Study of the Effect of Project Management on Manufacturing and Production Projects

S.B. Ahmadi, Z. Moradpour, Gh. Liaghat

Abstract—In this article the accumulated results out of the effects and length of the manufacture and production projects in the university and research standard have been settled with the usefulness definition of the process of project management for the accessibility to the proportional pattern in the "time and action" stages. Studies show that many problems confronted by the researchers in these projects are connected to the non-profiting of: 1) autonomous timing for gathering the educational theme, 2) autonomous timing for planning and pattern, presenting before the construction, and 3) autonomous timing for manufacture and sample presentation from the output. The result of this study indicates the division of every manufacture and production projects into three smaller autonomous projects from its kind, budget and autonomous expenditure, shape and order of the stages for the management of these kinds of projects. In this case study real result are compared with theoretical results.

Keywords—Project management, Manufacturing, production.

I. INTRODUCTION

INTEREST in project management is growing significantly. Yet, projects continue to fail at an astonishing rate. At the same time, the role complexity, chaos and uncertainty play within our projects and project environments is gaining recognition in both research and practice. Hence, it is time to review our understanding of project management education and reflect about how we develop project managers to deal with the increasing level of complexity, chaos, and uncertainty in project environments. Project management is today's spicy topic. Copious research work has been done but this field is so dynamic that every angle shows a different prospective of the subject. Since its commencement in the literature and its applicability, the world has shown tremendous progress. As erudition involves day by day in project so as stringency involves in managing these complex and gigantic project and for unexpected events and environmental impact not planned for are common during project implementation [1]-[5].

The widespread use of project management standards for professional competence assessment and development is based on a rationalistic approach, whereby competence is seen as constituted by a pre-defined set of attributes in the form of knowledge topics.

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Yet little is known about whether and how these attributes are used by project managers in the workplace. We argue that while a great deal is written about traditional project management we know very little about the "actuality" of project based working and management [6]-[7].

There has been a long debate in the management education community as to whether "project management" is a practice or an academic discipline. In the R&D field, tools and techniques of project management are applied and implemented to complete complex projects successfully [8]-[11].

In the construction engineering and management discipline, people learn and implement planning, managing, and controlling of engineering construction projects to meet the time, budget, and specifications. In the engineering field, production planning, scheduling and quantitative methods are applied to manufacturing systems to achieve higher productivity [12]. Virtual reality (VR) models are used in large construction projects by some of project managers. Value engineering (VE) is a management tool to achieve essential functions of a product, service or project with the lowest cost. VE has become a standard practice for many government agencies and private engineering firms and contractors since its first adoption in the 1950s. Xueqing Zhang and et al have developed a value engineering knowledge management system (VE-KMS), which applies the theory of inventive problem-solving and integrates its creativity tools into the creativity phase of the VE process and thus makes the creativity phase more systematic, more organized and more problem-focused. Today's information flow is, from a general point of view, considered to be insufficient and the hypothesis is that using VR models in the construction process have the potential to minimize waste of resources and improve the final result [13]-[14]. Philip H. Brown presents a new model in large structure like dams that the Integrative Dam Assessment Modeling (IDAM) tool is designed to integrate biophysical, socioeconomic, and geopolitical perspectives into a single cost/benefit analysis of dam construction [15]. Ever-increasing process of project management in present time along with the variety of subjects like engineering, experimental and social sciences have transformed analysis and interpretation of the discussion. For the help to reflect and distribute spiritual and bodily energy, thinkers enjoy special credibility and firmness in different problems with distinguished thought and directions. With the dividend from the experience, increased direction, classification of principles and high targets and describe the method of superior management; a researcher can

give suitable and necessary help to other thinkers and researchers in right course.

With the classification of working stages in the manufacturing and production management, this article suggests the role of fundamental transformation arising from programming of project management as three basic steps, which are:

a) Research deadline period is divided into three phases [16].

b) For every phase, exact execution program is drawn [17].

c) Process of special project management is presented for connecting research phases to production output [18].

In qualitative comparison of research with quantity and quality results in case study, we are able to present these results by using management of inverted knowledge, according to S. B. Ahmadi model [19]-[20]. In particular, we discuss new perspectives and a model for an advanced level of project management education and to support this model, we report an empirical exploration which enables managers to see how project management actually functions in context.

II. Description of the Topic

Need of executive and research based management especially the comprehensive management based on foresighted desires and goals are not hidden to anybody, which is arranged for attractive, provocative and knowledge strength of researchers [21]. This program can be under following stages:

1) Variations of plan cause that at the given time; the researchers would select and absorb the best program from among the available programs with due attention to interest and spirit.

2) Extent of plan for programming must grab all the activities of the researcher and plan limitation prevail upon the subject selection.

3) Educational needs of the researcher on one hand and employer needs on the other with different aspects of plan designing offer worthy direction and motive.

4) For analytical method, needful output and important data of management would be inserted so that the very same researcher would strengthen in the accumulated plan and proceed to whatever could have refrained in the initial work of principle and aims [22].

5) It is necessary to index the most familiar available method for the research because the possible indicators promise in the methods and hold forcefully researcher's reflection and easily become enforceable in form and shape.

6) Every research axis has the need for the groundwork to accept the elements of director and creator that would employ as first stage of the research.

7) The stage of management programming is the most important stage for the researcher because whatever is anticipated, but it has been formed and activated in this stage and imaginations of the initial research turn around transforming to the actualities and exactness [23].

8) Evaluation is the most effective sign for the exactness of the execution of programs and related aim. "Assessment" code and successful connection in "targets" and real step of program "execution" pave the way for the director [24].

9) Director must enjoy coincidentally, the accumulated results, and whatever observation is made is diverse from the point of construction and exposition. Execution and designing and other related parameters should be changed to the extent that the "desired' result is found. Reform of construction at every educational and administrative level should be constant and gradual and with due attention to changes in times and places and changes in the related factors and this change as parallel and occasionally non-noticeable on researcher and its management method were effective and would be clear and wide for the future research [25]-[26].

Evidently, the aim of giving and getting education is that director would be informed with the fundamental principle and definition of research science in stages of gathering, arranging, presenting program and introductory analysis of data and information and on these basis would employ the transformation and fortification of the structure [24].

After the acquaintance with the program and information, these aims for the director can be put as follows:

a) Definition of data and information and even their activity instances would be highlighted.

b) Contexts like test, estimate, parameter, scale and principle would be identified and explained.

c) Various quantities after their extraction would be classified and separated.

d) Program and its base combined with limited expectation of research plan and results would be sensed and defined through comparison.

e) Various applications would be identified and as such, different phases of every program would be extracted.

f) Direct and indirect changes from qualitative to quantitative and quantitative to qualitative would be acquainted.

After getting the gradual portions of a program, researcher would take various powerful and fundamental steps "liable for the programming". Some for manufacture and production program, deep and matured intellect of directors are one of the essentialities. By this way, it is suggested that for restoration and vivification of this fruitful steps, two test properties would be active for public and individual information [27].

A. Public

1) Understanding the meanings and skill of fundamental thought.

2) Inductive thought along with gathering, organizing and control of data.

3) Instruction and investigation methods according to theories and educational incidents

4) Exploitation from the presented definition especially

principles and bases of organizers.

5) Enough and strong reliance on intelligence as the urgent and direct receiver and thus information of sources, origin and production decision.

With respect to the emphasis on the fundamental skills in thought, the inductive outlook can be performed for the data arrangement. Presence of an element liable to produce and act like knowledge and memory, every kind of operation feasibly construct in the manufacturing and production programming with applying special method "efficiency". By this way, personal information can have its place in presenting special and distinct as well as clear method in the manufacturing and production management program.

B. Personal

1) Focus on personal characteristics and analytical strength
2) Indirect training from the method of a definite axis
3) Innovation for increasing creative thought
4) Increase in information with the deployment of current affairs and integrated studies.
5) Executing programs to give share to the people in individual responsibilities in front of research and their roots.

With the operation of "skillful management", individual and public programs in this way bring into existence the customary researchers and thinkers who are comprehensive and with their help, protection and support from the research were transformed into desirable and safe environment for dehiscence action and suitable means was applied for higher understanding and emergence of desirable atmosphere. As such, this means will be accurate outlook and experimental methods have practical roots and in reality, the obligation of knowledge and understanding are such, which give diverse views regarding theory and action. With the conviction, this can also identify abilities and so far their limitations. Axis of research and manager in this way can help to creativeness, which would further give impetus and likening among the researchers, construct dehiscence in their hidden talent, respect to the genuineness of person and would not separate any of the researchers desires and similar to the rings of a chain, would recount the importance of each of the circles with due attention to their places in the chain as well as with due attention to the importance of each circle of research and investigation. In Contact with the thoughts of manager, the thoughts are protected from imprisonment to instant and transient affairs [25], [28]. In the thought, moments should not be placed at first important place rather it should be important for actual methods and means so that it gradually affect the changes and welfare of educational process especially investigation and research. On one side, knowledge and understanding are art of manager along with growth, liking and aestheticism and have special importance. As such, the educational standard, actual research methods and gaining research experiences are expressed as: a) strength to critical analysis (positive or negative) for the "self controlled" thought, and b) recognition to reality from the metaphor, with respect to research framework. On the other side, correct training and

management for research production and method can change the material and intellectual conditions of a person, family and society and thus lead to a direction, which is complete and prosperous. Body and mental health, having balance, abstinence from the extravagance and waste are necessary for a healthy manager and familiarity with the peace and tranquility in the research domain increase the possibilities of their success. Management work is motivated by thinking ability and this subject firmly support the person in search of work and thought, creativity and innovation and 'unsuccessfulness' are counted and registered as " access to angles through research" without spoiling of mind. As such a) actual and acceptable research management programming must build evolving spirit and personality, b) skillful knowledge must produce skillful and active research manager, c) factual research must provoke anxiousness and affection for comprehensive reality and creativity in the spirit and psyche of the research manager. By this way, having targeted and foresighted programming with the help of managers and reaching to the research stage through the thoughtful training among researchers will be highlighted and specified and thus manufacture and production projects have these needs in addition to the introductions.

III.   COMPARATIVE FRAMEWORK

Generally, for the researchers, the programming must be in the way that important points should be in accordance to the management viewpoint. These points can be in a kind of emerging streams for innovation and novelties in introduction and identification of the manufacture and production projects, which include following headings:

A. Creative though of manager

As a pure and inquisitor, manager in a close meeting with the theme 'thought incursion' request the researchers and officials of the project and repeat whatever he desires and then through deliberative means hint strong and documented points in the research framework and highlight the course of the theme for classification. Whatever outcome of the management, necessarily it remains as an effective subject in social and individual relations and graft with other outcomes and thoughts and precedence further as an extended waterfall distributaries [29].

B. Reward to Managers' Creativity

For worthy and living thoughts, "answer to the superior method" is one of the important targets of management theory, which make the diction of reward and investment "depth of research and character" more attractive [18].

C. Project and Research Constraints

This subject causes spirit frigidity and weakness of thought and actions among managers and must be avoided at the beginning of the work and be given more importance in the initial stage and give enough indication to the problems and firmness in the activities, before the research. Outcome of the

creativeness and whatever put in conscience today is the "art" of research. In such conditions, definitions and credibility of the project management in its entire dimension along with innovation would cause indirect movement and definite effect on the research. By this way, manager can also appear with more motivation in planning and programming of the project and researchers [25]-[26].

IV. DETERMINING PROJECT BOUNDRY AND LIMITATION

One of the important aspects for planning the projects by the managers is the determination of boundary and limits of the project because the identification of limitations ascertains the arena of the activities. Highlighting the boundary and limit aims to declare strength of "every program" and "every individual". Work foundation with the program framework would have targeted roots, following simple and healthy connections and would ascertain training along with the project. These resources and targets must be programmed on the basis of available knowledge and technological boundaries and fundamental and essential desires of a system of education and planning and their "shapes" would likely to be broken and transformed for the researchers. In the first stage of planning, the target must not be identified rather it must establish connections easily with the audience and would participate in the researchers and audience arrangement. At a time when the target was finally planned, their limit and frontier was unknown and their detail was not distinguished. It is better that the program details are formed with the contemporary work so that the ultimate aims would easily be ascertained and completed. Assessment indicators to reach to the results will be durable and targeted for the project managers. Presence of "evaluation" in the stages of research can remove the errors and prevent them from deviation and thus would confirm the approximate forecasted results. After the definition and framework draft, steps can be taken towards monotonous management and direction plan with the collections of information, material and tools liable to be used, which points to the method of direction, control and exit of the project with the presentation of some actual elements:

• Collection of data and information are the foremost need for manufacture planning after the target and principles and usually their execution are impossible with data. Even if it were done, it would not have suitable base.

• A connected and expressive plan is needed for constructing relevant marks and lines of management programming. This plan is better to coordinate and support and back the durable works to reach to the stage of execution.

• Cross-section of work progress and different management, control and supervision programs are serious principles and factors for preventing from the occurrence of mistakes during the work process and prevention from deviation in "short span of time".

• Execution of educational stages along with the observance of exit and control processes is important part of the research project after the improvement, with the help of project managers. Project management and lay out of management programming can be effective and useful with the above highlighted and reliable points, which become deep and light as well as attractive and distractive with due attention to the tests and methods by the project managers. From the shapes and mixture of the programs and the opinion of project managers with few simple points, some transparent opinion can be formulated for the manufacture and production projects, which are highlighted below:

• Attention to simplify the complex problems: There are various complex issues in the research and industrial projects, which show that there is not only absence of liking in the project manager but they are dominated by disappointment. At time these issues become simple and digestible, more power of influence and attraction are being brought into existence and as a result cause eagerness in thought and functions of manager and management programming.

• Attention to individual needs and concerns: As the spirit of introvert and extrovert persons differs in the psychological studies, their desires and needs also vary. Program of project managers should secure the concerns and needs of the researchers to the maximum limits.

• Attention to educational subjects: In terms of the methods of the planned project management, there are various educational subjects and targets for the researchers, which only has not abundance variations for the researchers' tendencies and these innovative and extended subjects also bring much attraction.

• Attention to the arrangement: With due attention to the complex human thoughts and available natural and physical problems arising out of order, the related factors could be suitable pattern for bringing order, skill and exercise in the entrusted affairs and as a result creation of idea will be new in the project.

• Search and Endurance: Some time, it seems that the planned subjects in the management and industry are not enough for the researchers. This subject, this way would emerge with a shape that would be constant in the process of research and perseverance. If search and layout are considered enough in the research environment, then the first undesirable barricade is constructed and all the new subjects behind that barricade would be buried.

• Presentation of new ways and acceptance of criticism: Having no limit on the responses, as a problem for the project managers would cause to emerge new ways to solve the problems and accept literal mistakes. With this method, the possibilities of getting new solutions would not be stopped and methods of continuous welfare will be carried out in the affairs of management execution.

V. INFORMATION KNOWLEDGE CHAIN

Knowledge management process for the benefit of appropriate strategies requires appropriate tools proportional to practice cycle in training and transfer of engineering principles and concepts. This process consists of at least four

main qualitative and quantitative parameters which, in sum, form knowledge pyramid.

Data: in fact, is a reality of a situation without affiliation or relationship to other members of collection.

Information: When the data become organized in the special laws and special categories are shaping information in fact information are the summarized data that significant work has been done on them.

Knowledge: memory and perception Add into information and cause a natural development in information. In most cases, the descriptive data summarization end is knowledge. Useful knowledge can omit unwanted information or create facilities and usefulness.

Intellect (Wisdom): final stage of information knowledge chain is the movement from knowledge toward intellect. Managements set knowledge management up in order to the creation of measurement process for usefulness amounts of produced knowledge in organization format in its acting and using time.

Data conversion process into knowledge can be summarized in a simple pyramid shape. Most experts, expert management, despite having a variety of comments, about the knowledge pyramid, have reached agreement. In fact, the pyramid is knowledge pyramid that data are at the bottom and the intellect is located at the top of the pyramid. The pyramid shows in knowledge management process quantitative reality. This kind of arrangement move from data base to improvement in quality. Surely, the borders of each layer of the pyramid space, significantly overlap includes: the border between data and information in the form of quantity and also the border between the knowledge and intellect in the form of quality. The above trend can be benefiting in different stages of training and research in the field of science degree in mechanical engineering branches. The Figs 1 & 2 show a mixed model of knowledge pyramid presented by S. B. [19]-[20].
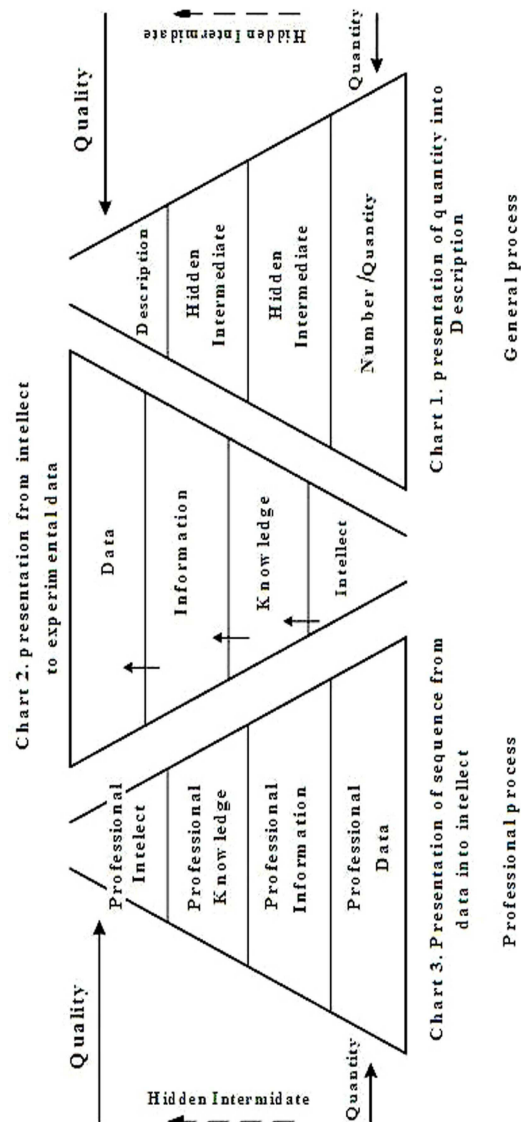

Fig. 1 S.B. Ahmadi model, a mixed model of project management with management of inverted knowledge, from general process to professional process (In research atmosphere)
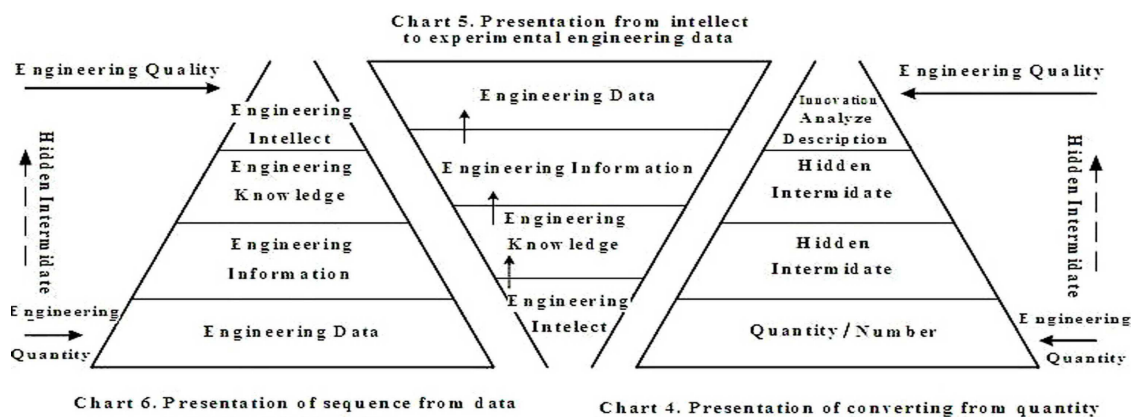
Fig. 2 S.B. Ahmadi model, a mixed model of project management with management of inverted knowledge, from industry age process to information age (In engineering atmosphere)

TABLE I
VARIATION LIST FOR COMPLETED PROJECTS IN MECHANICAL ENGINEERING

Row	ID Project . NO	Start's date	Period tot. (months)	Study (months)	Design (months)	Production (months)	Method effect
1	91000101	1991.9.20	52	17	15	20	With out using project management
2	91000102	1991.9.20	54	14	13	27	
3	91000103	1991.9.20	53	16	18	19	
4	91000104	1991.9.20	55	15	20	20	
5	91000105	1991.9.20	53	17	20	16	
6	96000101	1996.9.20	41	13	13+15		With using project management foundation
7	96000102	1996.9.20	39	12	14+13		
8	96000103	1996.9.20	42	13	14+15		
9	96000104	1996.9.20	42	12	14+16		
10	96000105	1996.9.20	40	13	13+14		
11	20010101	2001.9.20	36	12+12+12			With using project management method
12	20010102	2001.9.20	37	12+12+13			
13	20010103	2001.9.20	38	12+12+14			
14	20010104	2001.9.20	34	12+12+10			
15	20010105	2001.9.20	37	12+12+13			

Table I makes a comparison between off- and on the project management in some academic research works. All of the below examples indicate a more economical construction due to project management which has shortened the period of the projects from about 4½ years to 2½ years, therefore causing a lot of benefit in various parts of projects. Regarding Table I, Employed pattern of project management in design and production phases showed the growth equivalent to about 25%.

Employed pattern of the methods of documented management programming has also showed the growth about 35% equivalent in the all stages and therefore ultimate result especially success in the execution of projects.Table II shows the time for elementary project and exact time for each part of this project. For second project the total time and the time for each phase are as the Table 3 shows. For this project after the studying phase the design phase was done parallel to production phase. With due attention to the project for having a same quality Table 3 shows a shorter time in comparison to

elementary project and for this project the cost had an decrease about 20% in comparison to elementary project.

Projects	Work Through the period	Time Period
Periods 1&2&3	Study - Design - Product	54 Months
Comparison	Phase 1-Phase 2-Phase 3	Nearly :18 -18 -18 Months

Projects	Work Through the period	Time Period
Periods 1&2&3	Study -(Design + Product)	39-42 Months
Comparison	Phase 1- (Phase 2+Phase 3)	Nearly :(12-14)-[(13-16)+(13-15)] Months

Projects	Work Through the period	Time Period
Periods 1&2&3	Study + Design + Product]	36 Months
Comparison	[Phase 1+Phase 2+Phase 3]	Nearly :[12 +12 +13] Months

Fig. 3 method of primary years, nearly time period average 54 months (table II)
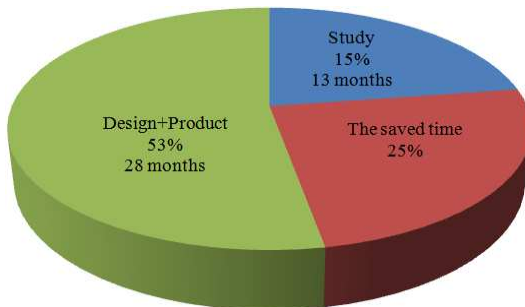

Fig. 4 method of middle years, nearly time period average 41 months (table III)
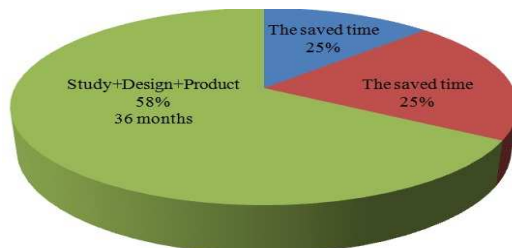

Fig. 5 method of final years, nearly time period average 36 months (table IV)

Table 4 shows the total time for third project beside the approximate time for each phase in this project that all three study, design and production phases was done parallel to each other ; result for the project shows in this project the total time was the shortest and cost had an decrease about 35% in comparison to the elementary project.

VI. CONCLUSION

With due attention to the definition and execution of manufacturing and production engineering projects, management and direction program must be taken care before the training. After arranging training programs, the researchers and project managers can begin their special studies, based on the project topic. It is necessary to plan the studies and classify the subjects. Scattered and unplanned period go out of the study cycle so that in this and later stages, researchers can begin the design and manufacture. Necessarily, the designing must be executed before the manufacturing. Standard and documentation programs follow construction stage and step-by-step, samples become close to the ultimate output. In the last stage of draft of the manufacturing program, "design connection and manufacture" performed with the help of project manager and successful comprehensive pattern are registered as a leading bridge. Result of this study mentioned in more than 15 projects (academic research works) in the field of Manufacture and Production Engineering, which employed the effect of the project more than earlier. In sum it can be said that:

1. Employed pattern of project management in design and production phases showed the growth equivalent to about 25%.

2. Employed pattern of design methods in the study, design and production project showed the growth equivalent to about 15%.

3. Employed pattern of the methods of documented management programming showed the growth about 35% equivalent in the all stages and therefore ultimate result especially success in the execution and shortening of the projects from 4 to 4½ years gradually decreased to 2½ to 3 years.

SUGGESTIONS

1. Comprehensive questionnaire for training and review especially to complete the manufacture and production projects, following project management methods and their results reach to the approval of authority.

2. Comprehensive questionnaire for designing and manufacture, towards extracting effective indicators and parameters, complete and chronological with the interference of project management methods, reach to the experts of design, manufacture and production.

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