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ROLE OF RELIABILITY MANAGEMENT TOOLS AND DOCUMENTATIONS- A REVIEW

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ABSTRACT

The role of reliability management tools and document cannot be over emphasized due to its role in ensuring better product all through it life cycle. It also helps the reliability Engineer to distinguish and oversee resource dependability hazards that could unfavorably influence plant or business tasks. This paper tried to look at the reliability management tools and document, and review the works of other researchers on the area of configuration management, value engineering, critical path and reliability manual. From their discussion it was admitted that reliability management tools play a key role in engineering industries hence its application in the different sector of life.

INTRODUCTION

In Reliability Engineering, reliability management is hinged on a number of instruments of measurements which could be referred to as tools, this helps to give a proper understanding of the subject when carefully studied.
(Wang & Tseng, 2011)Customers or Consumers taste changes all the time forcing manufacturers to develop new products or systems to satisfy the needs of their customers, who happens to be the reasons why they are in business, as customers changes their taste from one pole to another products design have to also change, these changes can range from colour, weight, size, performance and so on. Configuration Management therefore ensures that products or systems are developed according to contract specifications thereby giving the customers satisfaction by its required performance, hence we can say it defines the engineering product and its technical changes.

In 1962, the US Air force published a report with the theme, "Configuration Management. During the Development and Acquisition Phases", it was coded as AFSCM 375-1, which is generally referred to as the history of Configuration Management. This subject is today accepted all over the industrial sector. It has several benefits which are but not limited to the following:

CONFIGURATION MANAGEMENT

Ali and Kidds, 2013 conducted two investigations; one was to know the critical success factors for the successful configuration management, while the second study was to identify the hindrances to effective configuration development. The study came to conclusion that most of the work focus only on the process capability itself and did not consider the success or failure of configuration management. The study went ahead to list ten process capabilities which will help in analyzing configuration management maturity model. (Bartusevics & Novickis, 2015) in this work a new model driven approach for the implementation of software configuration management was put forward and it helps in organizing existing solution in parameterized way that increased it reuse.(Pearce et al., 2016)brought forward a new method that is acceptable in addressing a problem, in which a suite of conflict classes are developed, to stand for the likely occurrence configuration failure modes. Developing a step by step process of regularly testing the likely hood of occurrence of each of the conflict class, if the recommended changes are accepted, by integrated constraint set in addition to part allocation and customization object relationships (Lindkvist, Stasis, & Whyte, 2013). Modern technologies are rapidly changing project delivery, making engineers to carry out reviews of older methods with the view to enhancing a more acceptable and better type of organizing. Since most time it requires the use of much digital data-sets, controls highly needed. This work therefore tries to bring out the differences and similarities between the top-most practices of handling change in digitally-enabled projects in Airbus, CERN and Cross rail. The reference point is configuration management, which is defined as a way of keeping parts or equipment's

integrity as well as managing changes to both the computerized informational collection and the related genuine designing frameworks. The emphasis was to make known why: configuration management took more recognition, instead of going down, why it is so relevant in this advanced age of more complex engineering systems, and 'big data'; Also, how methods of using configuration management are formed by these mechanical settings of structural designing, atomic research and aviation. It was also suggested that for future purposes areas that warrant further attention include the inter-relationships between configuration control and data analytics and visualization using large digital data-sets.

(Xu, Malisetty, & Round, 2013) this study looks at how configuration Management is practices in the Aerospace industries and have seen that the Aerospace industries adopts three tools in configuration management, which are the Standardization of processes, extending the Configuration management with advance capabilities and Enabling configuration, this was found to be accepted by most Aerospace industries. The study also went ahead to check the current challenges of configuration management in the Aerospace industries and conducted work on strategic actions for adopting configuration management and the current trend. The bedrock of through -life engineering services is the ability to trace and trace system components throughout their life-cycle. System configurations need to be known to (re)engineer, build, operate, maintain, and dispose systems in a sustainable way. This paper tries to encourage the implementation of Configuration management for through-life engineering services and systems engineering, it also tries to look at areas such as PSS (Product-Service Systems) and MRO (Maintenance, Repair, and Overhaul). Opinions, views related to configuration management and daily challenges of Configuration management for long-living complex systems were also analyzed (Müller, 2013) . Also highlighted are areas that need attention for Configuration Management implementation (CM data and process management) by means of PLM. Configuration Management (CM) is a powerful tool for Project managers to utilize a formalized system all together that they can manage status and changes to it all through the lifecycle. This work was embarked to identify and prioritize the hindrances in the implementation of the CM practice, classify these obstacles into more manageable group of factors, and break down the impacts of different factors on the identification and rating of these obstacles. Nineteen obstacles are finalized and prioritized based on their criticality and therefore three groups (managerial and organizational barriers, implementation barriers, and planning and process barriers)are separated with the help of factor analysis. This study will help both configuration management and project management experts to design better and avoid the effects of these key barriers from the definition stage (Ali & Kidd, 2014).

VALUE ENGINEERING

Value engineering in this case is the scientific application of knowledge, logics and ability to innovate new ideas and use them to bring up or accomplish a task at a minimal cost. The financial cost reduction when value engineering is applied is quite reasonable. In1947, the General Electric Company gave Lawrence D. Miles the assignment to bring out ways of optimizing costs using material substitution method or when there are variations in design and production methods, which eventually serves as the history of Value Engineering in Reliability.

APPLICATIONS OF VALUE ENGINEERING

Value engineering has found a wide range of applications in different sector of human existence, several studies and work has been done by different researchers, some of which are considered bellow. (El-Nashar & Elyamany, 2016)Lack of irrigation water system is a problem that happens at Canal Tail-end (CT). This paper utilizes Value Engineering (VE) strategy to find solution to this issue. VE philosophy incorporates gathering data about the water deficiency at CT, break down elements of channels, create inventive ideas, survey imaginative ideas based on evaluation criteria, get a short rundown of significant worth choices, and create alternative utilizing Life Cycle Cost (LCC) and Net Present Value (NPV). Study outcome demonstrate that VE procedure is a problem-solving apparatus that aides in finding solution with focus on achieving the basic function of the system (Heralova, 2016).

In this paper, another quality-oriented control approach for Value Engineering is proposed. It is substantially used in a Target Costing and Target Pricing idea so as to create, keep up and process reliable data. Based on Target cost and prices, the approach decides the quality program of the component parts and the quality-related

production. With the aim of trying to make available options to different applications in business, this new approach will depend on a discrete quality measure that takes into consideration the mapping of multidimensional conditions. After mathematically defining the basic quality arranging model, we propose a correct Dynamic Programming approach for de-terming ideal programs (Bock & Pütz, 2017). It is demonstrated that this technique is firmly polynomial if the resulting item quality levels does not increase exponentially. This work did not however consider provision of decision support for the level of real-time value engineering, therefore a variance analysis scheme for examining the consequences of actual decisions is proposed (Pinedo & Carrera, 2015)The work manages the plan and the execution of the first phase of the Experiential Engineering Project (EEP) and with the evaluation of its effect as an instructive methodology for training in industrial engineering. The EEP has been intended to add value to the Engineers for future job competitiveness offering some benefit to their employability and self-employment generation based on ethical and moral behavior. The first stage connected the educational programs subjects to the work area of industrial engineering through exercises and deliverables whose outcomes were investigated quantitatively and subjectively utilizing statistical measurements as an appraisal tools. The outcomes demonstrate that the EEP has had a critical positive effect on the learning process of the engineering students seeing it as supportive and appropriate for their learning.

(Park, Kim, Park, Goh, & Pedro, 2017)Value Engineering is a demonstrated managerial strategy for producing benefits and enhancing the value of construction projects. Be that as it may, due to kludgy and awkward past information and free-thinking strategies, idea generation during VE workshop is tedious and regularly depends on VE members' involvement and experience. Though different investigations have created specialized frameworks identified with database management to overcome these constraints, Idea generation process is yet perceived as an area to be improved. This investigation proposes a BIM-based VE Idea Bank to empower the methodical recovery of past VE data, and efficient generation of new idea. The system development includes: 1) Data model based on VE Idea Bank; 2) making BIM objects; and 3) integrating BIM and VE Idea Bank. A model is produced and its adequacy is evaluated through system trials, interview and surveys with 23 industry experts. the outcome demonstrates that the proposed system can possibly enhance VE study efficiency.

RELIABILITY MANUAL

One of the strategies to characterize a company's way of handling reliability is to make a reliability manual. The reliability manual gives the system an essential direction for the company's identified with reliability. The manual may incorporate data on building up reliability objectives, particular components for project milestones, checking strategies, and essential way to deal with disappointment investigation and client bolster.

The reliability manual gives simply enough data to control the groups as they make reliable items. It likewise shapes an unmistakable component of the company's approach, best practices, and strategies concerning reliability. (Fred Schenkelberg) (Tasker, Shaw, & Kelly, 2014) the work here aimed at putting forward a "Strategy Document" that is expected to serve as a lead document for research work and other activities that are directed at specifying and what's more, execution of a national technique for standards for advancement of new thought in Through-life Engineering Services (TES) attending to the inquiry: "by what means can the improvement and utilization of Standards upgrade or quicken development in the improvement and conveyance of through-life engineering service? It also investigation developed an interpretation of a "road map" for through-life Engineering.

CONCLUSION

The role of reliability management tools and document cannot be over emphasized due to its role in ensuring better product all through it life cycle. It also helps the Engineer to distinguish and oversee resource dependability hazards that could unfavorably influence plant or business tasks. The document provides a standard guide for continuity and consistency of production of products and service provision. Costs and other factors that enhanced the practice of reliability management are also addressed, with the aim of bringing design, product, and maintenance costs to the minimum.

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REFERENCES

1. Ali, U., & Kidd, C. (2013). Configuration management process capabilities. *Procedia CIRP*, *11*, 169–172.
2. Ali, U., & Kidd, C. (2014). ScienceDirect Barriers to effective con fi guration management application in a project context : An empirical investigation. *JPMA*, *32*(3), 508–518.
3. Bartusevics, A., & Novickis, L. (2015). Models for implementation of software configuration management. *Procedia Computer Science*, *43*(C), 3–10.
4. Bock, S., & Pütz, M. (2017). Implementing Value Engineering based on a multidimensional quality-oriented control calculus within a Target Costing and Target Pricing approach. *International Journal of Production Economics*, *183*, 146–158.
5. El-Nashar, W. Y., & Elyamany, A. H. (2016). Value engineering for canal tail irrigation water problem. *Ain Shams Engineering Journal*.
6. Heralova, R. S. (2016). Possibility of Using Value Engineering in Highway Projects. *Procedia Engineering*, *164*(June), 362–367.
7. Lindkvist, C., Stasis, A., & Whyte, J. (2013). Configuration management in complex engineering projects. *Procedia CIRP*, *11*, 173–176.
8. Müller, P. (2013). Configuration management - A core competence for successful through-life systems engineering and engineering services. *Procedia CIRP*, *11*, 187–192.
9. Park, C. S., Kim, H. J., Park, H. T., Goh, J. H., & Pedro, A. (2017). BIM-based idea bank for managing value engineering ideas. *International Journal of Project Management*, *35*(4), 699–713.
10. Pearce, B., Kurz, M. E., Phelan, K., Summers, J., Schulte, J., Dieminger, W., & Funk, K. (2016). Configuration Management Through Satisfiability. *Procedia CIRP*, *44*, 204–209.
11. Pinedo, M., & Carrera, E. (2015). Increasing Value in Engineering Learning: Design and Evaluation of a Peruvian Project. *Procedia - Social and Behavioral Sciences*, *182*, 746–755.
12. Rachwan, R., Abotaleb, I., & Elgazouli, M. (2016). The Influence of Value Engineering and Sustainability Considerations on the Project Value. *Procedia Environmental Sciences*, *34*, 431–438.
13. Tasker, P., Shaw, A., & Kelly, S. (2014). Through-life Engineering Services – Innovation and the Role of Standards, *22*, 197–203.
14. Wang, Y., & Tseng, M. M. (2011). Integrating comprehensive customer requirements into product design. *CIRP Annals - Manufacturing Technology*, *60*(1), 175–178.
15. Xu, Y., Malisetty, M. K., & Round, M. (2013). Configuration management in aerospace industry. *Procedia CIRP*, *11*, 183–186.