

Toyota Automotic Industry.

Sixia Wang

Doctor of Philosophy (PHD) Management, LimKoKwing University of Creative Technology,
Cyberjaya, Selangor, 63000, Malaysia

Abstract

Every organization in the world that has a competitive advantage in the market in one way or another have adapted the concept of innovation and technology. Innovation and technology is the talk of the day to day business activity. Every firm is embracing the new way of doing business activities due to is consistent positive returns. Unlike in the former days, the business process has been made simpler, for example, in processes like manufacturing, banking, housing, and construction, just but a few. On the other hand, the motor industry has come a long way in embracing the latest innovation and technology that provide and enhance better manufacturing and service.

Keywords

Management ,processes,industry,service.

1. Purpose of the Study.

The main reason for the study is the see the relationship and the interconnection of innovation and technology with the automotive industry. It is to see how the processes in the Toyota industry have excellently been implemented and incorporated with the emerging innovation and technology. It is also to assess the success of the company due to the adaption of technology.

2. Scope of the Study.

The scope of the study is in alignments the use of technology and innovation in business. The Automatic sector is being considered for this study and putting more emphasis on the Toyota company. The report on the company's technological and innovation activities will serve proper ii, leading in terms of sales in the automotive industry.

3. Objectives.

The objectives of this project are as follows:

To identify the impact of innovation and technology in the automotive industry.

To analyze the impact of the latest technologies in the industry's business operations.

To determine the latest technology that helps and may help the industry to grow further

To provide recommendations on innovation and technology management to the firms

4. Introduction

This report focuses on the importance of innovation and technology in the automotive industry. The firm chosen for this is study is Toyota. The company is the world-leading automotive manufacturing company whose headquarters are in Japan but having branches in almost every country in the world. It produces over 10 million vehicles per year, which can only be made possible by the use of technology in every step of the manufacturing process.

The company has been able since 1990 to establish a system that solves the problem earlier experiences in a faster and a cheaper way that required less space and inventory. The following sections show more of the technological and innovativeness in details.

4.1. Background of the Study.

It is evident enough to attest that technology and innovation so far remain to be the backbone over the developments and revolution experienced to date. Every other organization is being open to new ideas that can give them a competitive advantage in the business world. Therefore, confidently the automotive industry has made drastic improvements in their manufacturing processes over the years due to the acceptance and implementation of technological innovation in their processes(Chanaron 2001). Emerging technologies are being implemented at a very high rate hence the drastic growth. Hence as long as a company is adapting the innovation and technological change, it will be in the front line in doing business. One of the innovations in automotive is the Internet of things as shown below.

4.2. Company Overview

Toyota motor corporation is the second-largest automotive dealer, where it is involved in the selling of vehicles and spare parts. The company was founded in 1937 by Mr. Toyoda where to date, it has employed 364445 employees in the entire world.(Morgan &Liker 2006) The company in 2018 was the 6th in the world ranking in terms of revenue collection, but to the current date, it is ranked the 10th worldwide .by the year 2006 statistically it had overseas manufacturing companies summing up to 52 outside the headquarters, Japan. Therefore, it has a huge market for its vehicle, which extends to more than 170 countries. Its main operation is manufacturing, assembling, selling, offering financial service, and also retail leasing. The company also hold stakes in other motor vehicle companies like Subaru, Isuzu, and Mazda. With all the outlets in the word, the company has been able to promote technology in all the branches to deliver quality products to the customers (Ohno 1988). For such a multinational to truly achieve those goals, the management has to have deliberately embraced technology in its operations and in management also.

4.3. Problem Statement.

Innovation and technology have drastically help in the growth of many companies in the world. It has become irresistible where every firm is trying to bring on board brilliant idea on how to improve and make their production efficiency. However, the use of technology has brought some serious loses to the Toyota company and its customers. Mainly the problem is due to overdependency of technology in every area of its operation. This led to the release of recall car that could unintentionally accelerate and end up causing accidents. It is evident that due to the overdependency of technology, the company ended up assuming the safety and quality checks and almost only 60% were tested(Cusumano 2010). This assumption brought by overreliance of technology led to the closure of six manufacturing sites and over 6000 jobs due to the destroyed reputation of the recall cars. Many other motor vehicles suffer from safety and quality test that lead to problems like fault airbags and poor braking systems.

5. Methodology.

Here techniques relevant for analyzing the management of technology and innovation are deployed. Their relevance allows the assessment of the requirement for the project of managing innovation and technological advancement to reduce if not totally removing the fault in manufacturing. They include:

Agile project development.

It is the most commonly known methodology used in aiding the implementation of large projects that do not have a clear requirement at the start but do increment with time as the user requirements keep changing and increasing (Dingsøyr et al. 2012). It is suitable for the development of software hence will be of great importance to be considered in the evaluation of the technological milestones made by the Toyota company. The methodology outlines the best strategies to satisfy the company's demand in the implementation of technology.

Lean project methodology.

This is a methodology whose main agenda is to maximize the customer's value by using the few available resources at the moment. It's an interesting methodology as it strives in reducing waste, and it is mainly applicable in the manufacturing industry (Waldhausen et al. 2010). Any process that does not bring any significance is removed, it ensures that there is also a fluent flow of work — no Variance in production. Lastly, the excess weight that slows the manufacturing processes is removed to ensure a good working environment. It ensures that the staffs in the company are given a great working condition to do a commendable job. This helps in understanding the satisfactory nature of the Toyota company staffs hence the growth of the company.

Kanban methodology.

This is a methodology's major where a release is made earlier than expected due to a managed team effort. This methodology was developed actually in the Toyota factories production sites. There the methodology suits the company and can really help one to understand the utilization of technology and innovation at every stage of the way. It operates by showing a picture of the workflow in every step to easily see the mistakes that can be available and remove them at an early stage to prevent more damage to a valuable asset.

5.1. Data Analysis Method.

Data analysis of a project in conjunction with the management of innovation and technology is very intensive. It is so advantageous to use data analysis method in this study. Therefore, there are various theories.

Diffusion theory.

While mentioning innovation, it would be very difficult to evade this theory. This is because it focuses on a basic idea, generally a problem that needs to be solved at the moment. The attempt to actualize the idea brings in the aspect of innovation and lastly its implementation gives birth to technology (Sahin 2006). In the automotive industry, it all started with the 1920s with an idea on an early and faster way of moving from one place to another. Hence the importance of seeing the relevance of this theory in the automotive industry today and appreciate it.



Fig 1. Product Adoption Curve

Incremental innovation theory.

This theory has been the backbone of many industries, automotive being one of them. This is evident in that initial design of the vehicle is still the same. The vehicles still have four wheels and were steered in some way (Dewar & Dutton 1986). Therefore, all that has been happening even in the Toyota industry is to add on the foundation design. Their improvement has been in small chunks to better the service provided by the vehicle. These improvements are geared in offering an efficient and better way of service delivery hence the importance of considering this theory.

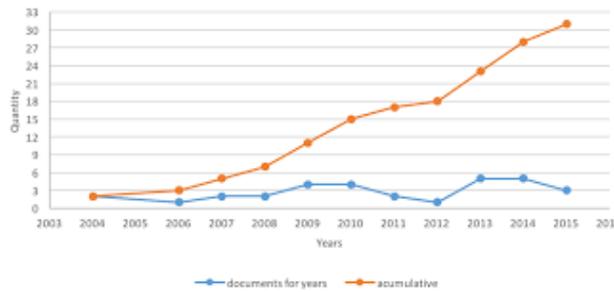


Fig 2. Incremental innovation theory schematic diagram

5.2. Analysis of Technology in the Automotive Industry.

Technological advancement has really shaped the course of automotive industries. This is evident in the comfort experience while driving. It has made driving easier and fun; hence, almost everyone desires to own a car due to the comfort and the flexibility it offers. Toyota company has utilized this gift of technology and hence gaining a competitive advantage over other competitors. (Tidd & Bessant 2018)

5.3. Analysis of the Toyota Production System.

This is a mind-blowing technological system that aid in the production of high-quality vehicles in a cheaper way. This, in turn, makes the Toyota product to be very affordable to the customers hence a large number of sales. It is mainly aided by the use of Lean methodology in production, which is customer centered by increasing the value with the elimination of unnecessary waste. The system, therefore, is a beneficial technological application in the management of production in the Toyota industry.

5.4. Analysis of Navigation and Bluetooth Technology and Smart Key System.

This kind of technology implemented in the Toyota products focusses on improving user convenience while he or she is driving. It helps the drivers to free calls wirelessly. The users can stream music through the vehicle audio system remotely. The smart key system ensures that the doors can be opened with less effort like having to touch the handle only. Currently, the Toyota vehicles do not need a key; instead, they do have a push button that does serve as the ignition to the engine. Hence this implementation brings a lot of convenience to the user.

5.5. Analysis of the Radar Cruise Control System.

It is a system that has really helped in defensive driving. It has an artificial intelligence capability that helps to measure the distance between the vehicle in front. This way, the system can adjust the speed of the vehicle to ensure that a safe distance is kept especially during high traffic. This technology uses radar to do so. This ensures that the driver can enjoy the ride with the confidence of safety at hand.

5.6. Analysis of the Head-Up Display and Lane Keep Assist.

Head-Up Display is the technology that implements the use of assisted reality to display information the windscreen to help the driver not shift focus while searching for some information. This helps him or her to do event business meetings or calls while still on the drive. With the addition of the Lane Keep Assist, the vehicle cannot lose track of the designated lane. Drivers, therefore, can be assisted as the name suggest to maintain their lane easily through a screen display or with the incorporation of the Head-Keep Display.

5.7. Analysis of Double Overhead Cam Technology.

This is a technological advancement of the engine that makes the car to be fuel-efficient and more reliable. This technology ensures that the engine uses as little resources as possible but on the other hand, produces the desired power. This technology has attracted many customers due to low fuel consumption and great horsepower output. It is a cylinder -head design where every cylinder has four valves. Some of the Toyota vehicles are also Hybrid Synergy Drive.

6. Innovation and its Impact on Automotive Industry

Innovation is the mother of greatness in the automotive industry. The interesting part is that it balances its self. In the automotive industry, some innovation solves a problem while on the other hand contributing to side effects(Tidd& Bessant 2018). The good thing is that this creates a great venture for more minds to be put into work to establish a sustainable environment. Therefore, there is a need to ensure that innovation is managed effectively.

6.1. Introduction of the Catalytic Converter.

This is one of the greatest innovations has helped in the conservation of the environment. The engines are fitted with a converter that is able to catalyze exhaust fumes in a redox reaction. This process ensures that the gases emitted while not have a negative effect on the surrounding environment. This innovation has gone to the extent of the event is a legal requirement. Therefore, the Toyota company has ensured that every manufacture automotive with its label has met all the legal standards.

6.2. Introduction of Hybridized Drivetrain.

This innovation was first driven by the Toyota Company in 1998. The hybrid vehicle improves fuel efficiency and in return, challenging other motor industries to follow the same paths. This innovation helps the mechanical propulsion to be as a result of combining petrol with an electric motor. On top of helping in the fuel conservation, the engine emits less Carbon (II)oxide compare to the other vehicles

6.3. Introduction of Turbochargers.

Toyota has implemented this innovation on diesel consumption engines. This innovation makes an engine produce more power than expected due to its proportional size. The innovation here is that more air and more fuel are compressed into the engine's cylinder, making it increase its horsepower. It has helped automotive companies produce lesser engine and include the turbocharges hence saving on the cost of manufacturing the vehicles.

6.4. Introduction of Power Steering and Automatic Transmission

These innovations are geared to make the driving experience more comfortable and enjoyable. The power steering powered by hydraulic helps the driver to use minimal energy in turning. On the other hand, automatic transmission saves the drive the care of changing the gear ratios, especially during a move manually. This innovation has helped the drivers to concentrate

more on the steering wheel. To those how are disabled in one way or another, this great invention has given them a hope drive like everyone else.

6.5. Introduction of Airbags and Three-point Seat Belts.

These innovations are the most important in the entire vehicle safety industry. Airbags operate under a mechanism of inflation of the bags with the proportion in the impact during the collision. It is evidently seen how this great innovation has saved, and it is continually saving a lot of lives. The Three-point Set belts, on the other hand, has replaced the two-point set belts that would bring about injuries in a high-speed crash; hence, they are recognized as the measure of standard. They reduce the collision impact too.

7. Recommendations.

Innovation and technology are like brothers and sisters. They do go hand in hand. A company that has the ability to innovate but lacks the technological resources to drive the innovation cannot survive in the generation. Therefore, as seem above its Cleary evident that we do need to do need them. However, below are some improvements that can be done to the automatic industry.

Production of vehicles that more ecofriendly.

With the current environmental crisis, it would be proud of any automotive company not only Toyota to help in this fight. This way, their sales would increase due to a good reputation developed. This eco-friendly car can be implemented thought adoption of hybrid vehicle that emits less toxic fuel and also the full introduction of electric vehicles at affordable prices.

Advancement in technology.

Due to the ever-increasing technological events, more can still be done to ensure that road transportation is safer. This can be done by the incorporation of artificially intelligent systems in the vehicles that can help the driver to see even the unexpected in order to save a life.

8. Conclusion

It is, therefore, evident the innovation and technology are among the building block of the motor industries. Managements that have understood the secret of them will at the end of the day reap of its fruits. As shown in the case study of Toyota Multinational corporation, the management team for a long time ago have developed a culture of embarrassing and encouraging new innovations and technologies to its development. Therefore, activities geared to the betterment of the entire motor industry should be promoted.

References

- [1] Cusumano, M.A., 2010. Staying power: Six enduring principles for managing strategy and innovation in an uncertain world (lessons from Microsoft, Apple, Intel, Google, Toyota and more). Oxford University Press.
- [2] Cusumano, M.A., 1988. Manufacturing innovation: lessons from the Japanese auto industry. MIT Sloan Management Review, 30(1), p.29.
- [3] Tidd, J. and Bessant, J.R., 2018. Managing innovation: integrating technological, market and organizational change. John Wiley & Sons.
- [4] Chanaron, J.J., 2001. Implementing technological and organizational innovations and management of core competencies: lessons from the automotive industry. International Journal of Automotive Technology and Management, 1(1), pp.128-142.
- [5] Cusumano, M.A., 1985. The Japanese automobile industry: Technology and management at Nissan and Toyota.

- [6] Dewar, R.D. and Dutton, J.E., 1986. The adoption of radical and incremental innovations: An empirical analysis. *Management science*, 32(11), pp.1422-1433.
- [7] Dingsøyr, T., Nerur, S., Balijepally, V. and Moe, N.B., 2012. A decade of agile methodologies: Towards explaining agile software development.
- [8] Lee, Y.H., Hsieh, Y.C. and Hsu, C.N., 2011. Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use e-learning systems. *Journal of Educational Technology & Society*, 14(4), pp.124-137.
- [9] Morgan, J. and Liker, J.K., 2006. *The Toyota product development system: integrating people, process, and technology*. Productivity press.
- [10] Ohno, T., 1988. *Toyota production system: beyond large-scale production*. crc Press.
- [11] Sahin, I., 2006. Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory. *Turkish Online Journal of Educational Technology-TOJET*, 5(2), pp.14-23.
- [12] Waldhausen, J.H., Avansino, J.R., Libby, A. and Sawin, R.S., 2010. Application of lean methods improves surgical clinic experience. *Journal of pediatric surgery*, 45(7), pp.1420-1425.