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Using S Technology, in the Automotive Industry, with the Approach of Its Implementation in Commercial Vehicles

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ABSTRACT

The successful transfer of technology, needs to recognize the industrial purposes, resources, technology, innovation and the mode of transmission, methods of transmission, influential factors, it's how to recruit and how to develop, and each of these cognitive relies on special expertise. One of the important technologies is automotive technology, and s technology is important for the transition and its development in recent years. Hence, in this paper, after studying Iran and the world's automotive and emerging technologies situation, the status of commercial vehicles and s technology model are studied based on external models, technical specifications, and cost. In this way, we examine the incidence and the applicability of the technology used in the production of heavy-duty vehicles, in recent years, with the passage of time, and we examine the technology lifecycle, from the perspective of physical characteristics and technical features. The results show that the technology of the studied heavy-duty vehicles (Titan) is close to the time of his fall, because spending puberty, so, according to the investigation of new technologies, we should strive to create changes in vehicle technology.

Keywords: Automotive Technology, Heavy-Duty Vehicles, Transmission, S Technology

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1. INTRODUCTION

Technology transfer is the best option to reduce the gap of technology, between developed and developing countries. S technology Method, with growing approach, is trying to develop, increase shelf life and mutation technology various industries, the efficiency of this method has been proven in several studies (Intarakumnerd and Charoenporn, 2015; Tian *et al*., 2014; Lee and Berente, 2013; Foster, 1986). Increasing advancement of technology, "In the beginning was slow, then become faster, and more, to have gone into decline" (Foster, 1986). And thus, it corresponds to the general structure of an S curve (Centidamar *et al*., 2009). Application of the S curve, in the history of technology research, is rare, and this is true, particularly in relation to its size. Tofighi and colleagues (Tofighi *et al*., 2011) presented a model of technological development, for passenger cars of Iran Khodro, by focusing on strategies of Research and Development and Evaluation of attitude strategy in the automotive industry. In (Tian *et al*., 2014; Walter *et al*., 1996), the impact of Thailand's automotive industry s technology has been studied, and the results show that the optimal time of change and development in technol-

ogy is very important for the growth of industry in this country so Iran can grow along with other countries. The automotive industry is one of the industries of the world, which is always growing and developing in the industry, following major considerations should be taken into account in the design and development of automobiles:

- environment (air pollution, noise pollution, recycle)
- dynamic characteristics (acceleration and braking efficiency, comfort, stability, noise and sound)
- Urban issues (laws and regulations, traffic issues)
- Economy (vehicle costs, energy consumption and fuel)
- Individual issues (customer acceptance, trust, quality and satisfaction)
- Translocation and heavy

However, today the main competition in the automotive field, in addition to safety, is reduced parametersFuel; reduce weight, and environmental issues. In the meantime, technology and military vehicles, is like other automakers, even more complex and competitive fields can be used unique technology for commercial vehicles.

Heavy vehicles are important technologies in the automotive industry. Fast, easy, and safe transportation, are among the fundamental requirements in the defense industry, the use of new heavy-duty vehicles equipped with new technologies, can provide this important. Among the heavy-duty vehicles, cars, 6×6, according to the different applications that are, are of particular importance, in this study we try to look at the introduction stage, growth, saturation, and time to deliver new products.

Given the importance of transport in the heavy automotive industry, and its security during transit time, and due to, the increasing use of new technologies in this field, introduction, manufacture or use of new vehicles,

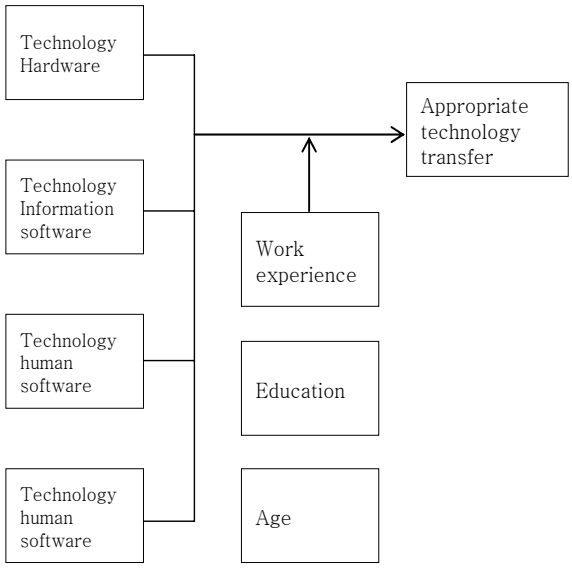

Figure 1. Conceptual model.

and in accordance with requirements car, are of great importance.

2. S TECHNOLOGY APPROACH

Technology development has been faster in recent years, and this means is that the technology life cycle is getting shorter. This feature is more key to the advanced technology, as technology advanced, are mostly faster life cycle (Phaal *et al*., 2004).

Management process technology, includes six main steps: 1) identification, 2) selection; 3) acquisition; 4) development; 5) the operation; and 6) effective protection (Centidamar *et al*., 2009), a process which, in all steps, knowing life situation it would be extremely influential in decision-making. The S-shaped curve is used, mainly in order to identify the technology life cycle. On every technology, this S curve shows productivity growth, as a function of research activities which are being carried out on the technology. This lifecycle is illustrated in the following figure.

Although the growth curves and alternative technology life cycle, are not unconnected with each other, but this does not mean that in a time when technology is growing, growth does not rival technologies. In other words, the growth of competing technologies can occur concurrently. This sometimes leads to the fact that, researchers can identify the bomber military technologies. Because, hang a technology growth curve, on the other, through the development of an alternative technology, and competitor, therefore, in practice, cannot always be concluded that the S-shaped curves, for different technology, are totally dependent to each other (Groenveld, 1997). Thus, in practice, the growth of an emerging technology and its development, leads to the fact that, productivity or key features of the technology, developed in aggregate. This is shown in Figure 2. In other words, it is possible that two or more competing technologies exist, at one time, that grow independently of each other, and alternative emerging technology, leads to hang former technology growth curve. Accordingly, the mere use of life cycle curve, in order to identify and

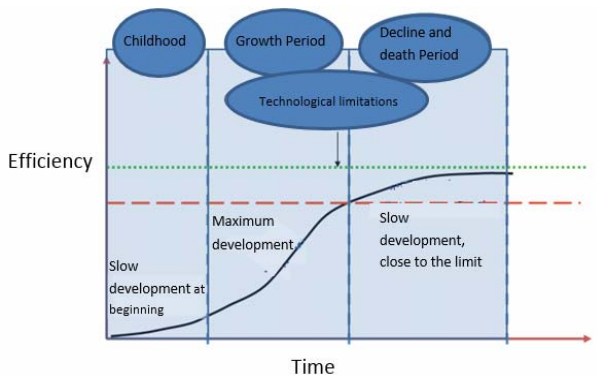

Figure 2. S curve, the technology life cycle and life course.

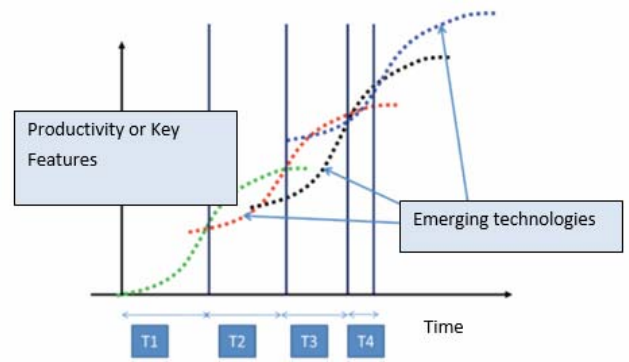

Figure 3. Emerging technologies, S-shaped curve.

predict technology alone is not enough. Access to the S curve for technology, despite its simple concept, is not a simple matter. Contrary to what there is in the area of sales, and sales of these curves can be used as a factor to quantify and examining the state of a product's life cycle, IT is faced with problems. Patents as a quantitative measure of the state of the technology used in most studies that have been done. But the question is how to calculate it.

In this study, we tried to, the life cycle of technology related to heavy-duty vehicle technology, to be detected.

3. STRUCTURE TECHNOLOGY

Technology analysts reviewed the structure, usually of three terms: the shape, configuration, and complexity. Complexity is a key dimension of the structure. To help explain the complexity, refer to the technical hierarchy, which creates a distinction between the different levels of technology is beneficial, Ultrasonic systems, product group, product, component, parts, and materials. Technical hierarchy, whatever is set higher technology, is more complex, and consists of subsystems. The connection between the larger systems, the overall complexity is greater.

3.1 Classification Technology

Technologies can be classified in several ways. Here, we offer the usual assortment of technologies, which includes new, advanced, simple, and intermediate technologies.

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3.1.1 Emerging Technology

An emerging technology is any kind of technology, which has not been released yet fully commercial market. In about five years, it will be so. Currently, its use may be limited, but we expect it to evolve into a form substantially in the future. Examples include emerging technology, genetic engineering, nanotechnology and superconductivity. These technologies can cause large changes in social institutions, and social self. These are the four stages of the technology life cycle:

1) Innovation Stage: This stage show, the birth of a new product, the material process, which is the result of the activities of R&D. In laboratories, R&D, new ideas, depending on business needs and scientific factors, are created. Depending on resource allocation, as well as elements of change, when in the innovation and the next steps are taken in, varies widely.
2) The linking stage: This stage shows presentations and commercialization of a new technology, such as product, material or process, with high potential for use immediately. Many innovations are kept in laboratories R&D. Only a small percentage of them are commercial. The commercialization of research outputs, technical as well as non-technical and are mostly dependent on economic factors.
3) Step Published: This market penetration, to showcase a new technology, acceptance of innovation, by potential users of the technology. But the adverse factors of supply and demand, impact on emissions, jointly.
4) Succession stage: The final step to demonstrate a reduction in the possible development of a technology for replacing other technologies.

In fact, as every being, continues from birth to death, every technology, also leave behind this process is like a living organism, it is life as follows technology. Infants (birth), growth, maturity, and decline (death), it will show up in the form of a coordinate system S, and the curve that determines the state of the technology life in two

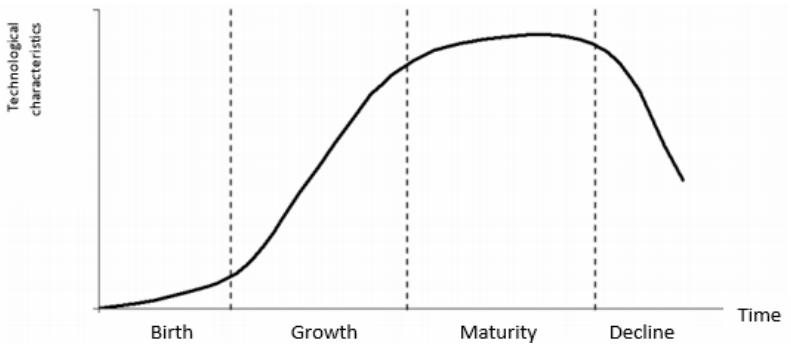

Figure 4. The life cycle of technology.

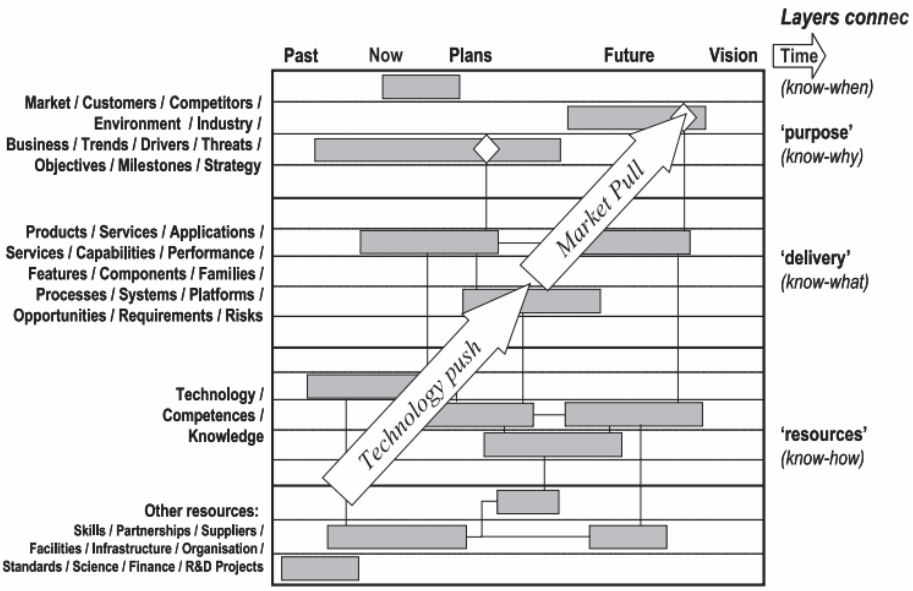

Figure 5. Roadmap of changes in technology, based on market demand.

axes, X axis as the time axis Y as a technology characteristic, as shown below.

In fact, the curves show that the development of many technologies, does not follow the curve of the aboverandomly and without principle, but it has a certain order, the process is rooted in, pushing technology to the customer's requirements, and push (push) client for technology development.

3.2 Different Stages of the S Curve

1) Birth or infancy stage technology investment is slow and with a lot of technical problems must be solved at this stage, to reach the commercial stage, at this stage, the probability of success in the market, is impossible to assess, because the this stage can be seen significant problems in the product.
2) Stage: At this stage, technologies and products, the rapid growth, after resolution of the technical and performance problems, and in the fall, a considerable amount of market, this makes the investments done a lot of a competitor, in the process, the majority of the cost is to reduce costs and enhance product quality, and because it is intense competition in the market, causing the price reduction.
3) Maturity stage: At this stage, the technology has reached the highest levels of performance and technical specifications, and at this stage of technology should be promoted. If that happens, and needs of customers and the market does not fix, this product is not competitive, and loses its place in the market, and consequently the product and product technology, are reduced to the decline in the S curve.

So, if we accept that the life of technology and products is limited, and if R & D units work well do not, and do not always occur, we will see the demise of technology to, at the stage of maturity should be taken in product development and innovation.

It is noteworthy that, with the technology lifecycle, life cycle PLC, influenced by the S curve, because customers are willing to pay in the curve to meet their requirements, as follows:

- Stage 1: Introduction: 2.5% they are customers, who are usually teenagers.
- Stage 2: 13.5% of customers they are, as they say experts or reference group.
- Maturity 3: they are 68% of customers actually buy high sales organization and customers.

4) The decline stage: they are 16% customers, who buy the majority of customers, the customers are buying, and products have slowly come out of the cycle.

In this curve, companies and the R&D department to design and produce new product until it reaches the stage of decay, which otherwise, they are out of the business cycle.

3.3 S Technology in Automotive

Based on studies, S curve can be considered, as Figure 3, the four phenomena: 1) research, 2) technology; 3) product; and 4) the operation of the market, considered in the automotive industry. In other words, the research and scientific studies on a topic begins. At one time, the emergence of the knowledge-based technology, and grows, with an interval, the life cycle of technology-based products begins. The same thing happens on the use of that product on the market.

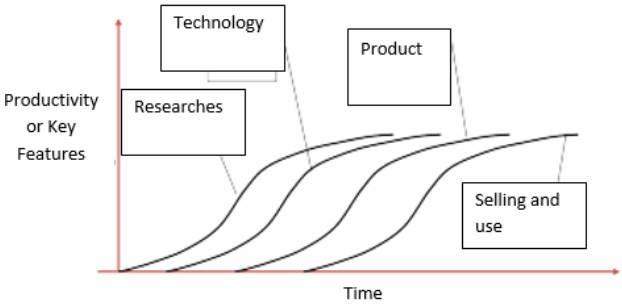

Figure 6. The order of the life cycle of technology, product and market based on an S-shaped curve.

Life cycle analysis is based on the fact that new technologies also have a life cycle, as human beings, why can identify the technology life cycle. The life cycle can be to find a technology-based dissemination. Dissemination technologies are based on this view, then, the more they are faced with growth restriction, due to market saturation. S-Shaped growth curve, are the most important type of modeling technology dissemination. Under this model, the diffusion of technology in the development of the community in the form of an S-shaped graph (as it is known in form as well).

There are two main approaches, the explanation curved S-shaped:
The first approach, based on the heterogeneity of the adopters of new technology or learning acceptor,
The second approach, learning model or models epidemic

3.3.1 Macro Perspective

Model Technology Assessment Anderson and Thomas (1990), is the center of what some describe it as "literature of technology life cycle" (Groenveld, 1997; Barrales-Molina *et al*., 2010). The model is based on technical evaluation, technological progress and industrial development of the industry. The Cyclical model includes personal technology cycles, each of which begins with a technological discontinuity, i.e., process innovation and effective breakthrough products. Technology classes, which show a break and elsewhere, are known as spin, discontinuous, fractured, stem, harmful, or the stage. These discontinuities followed by a period of arousal, during which guided competition among major defeat changes, which eventually leads to the selection of a dominant configuration, the dominant design, the industry standard. This project has been accepted widely, and is accompanied by a change in the nature of competition in the relevant industry. After the emergence of a dominant design, the selected period of evolution in technology, makes the continuation of the cycle. During this period, there were also changes, known as evolutionary, continuous, progressive, technology or components. As soon as this stage is completed, the cycle of variation, selection, and service, again begins with more technical discontinuities. Figure 7 summarizes the main elements of the macro perspective TLC.

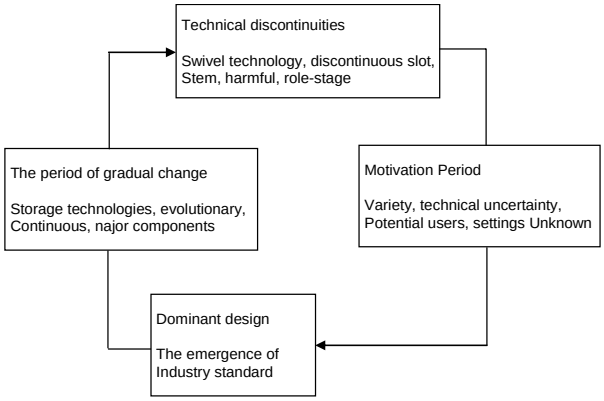

Figure 7. TLC macro perspective.

In Figure 2, the period of the motivation, deliberately attached to a stage that comes before it, to emphasize that it immediately follows a Period of technological discontinuity. The period of gradual change, without delay starts, followed by the emergence of a dominant design.

The second perspective, in an identical phenomenon, is a major innovation for a plot of Technology, at the time; these results in the curve inverted, as shown in Figure 8. Add the innovation process, the completion of the "dynamics innovation model."

3.4 Process of Technology Transfer

In general, the process of technology transfer, transcoding three steps, which must be done all the steps successfully, the transfer is complete

Table 1. Approaches and models of s-shaped curve

Suppose approaches	Related Model	Description
1. Adopters of technology heterogeneity	Normal model	S curve, is normal cumulative function
	Learning model (epidemic)	
2. The lack of information technology	probability model (probit)	
	Alternative models	Based on the dual forces, legitimacy and competition
		Based on preliminary selection

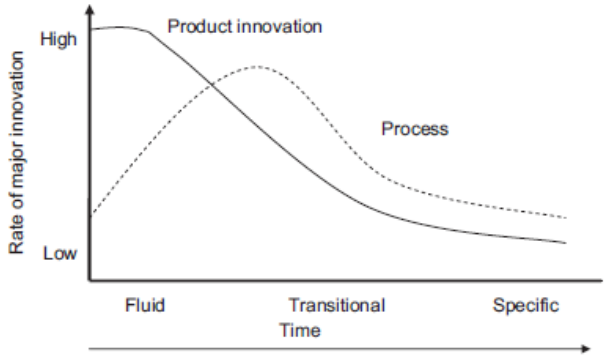

Figure 8. Effect of Oterback "innovative model dynamics", on the IT life cycle.

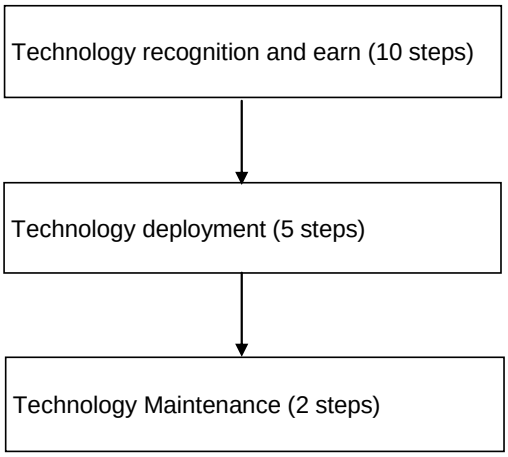

Figure 9. The process of technology transfer.

Step 1: Identification and acquisition of technology, the chapters of this phase include:
- 1.1 Preliminary studies of recognition of its technology and imported components
- 1.2 Planning and organization design, selection and acquisition of technology
- 1.3 Holders of valid information about resources and technology
- 1.4 Introduction of the holders of technology, and request information from them
- 1.5 Evaluation and comparison of proposals
- 1.6 Select the appropriate proposals, and prioritizing between them
- 1.7 Preparation for negotiations with the holders of
- 1.8 Negotiation, to achieve the best conditions
- 1.9 Preparation and submission of final report
- 1.10 Contract

Step 2: Technology deployment, outlines this phase includes:
- 2.1 Authentication ready to enter the next stage
- 2.2 Get primary documents, check and control their primaries, announced the shortcomings and the necessary follow-ups, in order to fix them
- 2.3 Stage adaptation: detailed linking of imported technology, project and resource needs and conditions in the country
- 2.4 Step assimilation (mastery and control over technology): The process of full knowledge of the recipient, rather than all components of acquired technology
- 2.5 Implementation and deployment process using the acquired technology.

Step 3: Maintenance Technology, subheadings this phase includes:
- 3.1 Development stage: it is a process that develops technology for new and better processes and products using earned, during which technology, knowledge gained from conformity, assimilation and application, experience, skill and results of the internal investigation.
- 3.2 Dissemination of technology: the process of deepening and expansion of business with technology components in the country;

If successful during this process, commercialization of technology transfer is possible. One of the problems of industries in developing countries, is the lack of effectiveness of imported technology transferred, the most important factor is the lack of a full technology transfer process.

4. RESULTS

In here, technology transfer and development results using s technology are provided for heavy-duty vehicles 6×6. To search for heavy-duty automotive technology lifecycle Titan, we decided to examine the vehicle technology, the technical aspects and appearance, and ultimately achieve Titan's lifecycle automotive technology, together, these two issues together.

We have used the latest technology of the vehicle, and deadly creatures in the world, to draw the lifecycle of automotive technology, automotive Titan's presence in the market. Thus, we investigated the frequency and application technology, used in the production of heavy tractors, in recent years, with the passage of time. As noted above, we first draw, and we reviewed the technology lifecycle, from the perspective of physical characteristics and technical features, separately, and finally, conclusions, and we have provided the lifecycle of technology Auto Titans.

4.1 Lifecycle of Technology of Automobile Titan in Terms of Technical Specifications

By comparing the technical specifications of the car Titan, and other deadly creatures born of the conclusion can be reached that, at the time of the advent of the automobile Titan, there were few tractors with technical specifications similar to Titan, but with the passage of time and access to other countries and manufacturers

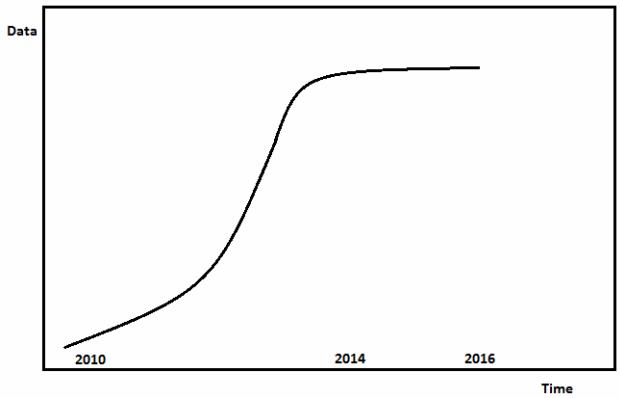

Figure 10. Auto Titans technology lifecycle, from the perspective of technical specifications.

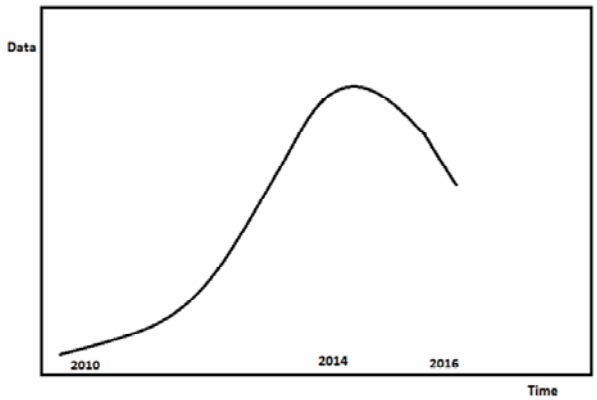

Figure 11. Auto Titan lifecycle of technology, in terms of technical specifications.

Exterminators manufacturing technology with the development of technical specifications, the technical specifications similar to Titan, it has become increasingly more functional and abundant.

By comparison, it can be concluded that, given the extraordinary power of Titan and its technical specifications, it is now the era of technology; the car spent your adolescence, because it is top of many deadly creatures still, in terms of technology. But we must also consider the fact that, manufacturers such as Mercedes-Benz, have achieved the production of stronger and superior technology Tractors compared to Titan, and now, they have produced cars, which are superior of the Titans, in terms of technical and power. So, summing up the above, it can be concluded, according to the car's position Titan as compared with deadly creatures, and many use similar technology to automotive technology titan, the car spent your adolescence of technology, in terms of Technical. The following chart indicates the issue.

In the above graph, the horizontal axis indicates time, and the vertical axis describes the used data, it is here that a lot of technology from the technical point of view. Can see that, from time-to-market automotive technology titan, it is useful to review, and now, it is in adulthood. Because there are still many manufacturers of heavy-duty tractors, have not achieved yet deadly technology, with features such as Titan, but there are few manufacturers who have achieved the technology beyond the technical technology of the Titans.

4.2 Titan Auto Technology Lifecycle, from the Perspective of Appearance

By comparing the optical characteristics of the Titans cars, tractors and other creatures born, it can be concluded that at the time of the advent of the automobile Titan, there were fewer fatal with external features near Titan, but over time it was used, and achieving other countries and producers manufacturing technology with the incidence of deadly physical description, and similar to Titan appearance.

But by studying the physical characteristics Tractors, produced in recent years, we can conclude that, for years, manufacturers have resorted to lethal changes in manufacturing technology, and have been making changes, the appearance of Tractors. By comparing the new technologies used in the new lethal and lethal rounds, it can be concluded that in terms of physical characteristics, the car Titan is very backward technology in the world, and is not comparable with them, and cannot compete with them in this respect.

Many items included in appearance, but if we mention the most important ones, such as exterior beauty, and beauty of various items in the cab, as they can be. In today's world where convenience, comfort and security are very important in making cars, unfortunately, Titan has fallen behind its competitors. Despite impressive as the car rounds, but new tractors, have received much higher grades, in the eyes of experts. Also, look into the cockpit and compare cases, such as the driver's seat, bedding, type of warning lights, the type layout and placement of signs, etc. This will surely notice that the car Titan away with its new competitors.

By comparison, we can conclude that, according to former and new technologies used in the production of lethal-and, now, the Titans spent their decline, in terms of appearance, after passing through a period of the birth, growth and maturity.

In the above graph, the horizontal axis indicates time, and the vertical axis describes the data, here, it is a lot of technology in terms of appearance. Can see that, automotive technology titan, from time-to-market, become more versatile, and now, after emerging from an era of growth and maturity, is in decline, and the more time passes, the distance the car with competitors the new terms of physical characteristics, become more and more.

4.3 Lifecycle of Automotive Technology Titan

Automotive technology curve with the Titans, technical and physical perspective, we can conclude that,

perhaps because of the importance of power, and the technical features, in heavy tractors, the importance of perspective is more technical in the car. The lifecycle of automotive technology titan, it is more like the technology lifecycle of the vehicle from the technical point of view. Therefore, we can say the Titans; the lifecycle of technology is in adulthood.

The accuracy of the above, it can be proven by comparing car Titan, and vehicles used in Iran and neighboring countries. Since the majority of tractors used in Iran and its neighboring countries, in terms of appearance, there are many new technologies.

In the above graph, the horizontal axis expresses the time, and the vertical axis states used date. Here, it is technology. Can see that, automotive technology titan, from time-to-market become more versatile, and now, it is in adulthood.

5. CONCLUSION

According to the lifecycle of automotive technology titan, which was displayed last season, we can conclude that, perhaps because of the importance of power and technical characteristics, in heavy tractors, the importance of technical terms in this car is more. Therefore, Titan lifecycle of automotive technology is more like the technology lifecycle car from a technical point of view. Therefore, we can say that the car is a titan in the lifecycle of technology during puberty.

According to adulthood are spending this technology, we can adopt different decisions, but what is important is that we should always pay attention to new technologies and products, provided by the manufacturers, and we review them. This is because technology is quickly advancing very fast, and there is the possibility of the launch of new technology products.

As suggested, the decision on the technology of car Titan, we can state that, at present, according to tractors in Iran and neighboring countries, and due to this, the technology of the vehicle, the parallax is apparent decline, new technologies, both in terms of technical and physical, can be imported, and this new technology and products derived from them, are used in the armed forces. Titan also necessary studies must be done on the car, along with new products in the car, and the car will be redesigned and produced, visually and with the same technical features, and delivered to the domestic market and markets of neighboring countries.

REFERENCES

Barrales-Molina, V., Benitez-Amado, J., and Perez-Arostegui, M. N. (2010), Managerial perceptions of the competitive environment and dynamic capabilities generation, *Industrial Management and Data Systems*, **110**(9), 1355-1384.

Centidamar, D., Phaal, R., and Probert, D. R. (2009), Understanding technology management as a dynamic capability: A framework for technology management activities, *Technovation*, **29**(4), 237-246.

George Foster (1986), *Financial statements Analysis*, 2nd Edition, New Jersy, Engelwood Cliffs: Prentic Hall.

Groenveld, P. (1997), Roadmapping integrates business and technology, *Res. Technol. Manag*., **40**(5), 48-55.

Lee, J. and Berente, N. (2013), The era of incremental change in the technology innovation life cycle: An analysis of the automotive emission control industry, *Research Policy*, **42**(8), 1469-481.

Patarapong Intarakumnerd, Peera Charoenporn. (2015), Impact of stronger patent regimes on technology transfer: The case study of Thai automotive industry, *Research Policy*, **4**(7), 1314-1326.

Robert, P., Clare, J. P., and Farrukh, D. R. (2004), Probert Technology roadmapping-A planning framework for evolution and revolution, *Echnological Forecasting and Social Change*, **71**, 5-26.

Tian, G., Chu, J., Hu, H., and Li, H. (2014), Technology innovation system and its integrated structure for automotive components remanufacturing industry development in China, *Jo-urnal of Cleaner Production*, **85**, 419-432.

Tofighi, A., Manteghi, M., and Abdi, B. (2011), Technological vision in automotive industry and presenting a model for the Iranian automotive industry, *International journal of automotive engineering*, **1**, 197-205.

Walter, W. P., Koput, K. W., and Smith-Doerr, L. (1996), Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology, *Administrative Science Quarterly*, **41**(1) 116-145.