







Identifying the Effective Factors in the Change Management Model in the Automotive Industry Based on the General Policies of the Industry in the Fourth-Generation Industrial Revolution

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Abstract

Purpose: The main purpose of this study is to present a change management model in the automotive industry based on general industry policies in the fourth-generation industrial revolution.

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Method: To achieve this goal, first the effective factors and indicators affecting change management are identified based on the data model of the foundation and then these factors and indicators are categorized. Given that the purpose of this research is exploratory, the use of the grounded theory research method and semi-structured interviews with experts and professors led to the development of research model criteria.

Findings: Based on the interviews and previous studies, the factors affecting the management of change in internal and external categories have been identified. Finally, change management strategies have been identified in three components: selecting acceptable managers, using consultants and expert staff, and creating a sense of empathy and trust.

Conclusion: The use of expert managers and appropriate leaders causes change management to be implemented productively. Ultimately, these strategies result in increased survival under the components of greater brand acceptance and profitability. Change management strategies have been identified in three components: selecting acceptable managers, using consultants and expert staff, and creating a sense of empathy and trust. Changes are more about the individual's feelings than emotions and are technical, and associating them with change is the most difficult stage of change

Keywords: Change Management, Automotive Industry, Fourth-Generation Industrial Revolution, Smart Factory.

1. Introduction

At present, the business environment is witnessing profound and fundamental changes, and many experts in the field of trade and economics believe that this evidence indicates the beginning of a new era, the fourth industrial revolution (Sima et al., 2020). The growing trend of integrating industrial production and information and communication technology has brought the fourth industrial

revolution to the world of production (Arnold et al., 2016). This phenomenon makes it possible to connect information, objects, and people due to physical and virtual convergence (cyberspace) in the form of cyber-physical systems. Thus, it makes it possible to transform factories into smart environments (Herman et al., 2016). According to some authors, the fourth industrial revolution is the most powerful driver of innovation in the next few decades, which will start the next wave of innovation (Ibarra et al., 2018).

Business models that are used to create value for businesses are no longer efficient (Feng, Huang & Wang, 2018). If we look back 20 years ago, we find that there are only a handful of jobs that still do the same thing in the past. They either do things differently or do different things (Acharya, Singh & Preira, 2018). Today, in the 21st century, change and how to successfully manage it has become a vital issue in the minds of organizational leaders. Change happens everywhere, and its speed and complexity are increasing. The future success of organizations depends on how they lead change. In today's marketplace, change is a necessity for continued success (Lozano & Haartman, 2018).

Therefore, the main features related to the Fourth Industrial Revolution, such as real-time capability, interoperability, and horizontal and vertical integration of production systems through ICT systems, are answers to current challenges that companies must reduce as competition intensifies and global demand fluctuates. Innovation and product life cycle and increasing complexity of products and processes are in line with them (Thoben et al., 2017).

Organizations today spend millions on change efforts; Such as IT launch, supply chain, and reengineering; But they have not yet achieved the desired return on investment. Also, the methods used in these efforts have led to a lot of resistance and burnout in people, losing the morale of employees. Statistics show that in the last two decades, seventy percent of all change efforts have failed to produce the expected results (Benjamin & Peter, 2011). One important recent study that confirms this finding is the IBM study of 1,500 examples of

change management conducted in fifteen companies. They found that sixty percent of change efforts failed to achieve their goals (Ivanaj, Ivanaj, McIntyre & Docasta, 2017). The fact is that there is still debate over controversial issues in change management, the need for explanation as well as application and culture building in the works (Demers, 2009). This shows that despite the widespread attention to change management as one of the basic management skills in recent decades around the world and in different countries, this issue is still from attention to implementation in practice and finally institutionalized in all areas of management and organization; and in general different aspects of individual and social life has a long way to go (Kotter, 2008). On the other hand, this indicates the dynamism of this field as a scientific field. Research, critique, discussion, and research on this issue can accelerate the process of formation, development, and establishment of this field, and while clarifying the shortcomings, also offer possible solutions and the ground for conflict of votes to achieve a vision. Light in the future smooth. Therefore, the production of science in this field can guarantee its growth and development and as a result the application of findings, opinions, and ideas in theoretical and practical structures (Hosseini et al., 2016).

According to the general policies of the system in the industrial sector, increasing the share of the industrial sector in domestic production and increasing the added value of the industrial sector have been emphasized. The country's industries and access to advanced and strategic technologies are considered in this document the automotive industry as one of the most important parts of the country's industry can take an important step in achieving these policies (Aref et al., 2020).

The rapid digitalization of the business world is breaking down traditional barriers to industry, and many academics and executives are emphasizing the need to revise existing business models (Gerlitz et al., 2016). Discussions and actions that promote the digital transformation of factories are on the rise among researchers, industries, and policymakers around the world. Germany was the first

country to refer to digitalization in 2011 as the "Fourth Industrial Revolution" (De Sousa et al., 2018). The term then spread to the Anglo-Saxon world during the "Fourth Industrial Revolution," while other countries have introduced other terms to describe the phenomenon. Thus, the United States, like Japan and Korea, focuses on "smart manufacturing." GE introduced the concept of the "industrial Internet" (Orji, 2019). Finally, other related terms include "smart manufacturing", "advanced manufacturing", "integrated industry", "smart industry" and "smart factory" (Alaloul et al., 2020).

It should be noted that, given that the car market is a very sensitive, dynamic, and competitive category, presence in global markets is not an easy task. According to Business Monitor, in 2008 the amount of car production in the world was 73 million units, which reached 78 million units in 2010 and 95 million units in 2018, indicating a positive growth rate. In the same period, car production in Iran increased from one million and 100 thousand units in 2008 to about one million and 500 thousand units in 2010, which shows a growth of 12 percent, which in 2018 fell by 40 percent to about one million and 27 thousand. Iran's ranking in the world has decreased from 13th in 2010 to 18th in 2018, which indicates that the automotive industry, in the face of these pressures and developments, to implement various changes in structure, processes, technology, and force. Human and other components and has tried to adapt to external developments, to meet the needs of society and the environment, but in recent years, the level of stakeholder satisfaction in this industry has been declining.

Given the exponential advances in information technology and the integration of these technologies with more traditional industrial products that have led to the emergence of phenomena such as the Internet of Things and robotic products, it is necessary to take a serious look at its position during the Fourth Industrial Revolution in the automotive industry. With the enabling of engineering applications in areas such as artificial intelligence, metadata, and the Internet of Things, humans have entered the fourth industrial revolution. During

this period, hardware and software innovations have been inseparably combined and introduced a new generation of smart industrial and non-industrial products to the market, so given the importance of change in the automotive industry to respond to pressures and adapt to change. Its study is important and necessary. So this research seeks to answer the question of what is the change management model in the automotive industry based on the general policies of the industry in the fourth-generation industrial revolution?

2. Methodology

This research is exploratory in terms of purpose and explores variables and their causal relationship. Also, the research method is qualitative based on the data foundation technique based on Glader & Strauss model. The required information was collected using interviews with experts. The research population of the present study includes senior managers and professors who are among the senior managers of the automotive industry after the revolution. Thus, first, according to the researcher's knowledge of the selected experts who were qualified to answer the questions according to the objectives of the research, interviews were conducted with the research samples.

Characteristics of industry experts: high experience, managerial position, high experience, and knowledge. The Snowball method was used for sampling. Snowball sampling is a non-probability sampling method where currently enrolled research participants help recruit future subjects for a study. For example, a researcher who is seeking to study leadership patterns could ask individuals to name others in their community who are influential. The interview was conducted in a semi-structured manner with open-ended and general questions of up to 15 people to achieve data saturation. Finally, the conceptualization of the subject has been done using open, centralized, and selective coding in the data technique model of the foundation and using MaxQda 2018 software.

In this research, the intra-subject agreement method has been used to calculate reliability

Table 1. Reliability calculation table

Interview number	Total number of data	Number of agreements	Number of disagreements	Reliability of retest (percentage)
10	60	28	4	93
15	55	22	6	80
3	100	41	8	82
Total	200	98	18	98

As the table shows, the codes recorded by both researchers are 200, the total number of agreements between these codes is 98, and the number of disagreements is 18. The reliability between the two encoders using the mentioned formula is 98%, which is higher than 60%, so the reliability of the encoders is confirmed.

3. Data analysis and Findings

In the first stage, qualitative data were collected through in-depth interviews with research participants. In the open coding process, many themes were obtained that during the reciprocal process of data analysis, the collection of this initial qualitative data was reduced to fewer categories. In the following, each of these categories obtained in the qualitative stage is examined. In the following, open coding for the components of the foundation data model is examined. The transcripts of the interviews were entered into MAXQDA software and examined for interpretation, and the open-source code was identified as follows.

Table 2. Open-source coding of the research

Open-Source Coding			
Managerial instability	Organizational selection system	Weakness in systemic thinking	Preference for personal interests over organizational interests
Influence in government	Existence of anti-development laws	Organizational complexity	Preference of personal interests to national
Accompany	Existence of	No bedding	Trading

the government	government bureaucracy		
Government Enterprise	Low adaptability to the environment	There was no written program	Interactive leadership styles
Political instability	Existence of international restrictions	Existence of transient changes	The power of persuasion of the manager
Inefficient manpower density	Aggressive foreign policy	Lack of managerial courage to solve root problems	Acceptance in workers
Economic instability	Increase revenue	Environmental pressures	Defiance
Existence of state economy	Expanding the export market	Creating changes in the organization, but with an emphasis on the role of personality factors, not based on a written plan	Existence of smart managers to use legal capacity
Limited selection options	Increase investment	Lack of foresight	Managers with high self-confidence
Existence of political pressures	Profitability	Organizational corruption	Having patient and calm managers
Do not allow the government to privatize	Improving the public image of the organization in the community	Lack of tolerance for ambiguity in decision making	Using consultants to make changes
Appointment of directors based on factional tastes	product variety	Lack of long-term view	Presence of senior manager in operations
Tolerate external pressures to apply opinions	Increase customer satisfaction	Resistant to change	Make changes with experts
The use of the automotive industry in elections	Meeting the demands of the people	Make conservative decisions	Ambitious managers
Exercising	Much change in	Lack of will and	Attract specialized

political power in the automotive industry	power structure	courage	human resources
Selection of managers based on political tastes	Existence of powerful informal groups	No risk-taking	Manpower training
Political instability	Conflict of interest	Do not do expensive work	Paying attention to technique
Inability to deal with imposed forces	Experience failed change	Conservatism	Existence of traditional structure
Inability to deal with influential groups in the system	Failure to make timely changes	Lack of alignment of policy makers with customer needs	Traditional management of the organization
Doing populist things	Change in making changes	Lack of infrastructure	Existence of traditional beliefs in the industry
Lack of meritocracy	Existence of unbalanced systems	Environmental legal requirements	Lack of expertise of senior managers
Creating an inefficient system of hiring and firing the government apparatus	Create a common belief	Support for change	Existence of perfectionists
Power supply from within to change direction	Making employees responsible	Build trust	Hiring experts
Use management team from within the industry	Keep employees up to date with changes	Human resource mobilization	Employing optimistic people
Make a floating connection	Manager with coordinating power	Accompany the body of the organization	Existence of experts to implement change

3.1. Axial coding

During axial coding, the categories derived from open coding are divided into 6 categories including axial category, causal condition, intervening condition, contextual condition, strategies, and consequences. Among the extracted categories, the category of "callus patch change" is considered the central category and is located in the center of the model. The reason for choosing this category as the central category is that in most data, its traces can be seen. Therefore, this category can be placed in the center and other categories can be related to it. The label selected for the pivot category is also abstract and at the same time comprehensive. The following diagrams show how the central category, causal conditions, intervener, context, strategies, and consequences are formed.

Table 3 - Six categories of foundation data model

Axial category: callus patch change		
Lack of system integration	superficial changes	Untimely changes
Casual conditions: government ownership		
State Economy	Appointments of political directors	
Intervening Conditions: National Culture		
Lack of courage in decision making	Avoid ambiguity	Utilitarianism
Context: Exterior environment		
Existence of cumbersome rules	International restrictions	
Strategies: Change management strategies		
Create a sense of empathy and trust	Use of consultants and specialized personnel	lection of acceptable managers
Consequences		
Profitability	More acceptance in brand	

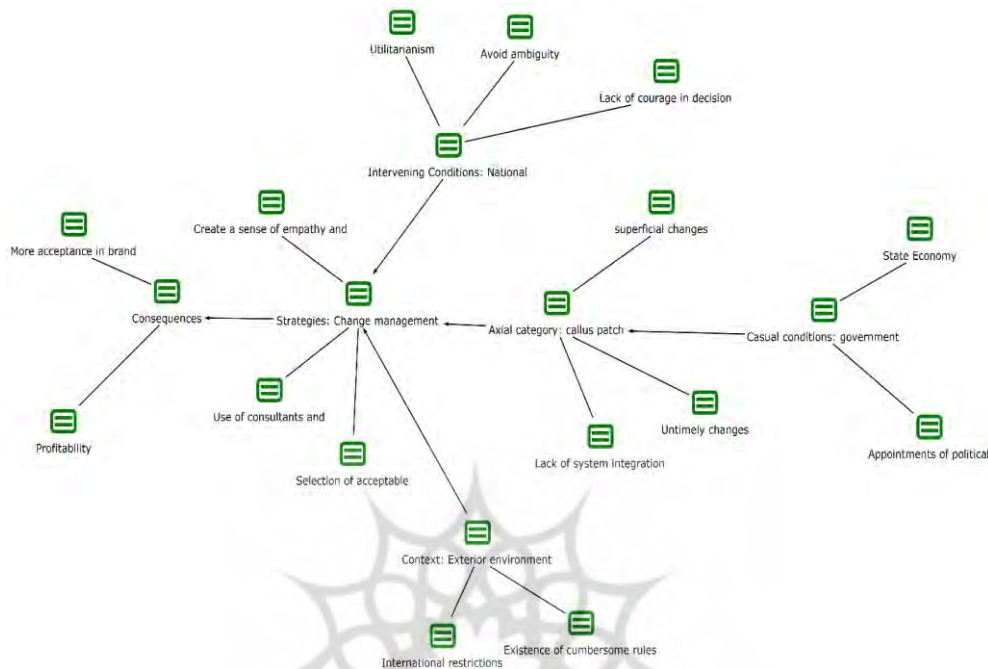


Figure 3: The proposed model based on axial coding

The correlation of the experts' point of view with the calculation of Holstein coefficient (PAO) or "percentage of observed agreement" is 0.830, which is a significant amount. According to the drawbacks of the Holstey method, the P-Scott index has also been calculated, the amount of which is 0.74. The fourth indicator for assessing the validity of qualitative research is the Kappa Cohen index. Kappa Cohen index in this study is 0.76. Finally, Kerpindroff alpha has been used and its amount in this study is estimated to be 0.87.

4. Conclusion

In this study, a comprehensive study of changes in the automotive industry was conducted to identify the model of changes that have occurred in the automotive industry and its findings to be used in the implementation of changes in the future of this industry. Based on the

digital developments in the Fourth Industrial Revolution, the greatest change that has occurred in the organizations under study and supported by the research literature has been the change in technology and the way things are done. The automotive industry is not isolated from this category and most of the changes in this industry have occurred in technology, which even this change has not happened in an integrated and continuous manner. Therefore, the main issue in this research is patch replacement (Brenner, 2008). This change is characterized by three components: untimely change, superficial change, and systemic inconsistency. This type of change indicates that the process of change in the organization is performed occasionally and unrelated. One of the special features of this type of change is doing contradictory things during different periods of change, which overlaps with the results of research (Maximilian et al., 2021). The most important causal conditions for change management in this organization are identified as government tenure, ie the components of the appointment of political managers and government economics. In other countries, the automotive industry is supported if it is profitable, while in Iran, despite numerous supports for the automotive industry, automakers not only did not take action to improve their products, but also caused great corruption due to poor management and unreasonable subsidies. Also, the government's domination of the country's automobile industry has made it impossible to reduce even one labor force in the years when this industry is facing a great decline in production, and the government's domination over this industry is so dictating that managers are appointed by changing governments. Change Every government, managers change.

The conditions of the interventionist in the category of change management are explained under the heading of national culture. Its components are utilitarianism, ambiguity and lack of courage in decision making. Culture as an important variable in change management in a series of change management models is one of the important dimensions of change management, which is also prominent in our research. Culture in our research model is derived from the

national culture of the country, which affects the automotive industry. These factors overlap with the dimensions of culture in the Globe (House et al., 2013) and Hofstede's (2010) project models.

Another factor that influences the change management model refers to the external environment factor, which includes international restrictions and the existence of cumbersome laws (Davenport, 2012). Research (Litvin, 1992; Anderson; 2001; Tichi, 1983; Nadler and Tashman, 1980; Wisboard, 1976) has considered the external environment as one of the important dimensions of change management. Due to Iran's conditions in the region and the world and the conditions of sanctions, international restrictions on the automotive industry have been effective. As explained in Ali's circumstances, state-owned enterprises are very influential in the automotive industry, which is why cumbersome laws are another important factor influencing the external environment.

Finally, change management strategies have been identified in three components: selecting acceptable managers, using consultants and expert staff, and creating a sense of empathy and trust. Changes are more about the individual's feelings than emotions and are technical, and associating them with change is the most difficult stage of change (Rahshalt, 2007). To bring about change, people need to gain trust in change, be motivated enough to drive change, and ultimately feel committed to change (Hofstede et al., 2010). Therefore, in successful change programs, it is necessary to pay serious attention to the reaction of employees to change (Sharif and Skandara, 2014). The importance of the human factor in the success of organizational change is such that some researchers consider organizational change as a combination of employee motivation for change, opportunity and potential for change, and employees' ability to change (Matusik et al., 2021).

Employee readiness for change "reflects the degree of cognitive and emotional willingness of individuals to accept and adopt a specific program to purposefully change the status quo and move forward" (Wang et al., 2020). If employees see change as the benefits they

receive from their organization, they reciprocate those benefits by engaging in different positive attitudes. (Zhang et al., 2019).

The source of change is the awareness and behavior of employees and without changing this part, there will be no change in the organization (Akter et al., 2016). Most change leaders ignore the human dimension, assuming that it is just a project of technological change and intelligence, or a small change (Saifulina et al., 2021). Therefore, the goal of change is to change everything and whatever we seek, the human dimension of change should not be underestimated (Aditi et al., 2019).

Promoting change requires leaders who lead change rather than managerial skills. Among the various leadership practices, studies show that servant leadership and moral leadership are practices that are more effective during change (Sharif & Scandura, 2014). The use of expert managers and appropriate leaders in this industry causes change management to be implemented productively in this industry. Ultimately, these strategies result in increased survival under the components of greater brand acceptance and profitability, which will lead to the added value to the industry. Based on studies conducted by Mousavi and Amiri (2021), they showed that organizational change improves financial performance and organizational economy. Meanwhile, the leadership and management component has increased the productivity of management, which improves the financial and economic performance of the organization. Change has had a positive effect on employees to improve the organization, but the lack of an overview and change management strategy leads to a psychological impact on participants in the implementation of this change. Feelings of distrust have been expressed due to the lack of continuous communication of change management problems. In the present study, creating a sense of empathy is one of the change management strategies.

Finally, although a degree of stability is critical to the organization's continued performance, given the rapid change and complexity of the Fourth Industrial Revolution and the smartening of

factories, an organization may never achieve an acceptable level of balance and even Do not anticipate the change in the sequence of the change process. Therefore, in very uncertain and uncertain environments, only organizations that tolerate a situation of instability, conflict, conflict, and tension that motivates them to a new perspective as well as continuous learning will be successful and consider it a dynamic model of change based on theoretical foundations. The presentation is designed for such environments and seems to be able to respond to the ambiguities in such environments.

5. Discussion and suggestions

The following are suggestions for managing the change in the automotive industry according to the components of the fourth industrial revolution:

1. Planning, leading, and institutionalizing a change in the organization is not possible without learning. Learning can transform change. Based on the learning and experiences that employees gain in their work-life through receiving feedback from colleagues, opinions of experts and experts, and arguing with colleagues, their behavior and actions change and institutionalize change in the organization. Therefore, managers who seek the success of organizational change should pay special attention to creating an atmosphere and culture of learning in the organization and strengthen it with formal and informal ways of learning and knowledge sharing.

2. Most successful changes do not use traditional patterns of bureaucracy and control, but rather move towards flexibility and self-organization. It is suggested that instead of direct control of employees, standardization of affairs be used and then delegated to individuals, and their performance against change be measured.

3. Changes should try to create a clear link between individual and organizational goals and interests. Employees need to be rationally justified in accepting change, and the

perspective of change and its dimensions must be clearly explained to them to ensure that change will not be to their detriment in the long run.

4. To make a difference in a large area of the organization, you need to motivate a larger group of people. The change leader must identify people who are in the right job position and who are ready to change and give them the spark to start the change and the need to implement it. In this way, these people can help motivate others and set off a wave of change in the organization.

5. As the positive results of these changes become apparent to the organization in the long run, employees may become discouraged and frustrated in the middle of the road. It is suggested that the small successes achieved on the path to change be reported to employees and that those who have played a role in achieving this success be rewarded based on merit and rewarded appropriately.

6. Given the dynamics of the organizational environment and the intelligence of the tools in it, managers must have a lot of flexibility in implementing the change program and, as appropriate, make and implement decisions to bring change back on track.

7. Callus patch changes affect the processes and methods of doing things in the organization. Therefore, employees should be involved in the formulation and implementation of these changes due to their daily communication with this part of the work, knowledge of its various angles, and correct and practical understanding of digital methods and processes.

8. Due to strong government ownership in the automotive industry, senior executives must have the power to negotiate and persuade senior executives in the government system to accompany the government in implementing change.

9. Managers who have more courage in decision-making and prioritize the interests of the organization and have the ability to ambiguity in the short term can institutionalize technological changes and intelligence in the automotive industry and from patchwork changes without looking to prevent a system.

10. One of the effective factors in managing change in the automotive industry is the external environment and international restrictions that senior industry managers should pay attention to in their commercial contracts, and these contracts should be with the Ministry of Foreign Affairs and taken from international law to do less damage. To enter the automotive industry.

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