

Manpower Consideration to Reduce Development Time for New Model in Automotive Industry

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Abstract: A study of manpower consideration to reduce development time for new model in automotive industry is presented in this study. The approach taken are by studying the existing practice in car development and suggesting various ways for manpower improvement such as through early involvement and input from manufacturing personnel, the proper job scope structure, proper training to the new staffs to accomplish an important task at the specific timing and clear definition of criteria for a Project Manager's appointment.

Key words: Manpower Improvement, Manufacturing Personal, Reduce Development Time

INTRODUCTION

Automotive industry in the world mostly depends on the new product development to enable it to stay in business. Therefore, car manufacturers should emphasis on various strategies and concepts that can be accepted by the local as well as overseas customers. The new model development should consider various innovations to remain competitive [1]. This is particularly important in the automotive industry where radically shortened product development cycle time remains a crucial differentiating factor between the best performing companies and the rest of the industry. The focus of innovation must be on developing new-to-the-world products that provide consumers with totally new perceived benefits [2].

In recent years, product development has become one of the most critical activities for all types of industries. There are many approaches, principles or philosophies on how to develop products [3] so that the customers are satisfied and the companies can meet their targets. To survive in this millenium era, every company seems to believe that time compression is always to be pursued, along with high quality products and low cost [4]. This approach requires a paradigm shift in every aspect of business. Most of the companies have made significant changes in their way of producing new products to the market.

In automotive industry, for making a new model, team works from the management, engineers and supporting staffs determine the smooth project implementation and time line. The new model making process involves stages including clay modeling, drawings, prototype, production preparation and mass production. Every stage should follow all the procedures and requirements including testing, trials and confirmation.

An automotive program begins with design and business strategy concept. A special group, namely styling group blends the customer needs with design ideas, product segment and new technology into a product concept. This translates into fundamental characteristics of the vehicle, such as physical dimensions, image, options and performance specifications. Then, the clay model group uses this information to create detailed interior and exterior models of the vehicle that will physically represent the styling creativity into reality. Then, they show their work to the high level management in order to get their feedback. Almost simultaneously, other development team members from body design, manufacturing and potential part suppliers will also view the models to assess the feasibility of manufacturing the vehicle and provide suggestions in order to improve the clay model. After refinement process is completed, the product design engineers will digitize the whole clay model surface for the purpose of detailed product design.

The product engineers will separate the digitized surface data and start to design hundreds of individual new parts such as doors, hood, roof and tailgate. Obviously, not all the parts found on a new model are necessarily brand new. Some of the parts are carryover parts especially the inner parts and floors that are hardly noticed by customers. Although it saves cost, this concept is a challenge to product engineers to manipulate the new parts that fix together with each other as well as with the large group of carryover parts and standard components.

The next process is prototype build-up stage whereby loose parts are built from product design and fit together as a complete car. From there, parts fitting will be verified and any abnormalities are recorded for further rectifications. Completed prototype cars need to

be tested and homologated in order to comply with the regulations and project objectives. Numbers of prototype cars are depending on volume and purpose of the testing.

The next task is how to transform the soft tooling method into a production requirement, which is more focused on high volume output. Vendors and manufacturing engineering uses the completed products designs to design and build production tools, which is a combination of methods and machines. Production tools are normally incurred the highest percentage of product development cost. Fabricating tools are dies, molds, forms and other similar devices that convert raw materials such as steel, rubber, plastic and glass into finished parts. Checking fixtures act as measuring tools to confirm the parts are according to their designed specifications and dimensions. On the other hand, assembly tools will acts as a device to weld or fasten two or more parts together into subassemblies, main assembly and finally transform into finished products.

The final development process is production trials. Prior to the trials, all the facilities and machines need to be installed to cater for the new requirements especially if the line is to accommodate for different models. Once the installation is finished, pilot trials will take place to evaluate and certify the ability of the entire production process that combines people and machines to produce quality products as per program objectives [5].

New model making in automotive industry involves complex phases of development program and would require long lead-time before the model introduction. Globally, the lead-time average from model fix to the start of production is 27 months, however, for this particular model under study, it was planned for 36 months. The program was totally managed by the company's engineers started from the concept stage until the product rolled out. Although the planning was 9 months above the global average, the actual lead-time taken was 40 months. The problems that related to the delays of the project were mostly related to technical issues, management responsibility, quality and third party involvement.

The main aim of this research is to manage a new car model project from modeling stage to the start of production within 27 months with efficient project implementation and marketing strategy. In order to achieve this aim, this research focusses on specific objectives such as to maintain the original project timing and pertinent planning which linked to product quality, to manage project implementation by means of efficient operation and also to have a specific production strategy to tackle on the focused market segments in order to increase profit.

MATERIALS AND METHODS

Car making process normally involves stages of clay modeling, prototypes, pilots and production. Different

carmakers may have different methods to go through these stages in order to meet customers demand. This research studies the method used for a particular model, evaluates the effectiveness and finally analyse the current practice. This research focuses on the data collection based on principal author's direct involvement in the project, project reports and group discussions input. The collected data are mainly the problems encountered during the project implementation phases. Then, project implementation tools and techniques are used to analyse and counter these problems. Furthermore, the analyzed data help the company to identify problem areas that need to be improved as a lesson learnt for the future benefit. However, this study is only restricted to the discussion on manpower issues. The methodology of this research is shown in the form of a flow chart (Fig. 1).

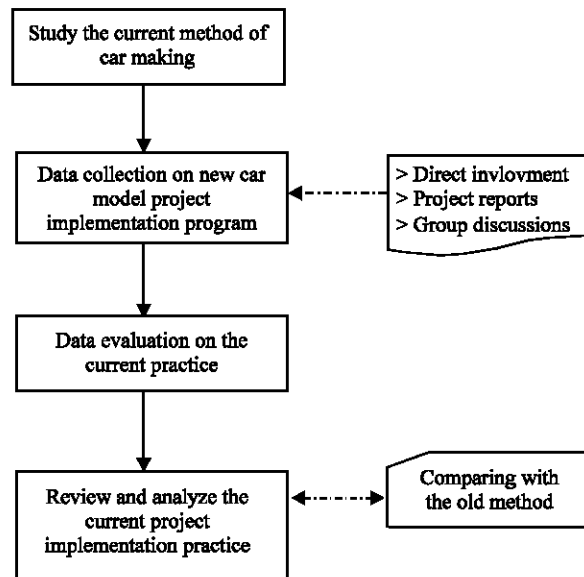


Fig. 1: The Methodology of the Research

This research starts with the study of current methods of car making processes by using literature review on areas of project management, operation management strategy, new technology and quality. The research focuses on how to maintain the original project timing and pertinent planning, which linked to product quality. The scope of study also includes project implementation by means of efficient operation and also to have a specific production strategy to tackle on the focused market segments in order to increase profit. Data collection on new car model project implementation program is based on direct involvement in the project, project reports and group discussions. This data is very important because it represents the actual problems during the whole processes of car making. Car making process involves people, materials and machines throughout the product cycle but only the people issues are discussed in this study.

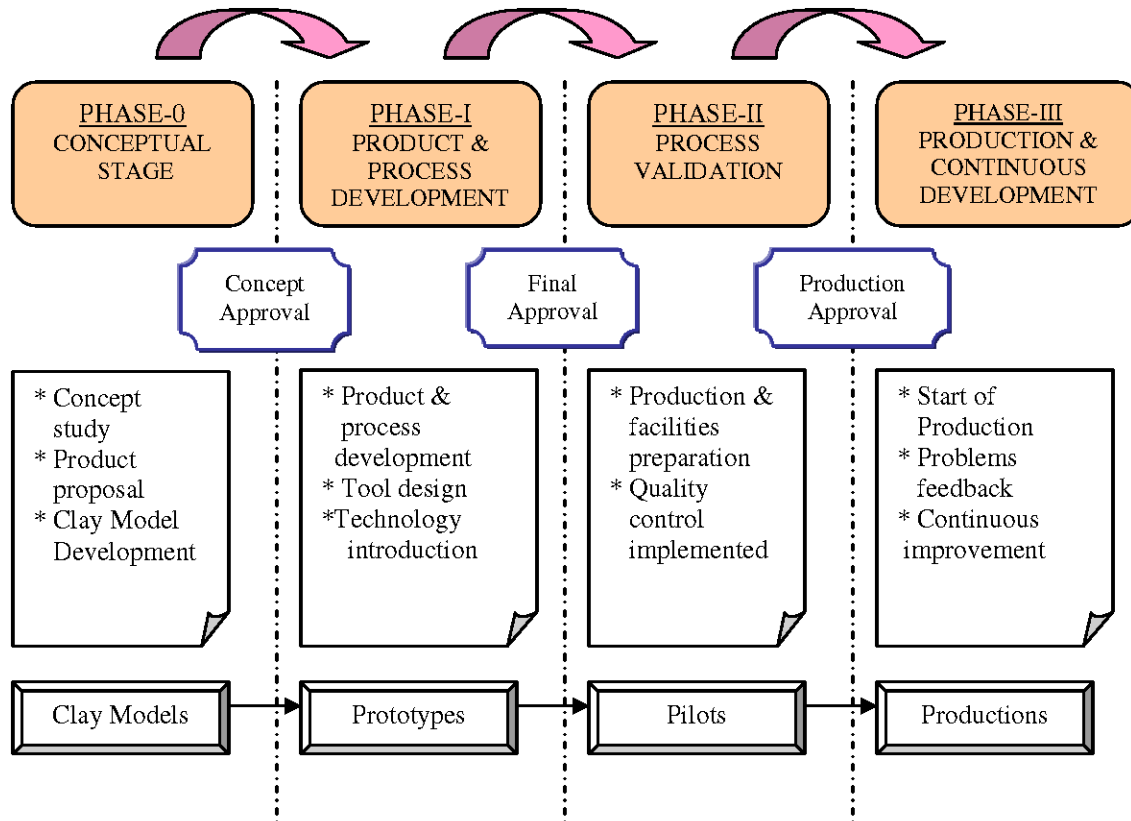


Fig. 2: Project Phase Diagram

Since the project involves many different parties, problems are almost unavoidable. Therefore, it should be rooms for improvements and depending on the degree of severity.

The next stage of the study is to evaluate the data on the current practice that lead to the problems during a project implementation. The evaluation is important because it can identify what are the factors that lead to the problems and it should be focused on 4M (Man, Method, Material and Machine) analysis. As stated earlier, in this study only the factor of manpower is considered.

The final stage of the methodology is to review and analyze the current project implementation practice by comparing the existing methods and the proposed methods of project implementation tools and techniques. This is an important aspect of this research because the analyzed data determines whether the tools and techniques are practicable to be implemented for a car making industry.

RESULTS AND DISCUSSION

The current practice for a new car making process is described in Fig. 2 for project phase diagram.

Evaluation on the Current Practice Focusing on Manpower:

This section describes the evaluation on the current practice focuses on manpower. Organizational structure for this project was not properly set-up with lack of involvement from the middle management level and lack of discussion on manpower loading. Furthermore, the job scope for each related department was not properly determined in the project structure, which resulted in the conflict of priorities. As describe in Fig. 3, only representatives from various departments reporting to the project manager for each department status. These representatives were not on the permanent basis; they can be replaced if they have another job to attend during that time. As a result, different representatives may have different opinions on certain issues that were being highlighted or agreed previously and sometimes it created confusion on the information given.

Without the proper job scope structure, many instructions were given by many bosses through improper channel. Although the comments and criticisms came from the experts, no clear direction on what to do with these suggestions.

Criteria for a Project Manager's appointment ware also not clearly defined by the management. It is important

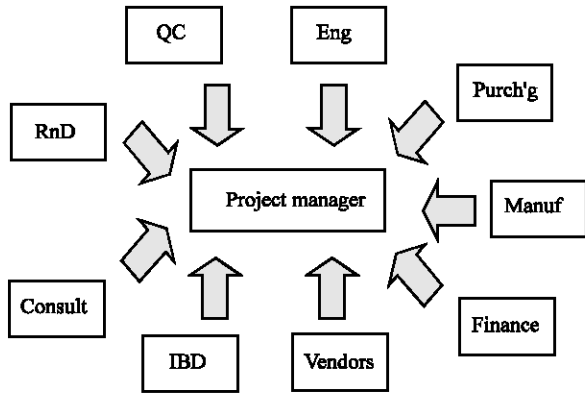


Fig. 3: Current Project Organization Structure

because, his public relations among inter departments as well as vendors and consultants would smoothen the project implementation. Without proper knowledge on the product and system, a project manager would have difficulties in controlling the project. Furthermore, a project manager should be selected from a senior management personnel who has the authority across the organization.

Training is one of the important aspects of a person to conduct a job efficiently. For this project, lack of training was given to the new staffs to accomplish an important task at the specific timing. With basic training knowledge, they were directly asked to do the job right after the recruitment without knowing the need for Failure Mode and Effect Analysis (FMEA) study on their design and manufacturing. Therefore, a lot of FMEA study was not done for parts and vehicle. As a result, the team was repeating the same problems that the earlier team was experienced. On the other hand, the existing staffs were not trained to keep up with the progressing technology changes and requirements. They probably very skillful engineers by using old method but not with the new technology, which resulted in longer implementation timing.

Another concern was the late involvement and input from manufacturing personnel. Normally, they started to involve from Production trial stage only, which was already too late for part improvements. The manufacturing team also was not a permanent team to do all the production trial stages. In other words, the team members kept changing depending on individual department's requirement and no continuity was expected in the trial reports. Sometimes, the research team feels that the new product should not be revealed to anybody else at the prototype stage and it just exclusively for the research and development team to do all the initial works. Moreover, there were cases whereby local vendors were not capable enough in term of technical capability to develop a new type of car component or reluctant to proceed with the change request due to frequent design changes by the company.

As a result, longer project timing was required to solve all the related problems. The cost of the project also was increased due to changes in design, manufacturing and vendor capabilities. As the design changed, part quantity also changed which resulted in Bill Of Material (BOM) and vehicle weight were proportionately increased.

Review and Analysis of the Current Practice Focusing on Manpower:

The current manpower practices are reviewed and analyzed in order to improve the project implementation program. Organizational structure for the next car project management is suggested to specify manpower loading and its requirements. The structure must include all the representatives from the key departments. The representatives must be well versed in their departments scope and know the car manufacturing process. The appointed representatives must work closely with the project team as well as to have close relationship with the project manager. The team should comprise internal engineers from various departments and external appointed vendors or consultants.

In the project team, the representatives are given clear job scopes to be performed throughout the project cycle as described in Fig. 4. To be more effective, coordination meetings are compulsory to be held consistently to get feedback and resolve issues. At the same time, department heads also need to be informed by their representatives in the project team on any issues so that the heads can take necessary action to expedite the solutions. The representatives should only concentrate on one project at one time to avoid overloaded or overlapping jobs at the same time. The properly set-up structure will clear the issues of lack of involvement from the middle management level, lack of discussion on manpower loading and improper channels of instructions.

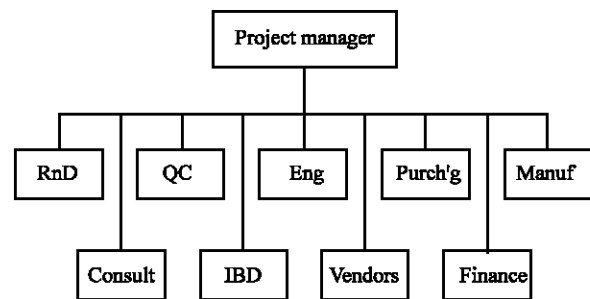


Fig. 4: Proposed Project Organization Structure

A part from the project team is the team looking at the product quality planning that comprises the company's and vendor's quality engineers. The cross-functional team concentrates on up-front quality planning, customer's satisfaction and supporting for continuous improvement. The team collects information to develop

counter-measures so that similar problems can be avoided in the future projects or to promote early identification of required changes. Thus, it avoids late design changes and provides a quality product on time at the lowest cost. The team cycle as shown in Fig. 5 is a method to facilitate communication with every one involved to assure that all required steps are completed on time [6].

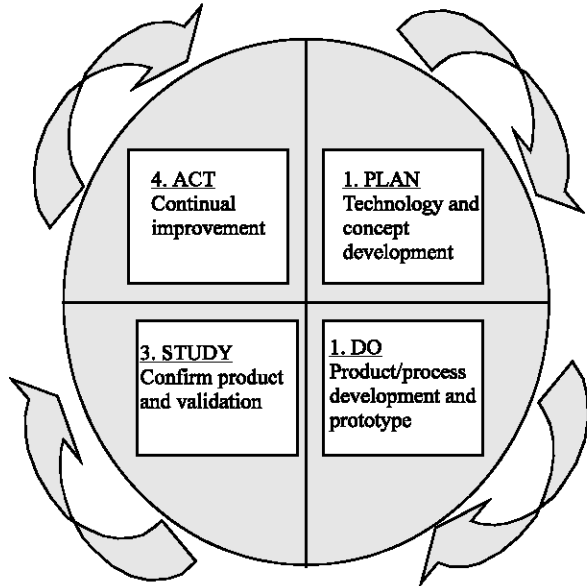


Fig. 5: Product Quality Planning Cycle

A criterion for the Project Manager's appointment is also one of the important issues that should be clearly defined by the management. The project manager should be appointed based on management know-how and technical experience in order for the person to control the overall project efficiently [7]. The person also should be from the senior manager and above so that he has the power to over rule certain orders from his juniors, vendors and consultants. A project manager is also responsible for defining the project management concept and guidelines to his team members. Manpower training is one of the important aspects in human development especially in a manufacturing environment whereby research and development are the key success of the company [8]. Therefore, earlier recruitment prior to the actual job's assignment is something that needs to be considered. Doing an important task without proper trainings would make the project become unorganized and out of control. It is really difficult to bring the things back on track once the schedule is half way through. Another way of internal training is through staff mobility concept.

This concept should be based on requirements such as project basis or yearly basis whereby the engineers will be given freedom to choose the place for his on job training. In five years, these engineers should have gained a complete knowledge on every department's job functions and will be easier for them to handle new projects in the future.

CONCLUSION

From this study, it can be concluded that in the development of a new car model the manpower issues cannot be underestimated. Among the issues that can be improved include the early involvement and input from manufacturing personnel, the proper job scope structure, proper training to the new staffs to accomplish an important task at the specific timing and clear definition of criteria for a Project Manager's appointment.

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