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Research & Development of Digital Marketing and Innovation in Commercial Automotive Industry

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Abstract

Automotive industry particularly, commercial automotive industry, ranks as a key industry in the economic growth. The necessity of investigating the research & development(R & D) activities of digital marketing and innovation in the form of a dynamic system in automotive industry based on the 3 variables: empowerment of supply network, of product innovation, and of digital marketing is quite undisputed. The present research has been done with a view to identifying and evaluating the cause-and-effect interdependent relations governing the variables of R & D of digital marketing and innovation in commercial automotive industry. The research is typically applied, and has been done using the descriptive-survey method. The research community consisted of 50 experts; all with acceptable academic backgrounds and years of experience as

executive managers and marketeers in the R & D of automotive industry. To analyze the data, the views of some elected experts on automotive industry, along with Delphi fuzzy and Dematel method were applied. Our findings showed that the variable "Intensity of R & D of digital marketing and innovation" has the most effect on the other variables. The variable "Empowerment of supply network" with the score of 3,25 has the largest amount of interaction with the other variables. Also, the variable " Empowerment of R & D in digital marketing and innovation" with the score of 1,08 has the smallest amount of interaction with the other variables. The results of this research show that the intensity of competitiveness and that of R & D are two causal variables in the R & D of digital marketing and innovation in automotive industry. Also, the empowerment of R & D of digital marketing, the empowerment of supply network internalization , innovation and process digitization, and product innovation are 4 variables resulted from or inspired by R & D. Accordingly, the limited size or quantity of production, a short-termed economic outlook on the sale of products, lack of motive for internalization, and product expansion, are the factors influencing the causal variables.

Keywords: Research & Development (R & D), digital marketing, innovation, industry of commercial automotives, Fuzzy techniques

Introduction

R & D is a viable, coherent process composed of basic researches, applied researches, and developmental researches the practical results of which, at each stage forms the repository of knowledge used to create products of processes (Anibal et al,2017). As a prominent valuable portal the knowledge treasures are regarded as the origin of ideas and new inventions (Latipova,2015).R & D is coming up with new ideas on products, processes and services and the application of knowledge to create products, processes and new developed services covering the needs of the market (Kaisa et al, 2016). Based on the endogenous growth patterns, technological progress and R& D are known as growth engine (Anibal et al,2017). The point is turning to R & D without establishing the required infrastructure including the manpower empowerment and organizational strategies, can cause the failure of R & D process at economic agencies (Yan Chen,2018). We can see that during the past decades the automotive industry has globalized. On the other hand, this globalization has brought about the new competitive conditions , and the international attitude of completing chain value in this industry (Shah Hosseini et al,2017). Based on the international reports, automotive industry after computer ,electronics and hygiene among industries, has got the largest share of expenses allocated to R & D (Statista report, 2019).

According to the latest findings of the International Organization, the amount of investment in research and development in the automotive industry globally in 2018, with a growth of 1.5 percent over the previous year, was equivalent to 98.2 billion dollars (Estika, 2019).

The five largest automobile-manufacturers Daimler, Toyota, Ford and BMW are among the 25 largest companies in the world in terms of investment in research and development. According to the 2018 R&D Annual Report, Daimler spent more than $ 11 billion, followed by Toyota with more than $ 10 billion, and Ford with more than $ 8 billion on research and development (Estika, 2019). It should be noted that with the complexity and globalization of the competitive business environment, research and development of new products is one of the most important sources of creating a competitive advantage (Drota et al., 2016). On the other hand, strengthening research and development in the automotive industry has had a significant impact on increasing the two factors of increasing corporate profit margins and sales (Jutty,

2017). In general, improving and developing existing products, access to new technologies, accelerating the introduction of new products, and limiting strategic risks are among the research and development strategies (Barigan et al., 2018). In terms of planning the development of the automotive industry, Iran has been a pioneer by comparison with such countries as India, China, South Korea and Turkey. However, despite having various industrial development plans, unlike some of the above countries, our automotive industry has slightly progressed. By studying and investigating the researches, it is observed that in the field of reviewing the cycle of research and development activities in the commercial automobile industry in the country, very few research activities have been carried out ,with a case-study focused on one particular automobile-manufacturing company ,and in most of conducted researches statistical and econometric tests were used to examine the dimensions of research and development in a company. The present study seeks to answer the following questions:

1) What are the effective variables in research and development in the commercial automotive industry?

2) How can the cause-and-effect interdependent relations of R&D variables in digital marketing and innovation in the commercial automotive industry be evaluated?

Research literature

Barigan et al. (2018) in their research entitled " Industrial Cooperation and Success at University Level" examined the moderating effect of innovation and mutual cooperation between companies, and stated that cooperation with science-based or market-based partners is a promising tool for R & D groups, so that using their expertise and additional resources they could produce innovative results. Anibal et al. (2017) in their research entitled "Classification of research and development projects and selection of research and development project management type" stated that currently, the dispersion and diversity of research and development project management methods and their classification cause problems affecting the selection of a proper managerial concept for R & D. Yan Chen (2018) in his research entitled "Relative adaptation to the intensity of research and development goal", has provided a framework to examine the dynamics of firms in relation to the intensity of research and

development goal. Firms usually do not directly or completely adjust themselves to the intensity of their research and development goals. They usually consider half the gap between past research and development intensity and their goal in a year. Kaiza Hannten et al. (2016) in their research entitled" Management of the Suitability of R&D Collaboration" stated that R&D collaboration with different types of external stakeholders is increasingly important for companies pursuing innovation-related goals. Slowly However, collaboration with actors including customers, suppliers, competitors, and research organizations has created risks associated with knowledge leakage and potential abuse of created value. In a study, Thomas et al. (2013) examined research and development and its impact on performance. In this research, the relationship between research and development and the efficiency obtained from several research and development indicators have been considered. The results of this study show that 10% growth in development research per capital causes 1.6% growth in revenue in the long run. Aron et al. (2002) in a study examined the impact of investment on research and development in the performance of companies. In this study, he compared the impact of investment on research and development on corporate performance between American and Taiwanese companies. Latipova (2015) in a study examined the impact of patents on research and development. The results of this research show the positive impact of patents on research and development. Diam et al. (2017) in a study examined the impact of research and development and capital on unrealistic pricing (pricing below par value) of high-tech products. In this study, they have considered the uncertainty of data as an effective factor in pricing. In fact, this data uncertainty and lack of information cause pricing to be lower than usual. Lai et al. (2015) in a study examined the factors affecting research and development in industrial companies. In their study of factors such as human resources, they considered patents. In this study, they analyzed seven basic factors, among which human resources is the most important and influential factor in the development of research and development in organizations. Jung et al. (2010) in a survey investigated the effect of R&D and networking on the export decisions of Japanese companies and firms. The results of this study show that cooperation with companies and international cooperation have a significant impact on companies' export decisions. Shah Hosseini et al. (2017) examined the management of strategic

research and development alliances in the Iranian automotive industry with a networking approach. Samadi Moghadam et al (2017) looked into the empowerment factors of R & D centers and their effect on technology transfer methods in investment. Ghazi Nouri et al. (2017) investigated factors affecting the cost of Iran's business sector in research and development activities; Dorsa et al. (2016) examined the impact of R&D spending on firm value. Criteria considered for market value include operating profit, dividend, operating assets, book value and other information (Jutty, 2017). Juliana et al. (2010) studied the impact of R&D Cost on Competitive Market Share of R&D Relationship, Hans (2003) looked into the impact of R&D Strategies on New Product Development Performance with Emphasis on the Role of R&D Team, Mead (2002) focused on R&D system design in large companies by examining the R&D process of designing a conceptual model for planning and controlling R&D activities. The following table summarizes the external and internal research related to R&D.

Table (1): External and internal research related to the subject of research and development

Variables related to R&D activities	
Intensity of competitiveness	Daim et al., (2017), Jung et al., (2010), Dorota et al., (2016)
Supply network capability	Daim et al., (2017), Jung et al., (2010), Arun et al., 2002)
Process innovation and digitization	Gasbi et al., (2016), Jung et al., (2010), Juliana et al., (2011)
Product innovation	Daim et al., (2017), Jung et al., (2010), Latipova(2015), Dorota et al., (2016), Juliana et al., (2011), Aníbal et al., (2017)
Intensity of research and development	Latipova (2015), Dorota et al., (2016) , Arun et al., (2002)
Competition in digital marketing	Huang (2008), Aníbal et al., (2017), Arun et al., (2002)
Financial incentives	Daim et al., (2017), Jung et al., (2010), Juliana et al., 2011), Yu (2017), Thomas et al., (2013)
Economies of scale	Latipova (2015), Dorota et al., (2016) , Arun et al., (2002), Gasbi et al., (2016), Jung et al., (2010)
Research and development budget	Daim et al., (2017), Juite (2017), Juliana et al., (2011), Thomas et al., (2013), Hans (2003),

| Variables related to R&D activities	
	Barragán et al., (2018)
Capacity of research and development in digital marketing	Jung et al., (2010), Linton (2000), Latipova (2015), Juite (2017), Juliana et al., (2011), Oliver (2019)
Organizational support	Latipova (2015), Meade (2002), Dorota et al., (2016), Juite (2017), Juliana et al., (2011), Barragán et al., (2018)
Market share	Daim et al., (2017), Gasbi et al., (2016), Jung et al., (2010), Huang (2008), Meade (2002), Hans (2003)
Organizational strategies	Linton (2000), Dorota et al., (2016), Oliver (2019)

The studies show that in the field of the severity of causal factors in the development of research and development based on the functional characteristics of the company, no framework has been provided. Also, existing researches have tested hypotheses of research and development in the form of a single variable, and most of the researches have a qualitative approach. The need to study research and development activities in the form of a system in the studied industry based on performance and the use of modern scientific methods of data analysis is one of the most important research gaps.

Methodology

The present research in terms of purpose is applied and has been done with a survey-descriptive method. The research is based on interviews with experts and information obtained from interviews. Experts have been selected based on the type of relationship with the issue and their mastery of the subject of research and development from experienced managers in commercial automobile manufacturing companies in the country. 50 experts in this research were selected. Some of the main features for the selection of experts are: relevant work experience, master's degree and above and some work experience as executive managers in research and development field. You can see the demographic statistics of experts in Table (2).

feature	explanations	Abundance	Percentage
Education	PhD	9	%18
	MA/MS	29	%58
	Expert	12	%24
	Total	50	%100
Executive work experience	Above 25	12	%24
	Between 20 and 25	22	%44
	Between 15 and 20	16	%32
	Total	50	%100
Organizational position	University professor	4	%8
	Senior Manager	29	%58
	Middle manager	17	%34
	Total	50	%100

After carefully reviewing the theoretical literature of research and analysis of researchers' studies, in order to identify the variables affecting research and development activities in digital marketing and innovation, first a questionnaire based on research literature with 20 initial variables was designed and sent to expert members. The questionnaire identified a number of factors that are effective in determining the level of research and development activities in digital marketing and innovation according to the characteristics of the commercial automotive industry in the country. Then, according to the fuzzy Delphi methodology, open interviews related to the subject were conducted in three stages, and in each stage, information was analyzed using fuzzy set theory. Considering that in Delphi method, the agreement of experts is the criterion for decision-making, by putting together the content of interviews, the collected statistical information and also the data obtained from field research, the general agreement of experts on the classification was reached. The operational steps of fuzzy Delphi method algorithm are shown in Figure 1:

Figure 1. Fuzzy Delphi method process
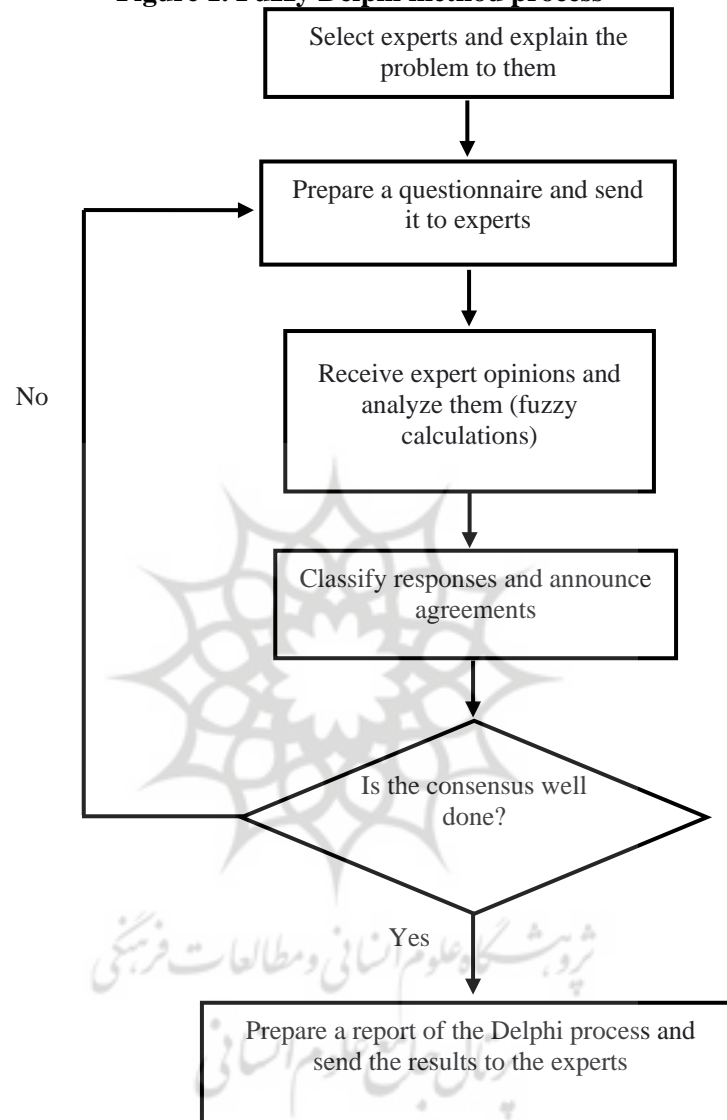
DeMatel method was used to investigate the cause and effect interdependent relationships between the variables in the system.

Findings:
Question 1 - What are the effective variables in research and development in the commercial automotive industry?

After a careful study of the theoretical literature of research and analysis of researchers' studies, the variables affecting research and development activities in digital marketing and innovation in the commercial automotive industry were identified, and are shown in Table 1 below:

Table 3. Identified variables

Row	Variables
1	Tariff policies
2	Government support
3	Intensity of research and development
4	Supply network capability
5	Innovation and digitization of processes
6	Product innovation level
7	Supply and demand policy
8	Income share
9	Manpower specialization
10	Competition in digital marketing
11	Financial incentives
12	Organizational Culture
13	Economies of scale
14	Research and development budget
15	Capacity of research and development in digital marketing
16	Organizational support
17	Market share
18	Organizational strategies
19	Organizational motivations
20	Organizational knowledge

In order to extract the variables effective on R & D in digital marketing and innovation in the commercial automotive industry, a panel was formed consisting of 50 experts. Then, according to the Delphi methodology, data was collected. A questionnaire with a Likert score of 9 was designed and sent to the experts with the aim of obtaining the opinions of experts about the effect of the identified variables. Experts had to determine the rate through linguistic variables. The use of variables with definite values makes it difficult for experts to comment. But by defining the range of qualitative variables, experts will answer the questions with the same mindset. Therefore, qualitative variables were defined as triangular fuzzy numbers in the following table:

Table 4. Definition of linguistic variables

Linguistic variables	A symbol	Triangular fuzzy number		
		a_1	a_2	a_3
very little	VL	0	0	2
Low	L	1	3	5
medium	M	3	5	7
Much	H	5	7	9
very much	VH	8	10	10

The purpose of the Delphi method is to achieve the most secure group agreement of experts on the subject. Finally, the variables were analyzed with the Delphi method using a questionnaire and a survey of experts in 3 rounds according to Table 5. Given that in the presented questionnaire, the opinions of experts were collected not only in the form of close questions, but also in the form of open questions. Ultimately out of totally 20 analyzed variables of the table below, on which the members agreed, 9 variables were picked by the experts.

7 variables in the second round and 5 variables in the third round were agreed on by the experts. It should be noted that the criterion of experts' agreement was the minimum error threshold in two rounds of 10% and the selection conditions of the average score variable were above 7.

Table 5. Delphi method evaluation results

Variable	first stage	second stage			Third stage			
	First round	The second round	Dispute	The result of the review The second round	The second round	Third round	Dispute	The result of the review The third round
Intensity of competitiveness	0.25	8.8	8.55	Re-poll	0.06	8.86	8.80	Consensus of experts
Supply network capability	0.26	8.82	8.56	Re-poll	0.04	8.86	8.82	Consensus of experts
Process innovation and digitization	0.02	8.9	8.88	Consensus of experts	–	-	–	–

Variable	first stage	second stage				Third stage			
	First round	The second round	Dispute	The result of the review The second round		The second round	Third round	Dispute	The result of the review The third round
Product innovation	0.05	8.6	8.55	Consensus of experts		–		–	-
Intensity of research and development	0.03	7.23	7.2	Consensus of experts		-	-	-	-
Competition in digital marketing	0.47	6.8	6.33	Re-poll		0.02	6.82	6.8	Consensus of experts
Financial incentives	0.24	6.01	6.77	Re-poll		0.04	6.05	6.01	Consensus of experts
Economies of scale	0.06	6.56	6.50	Consensus of experts		–	-	–	-
Research and development budget	0.05	8.82	8.77	Consensus of experts		-	-	–	-
Capacity of research and development in digital marketing	0.03	7.27	7.24	Consensus of experts		-	-	-	-
Organizational support	0.04	7.14	7.1	Consensus of experts		-	-	-	-
Market share	0.29	8.59	8.30	Re-poll		0.10	8.69	8.59	Consensus of experts

In the table above, the average final scores of each variable can be seen. The third column contains the variables that the experts agreed on in the second phase and the fourth column contains the variables that the experts agreed on in the third phase. In this study, according to the numbers obtained from de-fuzzy, the aggregation of experts' views has considered the number 7 as a confirmation threshold.

Table 6. Selection of research and development variables

Row	Variable	Average round score 2	Average round score 3	General condition
1	Intensity of competitiveness	-	8.86	Confirmation
2	Supply network capability	-	8.86	Confirmation
3	Process innovation and digitization	8.9	-	Confirmation
4	Product innovation	8.6	-	Confirmation
5	Intensity of research and development	7.23	-	Confirmation
6	Competition in digital marketing	-	6.82	disapproval
7	Financial incentives	-	6.05	disapproval
8	Economies of scale	6.56	-	disapproval
9	Research and development budget	8.82	-	Confirmation
10	Capacity of research and development in digital marketing	7.27	-	Confirmation
11	Organizational support	7.14	-	Confirmation
12	Market share	-	8.69	Confirmation

The findings of the table show that the variables of competitiveness intensity, supply network capability, process innovation and digitalization, product innovation, research and development intensity, research and development budget, research and development capability in digital marketing, organizational support, market share by experts were confirmed and selected. Competitive variables in digital marketing, financial incentives and economies of scale were not approved of and selected by experts. The following table shows these final variables.

Table 7. Final variables in fuzzy Delphi method

Row	Variables	Final score
1	Intensity of research and development	8.86
2	Supply network capability	8.86
3	level of innovation process	8.86
4	Product innovation level	8.86
5	Income share	7.23
6	Research and development budget	8.82
7	Research and development capabilities	7.27
8	Organizational support	7.14
9	Market share	8.59

Question 2: How can the cause-and-effect interdependent relations between R&D variables in digital marketing and innovation in the commercial automotive industry be evaluated?

Group DeMatel technique has been used to investigate the causal relationships. The purpose of using this technique is to divide the variables into two parts, causal and consequential. This technique, which is one of the multi-criteria decision making methods, is based on the principles of mathematical analysis of graphs. In the first step, according to the group decision-making technique, the research and development variables extracted in the previous step and the graph elements are placed at the vertices of a diagram. Experts were then asked to determine the intensity and direct permeability of each variable in pair comparisons. This intensity was determined as a score from 1 (without any effect) to 10 (highly effective). Then the average scores obtained for each variable on the personal diagram were calculated. The set of unlimited sequences of direct and indirect effects of elements on each other can be calculated as a geometric progression, based on the existing laws of graphs. Calculating this set will also require the use of the following equation.

$$S_{t \to \infty} = M + M^2 + M^3 + ... + M^t = \frac{M(I - M^t)}{(1 - M)}; \qquad Lim\, M^t{}_{t \to \infty} = 0$$

$$= \frac{M}{(1 - M)} = M(1 - M)^{-1}$$

Relationship (1)

The above relation calculates the possible intensity of all direct and indirect relations arising from the point of view of experts. Therefore, according to the above relation, we have:

Table 8. Existing relative intensity scales of direct and indirect relationships between variables

Variable	Intensity of competitiveness	Supply network capability	Process innovation and digitization	Product innovation	Capacity of research and development in digital marketing	Intensity of R&D
Intensity of competitiveness	0.12	0.41	0.43	0.47	0.34	0.04
Supply network capability	0.17	0.56	0.30	0.34	0.02	0.05

Variable	Intensity of competitiveness	Supply network capability	Process innovation and digitization	Product innovation	Capacity of research and development in digital marketing	Intensity of R&D
Process of innovation and digitization	0.10	0.34	0.01	0.01	0.01	0.03
Product innovation	0.10	0.33	0.01	0.01	0.01	0.03
Capacity of research and development in digital marketing	0.31	0.04	0.04	0.04	0.03	0.10
Intensity of R&D	0.04	0.13	0.13	0.15	0.11	0.32

It should be noted that due to the nature of the three variables of research and development budget, market share and organizational support have a causal aspect, so it is not considered in the DeMatel analysis. In the next step, we specify the possible hierarchy or structure of the variable. The order in which a given variable influences another variable or their influence determines the possible structure of their hierarchy variable in solving the problem. For this purpose, in order to access the possible structure of direct and indirect relations, we examine the order of variables in terms of influencing each other and also their order in terms of being influenced in the table below.

Table 9. Order of permeability and effectiveness of decision-making variables

prioritization	Based on row sum (R)	prioritization	Based on column sum (J)
Intensity of competitiveness	1.81	Supply network capability	1.81
Supply network capability	1.44	Product innovation	1.03
Intensity of research and development	0.88	Process of innovation and digitization	0.93

prioritization	Based on row sum (R)	prioritization	Based on column sum (J)
Capacity of research and development in digital marketing	0.56	Intensity of competitiveness	0.84
Process innovation and digitization	0.51	Intensity of research and development	0.58
Product innovation	0.49	Capacity of research and development in digital marketing	0.52

The highest row sum (R) indicates the order of the variables that strongly influence the other variables (the R&D intensity variable has the greatest effect on other variables). The highest column set (J) indicates the order of the variables that have the most impact on other variables (the variable of supply network capability has the most interaction compared to other variables).

Table 10. The order of influence on the interaction of variables with each other

Ranking	Based on (R + J)	Ranking	Based on (R + J)
Supply network capability	3.25	Intensity of competitiveness	0.97
Intensity of competitiveness	2.65	Intensity of research and development	0.30
Product innovation level	1.52	Capacity of research and development in digital marketing	0.05
Intensity of research and development	1.45	Supply network capability	-0.37
Process of innovation and digitization	1.44	Process innovation and digitization	-0.42
Capacity of research and development in digital marketing	1.08	Product innovation level	-0.53

Therefore, the order of the variable from column (R) represents the hierarchy of penetrating variables and the order of the variable from column (J) indicates the hierarchy of variables under influence.

Therefore (R + J) specifies the sum of the effect and the effectiveness of the desired factor in the system. In other words, the factor that has the highest value (R + J) has the most interaction with other factors of the system, or rather these variables are the cause. The supply network variable with a score of 3.25 has the most interaction with other variables. Also, the R&D capability variable in digital marketing has the least interaction with other variables with a score of 1.08. The final (only) value of the effect of each factor on the sum of other factors of the system is also obtained from the difference (R-J).

$$R > J \Rightarrow R - J > 0 \quad \rightarrow \text{The variable is a definite influencer.}$$

Relationship (2)

$$R < J \Rightarrow R - J < 0 \quad \rightarrow \text{The variable is a definite susceptible.}$$

According to the above table, a Cartesian coordinate system was formed so that its longitudinal axis is calibrated in terms of values (R + J) and its transverse axis is calibrated in terms of (R-J), and the position of each factor with a point to the coordinates. (R + J, R-J) A: was specified on this device. A simple graphical view of the final structure of the system is obtained. The results show that the variables of research intensity and development and the intensity of competitiveness resulting from the output of research and development are causal variables in the cycle of research and development activities and other variables are consequential by nature.

Figure 2. Coordinates of causal variables in research and development
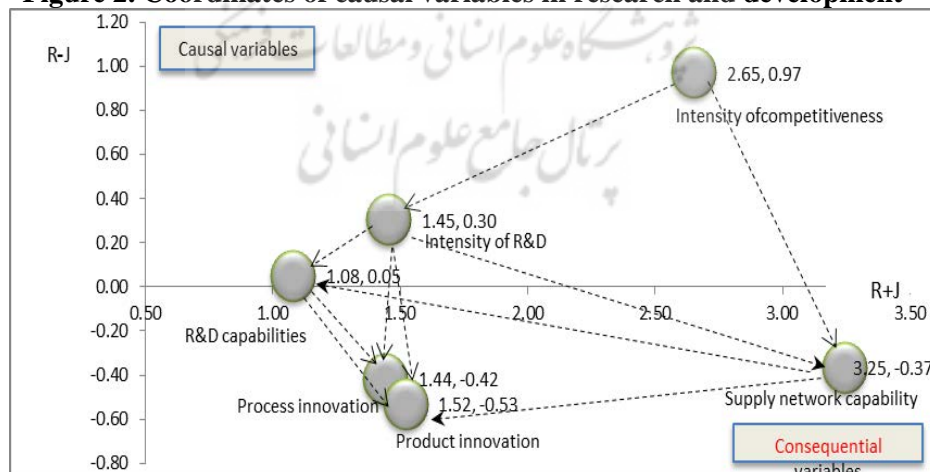
Discussion and conclusion

A study of the commercial automotive industry in the country shows that due to its high role in the value of Rial sales of automobile companies, there is no specific strategy for the development of domestic branded products, and on the other hand, there is no specific policy in this regard . All partnerships have involved assemblage or licensed manufacture. No joint venture agreements have been reached in this area and a small number of world-class companies has entered the Iranian market in a limited way, While they make their strong presence felt in other countries and markets such as emerging markets or countries called the BRIC Group (Russia, China, India and Brazil) and Turkey, and mostly cooperate in the form of joint venture agreements, but they show no inclination as to take part in Iranian automotive joint investment projects. The automotive industry, especially the commercial automobile industry, is considered as a key industry in economic growth; Therefore, the development of this part of the industry is one of the programs that takees place in most developing countries. For this reason, many researches have been focused on R & D capabilities and empowerment.

In this research, an attempt was made to examine the most important capabilities of research and development activities in the commercial automotive industry. In order to identify influential and susceptible or impressionable variables in research and development, 9 variables are analyzed based on the output of Delphi method. Another causal variable in research and development is the intensity of competitiveness of automobile manufacturing companies. According to studies, the intensity of competitiveness of domestic automobile manufacturers compared to internationally renowned ones is very weak. In Research (Aibal et al., 2017), (Yan Chen, 2018); (Kaiza Hannten et al., 2016) and (Latipova, 2015) various factors affect the intensity of competitiveness. Among them, the price, speed of delivery, quality and reliability of the product and flexibility can be mentioned. Analysis of competition in digital marketing of commercial automobile companies in the country also showed that the market share is mainly in the hands of international brands.

Another causal variable in R&D is the amount of R&D budgets and the share of sales allocated. According to the researches, the share of research and development budget from the annual sales of domestic companies of international automobile manufacturers is international. According to previous research, various factors affect the intensity of

research and development including intellectual property rights (Latipova, 2015), investment risks in research and development (Shah Hosseini et al., 2017), economies of scale (Yan Chen, 2018), industrial structure (Thomas et al., 2013) and access to financial resources (Barigan et al., 2018) can be mentioned.

The results of this study show the intensity of competitiveness and the intensity of research and development of two causal variables in research and development as well as research and development capabilities in digital marketing, supply network internalization capability, process innovation and digitization and product innovation are four consequential or susceptible variables in R&D. The R&D capability/empowerment in the commercial automotive industry is directly dependent on R&D intensity as well as the supply chain internalization capability , which requires the following: capacity building in attracting resources and cycles of technical and engineering learning, design and construction, and technology development.

Policy makers and executives of manufacturing companies are advised to develop this capability in the form of research and development projects. The intensity of competition in digital marketing in the commercial automotive industry directly affects the capabilities of the supply chain, the level of product innovation, and the level of innovation and digitization process, which requires the allocation of resources and organizational support, so it is suggested to policy makers and executives of manufacturing companies that they allocate research and development budget share of sales, develop and export market share and share of profits, and also they look forward to research and development projects.

One of the key factors in profitability is the improvement of production capacity and research activities, development and investment, which will lead to the improvement of technology and innovation, and ultimately competitive advantage. Research and development intensity is a key variable in developing R&D capabilities in digital marketing and innovation. The weak share of research and development budget along with the low and limited market share and the lack of proper investment bring the research and development capability in digital marketing and innovation to its nadir. Therefore, it is suggested that the necessary measures be taken in the field of digital marketing of product sales along with appropriate investment in research and development.

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