are those which have made the outmost use of their intellectual capital. Iranian automobile industry's concentration toward intellectual capital would be able to influence organisational performance. Such a stand had been made in numerous literature – albeit within different country setting. The importance of intellectual capital in pushing the boundary of performance for Iranian market is highly plausible since concentrated training, development activities, structural and relationship building exercises would help in creating business performance. In this context, the following hypothesis is formulated:

H3: There is a positive relationship between intellectual capital and organizational performance.

3 Methodology

The present research made use of self-administered questionnaires as a reliable instrument to gather required data. The questionnaires provided were posted to the auto part manufacturing firms managers. For the purpose of this study, the minimum sample size was set to be 265. Therefore, the researchers sought the participation of 300 companies under the supplier company category. Finally, 275 managers participated in the survey. The data gathered were subjected to required analyses with the use of the structural equation modelling (SEM) on the basis of the Partial Least Squares (PLS) technique. A model was constructed by means of the Smart PLS software to examine the direct impact of IC on organisational performance and also the mediating effect of the organisational innovation capability between IC and organisational performance.

4 Results and Discussion

Before running the SEM test, the data were normalized; The, the normality was examined by means of the skewness and kurtosis analyses. Kurtosis measures the distribution peak and shows how the distribution is high around the mean [62]. On the other hand, skewness measures the degree of distribution asymmetry. Taking into consideration a rule of thumb, in case of a normal data distribution, both kurtosis

and skewness must be ranged between -2 and +2. In addition, the Kolmogorov-Smirnov and Shapiro-Wilk statistics were applied to each construct. As confirmed by the obtained results, both kurtosis and skewness were ranged from -2 to +2 for all items, and indicating normality of the data are in the acceptable range. The kurtosis privileges are ± 2 times the standard error and the degree of fracture is ± 1 times the standard error, the potential for limiting data analysis and post-result interpretation [62].

The univariate outliers or anomalies were distinguished by considering recurrence appropriations of Z scores of the watched information [62]. In any case, any univariate exception was not identified for this examination; this was because it made use of a 7-point Likert scale ranging between 1 and 7. Moreover, the attributed information anomalies were identified with the use of univariate (histograms, box-plots, and institutionalized Z score). As per Hair [63], for an enormous example estimate, a flat out (Z) > 3.5 shows an extraordinary perception. The outcome demonstrated that the institutionalized (z) scores of the credited factors extended from - 3.90 to 2.50, showing that none of the variable surpassed this limit. This is appeared as below.

Table 1: Examination of Outliers

	Minimum	Maximum
Z score (OP)	-1.96817	1.84475
Z score (IC)	-1.64628	1.36168
Z score (OIC)	-1.77446	1.94811

Previous to running the model, there is a need for properly checking the multicollinearity problem in case of continuous and dummy variables. According to Tabachnick and Fidell [64], multicollinearity appears when it is difficult to detect the separate impact of independent variables upon the dependent one due to the existence of strong relationships amongst them. That is, multicollinearity refers to a certain condition in which there is a high correlation among explanatory variables.

Two more commonly-used methods for detection of multicollinearity severity level are: the inspection of the bivariate and multivariate correlation matrix and the calculation of the variance inflation factors (VIF) and tolerance impact [64]. As maintained by Pallant [68], the tolerance effect shows that the variability defined by the independent variable is unique, while VIF acts on the contrary. Lower tolerance (say, below 0.1) and larger VIF (say, above 10) demonstrates the multicollinearity occurrence [65].

Table 2: Pearson correlation for observing multicollinearity

	OIC	IC
OIC	1.000	
IC	-.201	1.000

Dependent Variable: OP

In the present paper, the Pearson's correlation was used to calculate the bivariate correlation matrix, whereas multiple regression procedure with collinearity diagnostic option was applied to the calculation of VIF and tolerance effect. Non-response is a major challenge facing studies using surveys as an instrument for gathering data. As suggested by Atif et al. [66], a non-response bias analysis is needed to be carried out notwithstanding how low or how high response rate has been obtained. To this end, the Mann-Whitney-U-test was conducted for non-response biasness in this research. It was calculated through taking into consideration the dissimilarity between early and late respondents concerning the means of all variables.

Table 3: Observing Non-Response Biasness through Mann-Whitney-U-Test

	OP	IC	OIC
Mann-Whitney U	7055.500	7608.500	9331.000
Wilcoxon W	16646.500	17199.500	18647.000
Z	-3.553	-2.710	-.081
Asymp. Sig. (2-tailed)	.520	.657	.936

The results introduced in Table below indicate that the notable quantity in any construct is at the very least or equivalent to 0.5 likelihood value. Therefore, it can be said that in this paper, non-response bias is negligible. A descriptive investigation was done for all constructs and questions. The statistic profile of the members is checked on as far as gender, position in organization and education foundation. Regarding gender, roughly 75% of participants were male and the rest of them (25%) were female. All of the participants were business managers. Majority of respondent indicated having undergraduate degree (52%), with 33% of them having a master's degree. Another 7% of them indicated having a PhD degree, while 4% were school leavers.

The results of descriptive statistics of variables is untaken in Table below that shows there are 5 constructs and 66 items are collected for the questionnaire, the result shows that maximum average is related to OP (mean = 4.0573) and minimum is related to the OIC (mean = 3.9245) variable and IC construct was above medium level in seven-point scale (i.e., Mean = 4.0004).

Table 4: Descriptive Statistics on Variables

Construct	Item	Mean	Std. Deviation
OP	13	4.0573	.92802
IC	19	4.0004	.92736
OIC	34	3.9245	.86910

4.1 Hypothesis Testing

At this step, the relationships among latent variables (hypothesis testing) are examined. Subsequent to running a PLS model, estimations are made in regard to the path coefficients, which denote the hypothesized relationships

that link the constructs. The path coefficient values are standardized on values ranging between -1 and + 1, with coefficients closer to +1 (which denote strong positive relationships) and coefficients closer to -1 (which denote strong negative relationships). It is true that the values that are close to -1 or +1 are almost always statistically significant; though, there is a need to obtain a standard error with the use of bootstrapping in order to test for significance.

4.2 The Effect of intellectual capital and organizational innovation capability

The effect of intellectual capital on organizational innovation capability was the first hypothesis. The results indicated that intellectual capital has positive and significant effect on organizational innovation capability ($\beta = 0.1876$; $t = 3.6513$).

4.3 The Effect of Organizational Innovation Capability and Organizational Performance

The effect of organizational innovation capability on organizational performance was the fourth hypothesis. The results established that organizational innovation capability has a positive effect on Project performance ($\beta = 0.2144$, and $t = 2.077$).

4.4 The Effect of Intellectual Capital and Organizational Performance

The effect of Intellectual Capital on Project performance was fifth hypothesis. As demonstrated by the obtained results, IC positively affects the organizational performance ($\beta = 0.2159$ and $t = 3.2566$).

5 Discussion

5.1 The relationship between IC and OIC

A positive and significant relationship between IC and organizational innovation capability is assumed by the first research hypothesis. The obtained results confirmed the existence of a positive and significant relationship between IC and IOC ($\beta = 0.1876$; $t = 3.6513$). This indicate that for every 1% of increase in intellectual capital elements (i.e. comprised of human capital, structural capital and relational capital), auto-part manufacturers' innovative capability would increase by 18.76%. This implies that the role of intellectual capital in pushing the dimension of innovative capability of the automation industry in Iran remains crucial. This finding is consistent with the findings presented by Abeysekera [46] and Lopez [43-59]. These authors found intellectual capital to have a positive effect on organizational innovation capability. On a more recent note, Han and Li [67] found intellectual capital having a significant effect on innovative performance in Chinese firms. The importance of these dimensions was examined by Mariz-Pérez et al. [68], Sumedrea [69] and Kalkan et al. [70] amongst others. The general consensus is that innovation is a necessity for organizations, should they aim to be competitive.

5.2 The Relationship between OIC and OP

The relationship between organizational innovation capability and organizational performance was the second hypothesis. The result showed that a positive and significant relationship between organizational innovation capability

and organizational performance ($\beta = 0.2144$; $t = 2.077$), which implies 1% increased innovation capability leading to a 20.44 % increased organizational performance. This is quite a substantial relationship in Iranian automobile industry. Higher productivity, better profitability [53], lead times, quality, and flexibility [55] seem to have been experienced by the auto-part firms in Iran. This could be attributed to the fact that Iranian automobile industry is leveraged upon the push for innovative product development, thus lack of it may hinder performance. The economic condition (e.g. sanctions and other) requires the auto firms to be constantly innovating in order to achieve growth.

Table 5: The Results of Main Hypotheses

	Path coefficient (β)	Standard Error (SE)	t-value
IC -> OIC	0.1876	0.0514	3.6513
OIC -> OP	0.2144	0.1032	2.077
IC -> OP	0.2159	0.0663	3.2566

Table 6: The Mediating Effect of OIC on the Relationship between IC and OP

	IC -> OP	IC -> OIC	OIC -> OP
Beta	0.9441	0.9611	0.9523
SE	0.0056	0.0031	0.0058
t-value	169.7241	308.7581	165.584
IC -> OP Mediated by OIC			
	IC -> OP	IC -> OIC	OIC -> OP
Beta	0.3815	0.9597	0.5841
SE	0.059	0.0035	0.0602
t-value	6.4641	272.8263	9.7024
Type of mediation: Partial			
Sobel Z value: 145.098 significance at $p < 0.000$			

5.3 The Relationship between IC and OP

The relationship between intellectual capital and organizational performance was the fifth hypothesis. The obtained results showed a positive and significant relationship between organizational innovation capability and organizational performance ($\beta = 0.2159$; $t = 3.2566$), that shows when one percent of intellectual capital increases, leads to a rise in organizational performance by 21.59% in

the sample Iranian auto-part manufacturing companies. It has a high consistency with findings reported in related literature [56]. If companies invest in human capital, relational capital, and structural capital, they achieve a significant improvement in their business performance. The higher the employee's absorptive capacity and cognitive ability are, the better organisation's performance would be. Similarly, efficient relationship management with all stakeholders as well as having structured processes, systems and infrastructure, would lead to improved business performance. This has been evidenced in this study, in the context of Iranian firms.

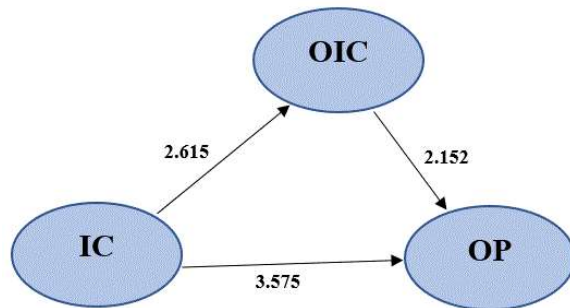


Figure 2: Graphical model of t-value

6 Conclusion

It is a long time literature has been loaded with lots of studies conducted into the significance of innovation in the enhancement of organizational performance. Different researchers have investigated different factors in a way to explore the factors with the most significant effect on innovative capabilities of companies and also the ways to translate them into business performance in different contexts. However, a review of literature showed that the Iranian automotive-parts manufacturing companies have not been exposed to such studies. As a result, these companies were investigated in this paper, and the obtained results showed the high significance of all considered variables in driving innovative capabilities in the Iranian companies. The intellectual capital was found highly significant in the Iranian context. Likewise, the mediation effect of innovative capability was found equally significant to the organizational performance. The present paper suggests a number of relevant practical and theoretical implications. If the innovative culture and intellectual capital are well concentrated, the Iranian automotive industry has the potential to achieve greater success. If Iranian companies get more engaged in concentrating innovative activities such as developing the capabilities, improving the cultural settings, and efficiently managing the external issues or events, then the shrinking economic state in Iran can be deferred.

Aknowledgment

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Ethical issue

Authors are aware of, and comply with, best practice in publication ethics specifically with regard to authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests and compliance with policies on research ethics. Authors adhere to publication requirements that submitted work is original and has not been published elsewhere in any language.

Competing interests

The authors declare that there is no conflict of interest that would prejudice the impartiality of this scientific work.

Authors' contribution

All authors of this study have a complete contribution for data collection, data analyses and manuscript writing

References

- [1] Lendel V, Varmus M. Evaluation of the innovative business performance. *Procedia-Social and Behavioral Sciences*. 2014 May 15;129:504-11
- [2] Statista GE. Waste-Statistics & Facts, 2018.
- [3] Cruz Alvarez J, Blanco-Jiménez M, Guerra-Moya S. Automotive Industry: Competitive Strategy and Challenges in the Pacific Alliance (Mexico, Chile, Colombia, and Peru). In *Regional Integration in Latin America: Dynamics of the Pacific Alliance* 2019 May 30 (pp. 29-43). Emerald Publishing Limited.
- [4] Felton A, Reinhart C. The First Global Financial Crisis of the 21st Century Part II: June–December, 2008. Centre for Economic Policy Research; 2011 May.
- [5] Mohr D, Müller N, Krieg A. The road to 2020 and beyond: What's driving the global automotive industry? Mc Kinsey & Company. Inc. Stuttgart. 2013.
- [6] http://www.idro.ir/en-us/About/Pages/About_Us.aspx
- [7] Automotive Industry", Supply Automotive Parts Company's (SAPCO)
- [8] Goudarzi, H. The history of the automotive industry: The Automobile Association released after sales service companies 2013.
- [9] Rooney J, Dumay J. Intellectual capital and innovation. In *The Routledge companion to intellectual capital* 2018 Jan (pp. 185-195). Routledge, Taylor and Francis Group.
- [10] Asiaei K, Jusoh R, Bontis N. Intellectual capital and performance measurement systems in Iran. *Journal of Intellectual Capital*. 2018 Mar 12;19(2):294-320.
- [11] Hussinki H, Ritala P, Vanhala M, Kianto A. Intellectual capital, knowledge management practices and firm performance. *Journal of Intellectual Capital*. 2017 Oct 9;18(4):904-22.
- [12] Sardo F, Serrasqueiro Z. Intellectual capital, growth opportunities, and financial performance in European firms: Dynamic panel data analysis. *Journal of Intellectual Capital*. 2018 Jul 9;19(4):747-67.
- [13] Jordão RV, Novas JC. Knowledge management and intellectual capital in networks of small- and medium-sized enterprises. *Journal of Intellectual Capital*. 2017 Jul 10;18(3):667-92.
- [14] Wang Y, Su X, Wang H, Zou R. Intellectual capital and technological dynamic capability: evidence from Chinese enterprises. *Journal of Intellectual Capital*. 2019 Jul 26.
- [15] Xu J, Li J. The impact of intellectual capital on SMEs' performance in China. *Journal of Intellectual Capital*. 2019 Jul 26.
- [16] Bontis N, Janošević S, Dženopoljac V. Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management*. 2015 Aug 10;27(6):1365-84.

- [17] Cenciarelli VG, Greco G, Allegrini M. Does intellectual capital help predict bankruptcy?. *Journal of Intellectual Capital*. 2018 Mar 12;19(2):321-37.
- [18] Ginesti G, Caldarelli A, Zampella A. Exploring the impact of intellectual capital on company reputation and performance. *Journal of Intellectual Capital*. 2018 Oct 8;19(5):915-34.
- [19] McDowell WC, Peake WO, Coder L, Harris ML. Building small firm performance through intellectual capital development: Exploring innovation as the "black box". *Journal of business research*. 2018 Jul 1;88:321-7.
- [20] Bontis N. Intellectual capital: an exploratory study that develops measures and models. *Management decision*. 1998 Mar 1;36(2):63-76.
- [21] Smriti N, Das N. The impact of intellectual capital on firm performance: a study of Indian firms listed in COSPI. *Journal of Intellectual Capital*. 2018 Oct 8;19(5):935-64.
- [22] Bontis N. Managing an organizational learning system by aligning stocks and flows of knowledge: An empirical examination of intellectual capital, knowledge management, and business performance. 1999.
- [23] Khan B, Farooq A, Hussain Z. Human resource management: an Islamic perspective. *Asia-Pacific Journal of Business Administration*. 2010 Apr 20;2(1):17-34.
- [24] Edvinsson L, Malone MS. Intellectual capital: The proven way to establish your company's real value by finding its hidden brainpower. *Piatkus*; 1997.
- [25] Stewart G. Supply-chain operations reference model (SCOR): the first cross-industry framework for integrated supply-chain management. *Logistics information management*. 1997 Apr 1;10(2):62-7.
- [26] Grasenick K, Low J. Shaken, not stirred: defining and connecting indicators for the measurement and valuation of intangibles. *Journal of intellectual capital*. 2004 Jun 1;5(2):268-81.
- [27] Hashim MJ, Osman I, Alhabshi SM. Effect of intellectual capital on organizational performance. *Procedia-Social and Behavioral Sciences*. 2015 Nov 25;211:207-14.
- [28] Amrizah K, Nawal K. The Relationship between Human Resource Management and Islamic Microfinance Providers' Performance: The Mediating Role of Human Capital. *International Journal of Business and Social Science*. 2013;4(16):52-7.
- [29] Cabrita MD, Bontis N. Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*. 2008 Jan 1;43(1-3):212-37.
- [30] Meles A, Porzio C, Sampagnaro G, Verdoliva V. The impact of the intellectual capital efficiency on commercial banks performance: Evidence from the US. *Journal of Multinational Financial Management*. 2016 Sep 1;36:64-74.
- [31] Anh NT, Hui L, Khoa VD, Mehmood S. Relational capital and supply chain collaboration for radical and incremental innovation. *Asia Pacific Journal of Marketing and Logistics*. 2019 May 2.
- [32] Perdomo-Ortiz J, González-Benito J, Galende J. Total quality management as a forerunner of business innovation capability. *Technovation*. 2006 Oct 1;26(10):1170-85.
- [33] Laforet S. A framework of organisational innovation and outcomes in SMEs. *International Journal of Entrepreneurial Behavior & Research*. 2011 Jun 14;17(4):380-408.
- [34] Martínez-Román JA, Gamero J, Tamayo JA. Analysis of innovation in SMEs using an innovative capability-based non-linear model: A study in the province of Seville (Spain). *Technovation*. 2011 Sep 1;31(9):459-75.
- [35] Saunila M, Ukko J. Facilitating innovation capability through performance measurement: A study of Finnish SMEs. *Management Research Review*. 2013 Sep 6;36(10):991-1010.
- [36] Saunila M, Pekkola S, Ukko J. The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*. 2014 Jan 13;63(2):234-49.
- [37] Richard PJ, Devinney TM, Yip GS, Johnson G. Measuring organizational performance: Towards methodological best practice. *Journal of management*. 2009 Jun;35(3):718-804.
- [38] Sink DS, Tuttle TC. Planning and measurement in your organization of the future. *Industrial Engineering And Management*; 1989.
- [39] Van Aartsengel A, Kurtoglu S. A guide to continuous improvement transformation: Concepts, processes, implementation. *Springer Science & Business Media*; 2013 Mar 2.
- [40] Riahi-Belkaoui A. Intellectual capital and firm performance of US multinational firms: a study of the resource-based and stakeholder views. *Journal of Intellectual capital*. 2003 Jun 1;4(2):215-26.
- [41] Ashton RH. Intellectual capital and value creation: a review. *Journal of accounting literature*. 2005;24:53.
- [42] Pew Tan H, Plowman D, Hancock P. The evolving research on intellectual capital. *Journal of intellectual capital*. 2008 Oct 17;9(4):585-608.
- [43] Abeysekera I. Intellectual capital disclosure trends: Singapore and Sri Lanka. *Journal of Intellectual capital*. 2008 Oct 17;9(4):723-37.
- [44] Martín de Castro G, López Sáez P. Intellectual capital in high-tech firms: The case of Spain. *Journal of Intellectual Capital*. 2008 Jan 18;9(1):25-36.
- [45] Chen MC, Cheng SJ, Hwang Y. An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of intellectual capital*. 2005 Jun 1;6(2):159-76.
- [46] Lu LY, Yang C. The R&D and marketing cooperation across new product development stages: An empirical study of Taiwan's IT industry. *Industrial marketing management*. 2004 Oct 1;33(7):593-605.
- [47] Hashi I, Stojčić N. The impact of innovation activities on firm performance using a multi-stage model: Evidence from the Community Innovation Survey 4. *Research Policy*. 2013 Mar 1;42(2):353-66.
- [48] Rhee J, Park T, Lee DH. Drivers of innovativeness and performance for innovative SMEs in South Korea: Mediation of learning orientation. *Technovation*. 2010 Jan 1;30(1):65-75.
- [49] Sanz-Valle R, Naranjo-Valencia JC, Jiménez-Jiménez D, Perez-Caballero L. Linking organizational learning with technical innovation and organizational culture. *Journal of Knowledge Management*. 2011 Oct 25;15(6):997-1015.
- [50] Leiponen A. Competencies, innovation and profitability of firms. *Economics of innovation and new technology*. 2000 Jan 1;9(1):1-24.
- [51] Cefis E, Ciccarelli M. Profit differentials and innovation. *Economics of Innovation and New Technology*. 2005 Jan 1;14(1-2):43-61.
- [52] Armbruster H, Bikfalvi A, Kinkel S, Lay G. Organizational innovation: The challenge of measuring non-technical innovation in large-scale surveys. *Technovation*. 2008 Oct 1;28(10):644-57.
- [53] Peng DX, Schroeder RG, Shah R. Linking routines to operations capabilities: A new perspective. *Journal of operations management*. 2008 Nov 1;26(6):730-48.
- [54] Murat Ar I, Baki B. Antecedents and performance impacts of product versus process innovation: Empirical evidence from SMEs located in Turkish science and technology parks. *European Journal of Innovation Management*. 2011 Apr 26;14(2):172-206.
- [55] Sok P, O'Cass A, Sok KM. Achieving superior SME performance: Overarching role of marketing, innovation, and

- learning capabilities. *Australasian Marketing Journal (AMJ)*. 2013 Aug 1;21(3):161-7.
- [56] Hang Chan K. Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 1). *The Learning Organization*. 2009 Jan 9;16(1):4-21.
- [57] Chen JJ. Determinants of capital structure of Chinese-listed companies. *Journal of Business research*. 2004 Dec 1;57(12):1341-51.
- [58] Tseng CY, James Goo YJ. Intellectual capital and corporate value in an emerging economy: empirical study of Taiwanese manufacturers. *R&D Management*. 2005 Mar;35(2):187-201.
- [59] López-Iturriaga FJ, Rodríguez-Sanz JA. Capital structure and institutional setting: a decomposition and international analysis. *Applied Economics*. 2008 Jul 1;40(14):1851-64.
- [60] Agorastos T, Dinas K, Lloveras B, de Sanjose S, Kornegay JR, Bonti H, Bosch FX, Constantinidis T, Bontis J. Human papillomavirus testing for primary screening in women at low risk of developing cervical cancer. The Greek experience. *Gynecologic oncology*. 2005 Mar 1;96(3):714-20.
- [61] Mavridis DG. The intellectual capital performance of the Japanese banking sector. *Journal of Intellectual capital*. 2004 Mar 1;5(1):92-115.
- [62] Kline RB. *Principles and practice of structural equation modeling*. Guilford publications; 2015 Nov 3.
- [63] Hair JF, Anderson RE, Tatham RL, William C. Black (1998). *Multivariate data analysis*. 1998;5:87-135.
- [64] Tabachnick BG, Fidell LS, Tabachnick BG, Fidell LS. Chapter 13 principal components and factor analysis. *Using multivariate statistics*. London: Pearson. 2012.
- [65] Pallant J, Manual SS. *A step by step guide to data analysis using SPSS*. Berkshire UK: McGraw-Hill Education. 2010.
- [66] Atif SM, Srivastav M, Sauybekova M, Arachchige UK. Globalization and income inequality: a panel data analysis of 68 countries.
- [67] Han Z, Li J, Singh M, Aglyamov SR, Wu C, Liu CH, Larin KV. Analysis of the effects of curvature and thickness on elastic wave velocity in cornea-like structures by finite element modeling and optical coherence elastography. *Applied physics letters*. 2015 Jun 8;106(23):233702.
- [68] Mariz-Pérez RM, Teijeiro-Alvarez MM, Garcia-Alvarez MT. The relevance of human capital as a driver for innovation. *Cuadernos de economia*. 2012 May 1;35(98):68-76.
- [69] Sumedrea S. Intellectual capital and firm performance: A dynamic relationship in crisis time. *Procedia Economics and Finance*. 2013 Jan 1;6:137-44.
- [70] Kalkan A, Bozkurt ÖÇ, Arman M. The impacts of intellectual capital, innovation and organizational strategy on firm performance. *Procedia-Social and Behavioral Sciences*. 2014 Sep 15;150:700-7.

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Appendix: Examination of Normality

Item	Skewness	Kurtosis	Item	Skewness	Kurtosis
IC1	-.160	-.622	OIC15	-.376	-.617
IC2	-.422	-.538	OIC16	-.033	-.609
IC3	.062	-.931	OIC17	.059	-.679
IC4	.213	-.402	OIC18	-.336	-.605
IC5	.133	-.223	OIC19	-.131	-.787
IC6	-.187	-.774	OIC20	-.082	-.530
IC7	-.204	-.422	OIC21	-.191	-.147
IC8	.080	-.732	OIC22	-.422	-.538
IC9	-.283	-.834	OIC23	.109	-.498
IC10	-.210	-.666	OIC24	-.160	-.622
IC11	-.236	-.859	OIC25	-.093	-.264
IC12	-.304	-.709	OIC26	-.336	-.605
IC13	-.160	-.878	OIC27	-.214	-.418
IC14	.415	-.320	OIC28	.080	-.732
IC15	-.022	-.911	OIC29	-.287	-.842
IC16	-.142	.009	OIC30	-.206	-.679
IC17	-.151	-.880	OIC31	-.231	-.842
IC18	-.115	-.764	OIC32	-.296	-.714
IC19	-.136	-.903	OIC33	-.219	-.684
OIC1	-.336	-.605	OIC34	-.192	-.641
OIC2	.022	-.312	OP1	-.160	-.622
OIC3	-.148	-.561	OP2	-.093	-.264
OIC4	.274	.008	OP3	.133	-.223
OIC5	.012	-.462	OP4	.415	-.320
OIC6	.093	-.500	OP5	-.153	-.815
OIC7	.076	-.350	OP6	-.078	-.962
OIC8	-.141	-.360	OP7	-.142	.009
OIC9	-.168	-.994	OP8	-.079	-.588
OIC10	.149	-.179	OP9	-.127	-.786
OIC11	-.309	-.593	OP10	-.336	-.605
OIC12	.109	-.498	OP11	-.168	-.994
OIC13	.059	-.679	OP12	.065	-.647
OIC14	-.067	-.832	OP13	.059	-.679