A REVIEW ON AGILE MANUFACTURING SYSTEM

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ABSTRACT

During the recent years, competition is intensified due to the globalisation and entry of several players in markets. This situation has facilitated the modern customers to demand innovative products and models in varied volumes. In order to fulfil this customer demand, it is necessary for the traditional manufacturing companies to practice agile manufacturing (AM) principles. On adoption of AM, a traditional company can exhibit agility by which it reacts quickly to meet the customers’ dynamic demands. In this paper, we review a wide range of recent literature on agile manufacturing. About 42 papers from premier scientific journals and conferences have been reviewed. We critique these bodies of work and suggest directions for additional research and identify topics where fruitful opportunities exist.

Keywords: Agile manufacturing, Agile Supply Chain, Fuzzy Logic, Future Research

I. INTRODUCTION

Manufacturing has undergone many evolutionary stages and paradigm shifts. The paradigm shifts in going from a craft industry to mass production, then to lean manufacturing, and finally to agile manufacturing (AM). The concept of agility (flexible and quick responsive manufacturing) will reduce time to reach market with appropriate products/services.

Businesses are restructuring and re-engineering themselves in response to the challenges and demands of the 21st century. The businesses of the 21st century will have to overcome the challenges of demanding customers who will seek high-quality, low-cost products that are relevant to their specific and rapidly changing needs. The time during which many companies competed based primarily on price tag has gone. Now is the time for companies to compete in the global marketplace, and "push the envelope" in delivery-
response, product quality, and overall excellence in customer service and customer satisfaction. Agility addresses new ways of running companies to meet these challenges. Agile manufacturing is attracting an increasing amount of attention from both the academic and industrial communities. Extensive programmes are being conducted on relevant issues to propagate agile manufacturing concepts, to build agile enterprise prototypes, and eventually to realize an agile industry. The AMEF has sponsored several major conferences and has created at least 18 ongoing ‘focus groups’ to explore further various aspects of agility and the infrastructure needed to support them. Considering the relevance of agile manufacturing we believe that new fruitful opportunities can be identified. The objective of this paper is to review a wide range of existing literature on agile manufacturing systems, to identify areas where further research is needed.

II. LITERATURE REVIEW

During the research being reported here, the literature was surveyed in supply chain strategy, fuzzy logic and some generic model and framework for assessment of the agility. Realizing the importance of agile manufacturing in the 21st century manufacturing competitiveness, an attempt has been made to review the literature available on AM with the objective to: (i) identify key strategies and techniques of AM, (ii) suggest some future research directions and (iii) develop a framework for the development of agile manufacturing systems (AMSs) along four key dimensions which include strategies, technologies, systems and people[1] also proposed a classification scheme with nine major research areas: (i) product and manufacturing systems design; (ii) process planning; (iii) production planning, scheduling and control; (iv) facilities design and location; (v) material handling and storage systems; (vi) information systems; (vii) supply chain; (viii) human factors; (ix) business practices and processes[6] and provide agile planning level[37]. Some investigation on lean and agile manufacturing to test whether their respective drivers and performance[20], discussed main issued related to lean production and agile manufacturing[19], compare all the modern manufacturing techniques[23] makes use of Analytical Network Process (ANP) with characteristics of production flow layout in complex agile manufacturing environments[29] and develop a novel methodology for the design of such a flexible super (Water-reuse network design) WRND[34] and provide three views of the relationship between lean (JIT) and agile manufacturing incorporating to assessed by structural equation model methodology[25]. SWOT (Strength, Weakness, Opportunities and Threats) analysis was also done for AM implementation and computerised system for AM improvements[38] for a rich analysis and deep understanding in an exploratory study of a recent trends for prioritization in distributed and outsourced projects[36] and the results indicated that development performance and product quality achieved by the agile process was superior[41]. In order to change this attitude, management must focus on service and flexibility, waste minimization, empowerment of human resources, training and technological surveillance. Indeed, combining a lean attitude with methodologies intended for the particularities of the sector (particularly the one of- a-kind production) and continuous improvement procedures (of means and knowledge) it is possible to achieve a lean and agile mould sector positioned as a structural element of the European industry[9].

In the automotive industry, it is thought that agile manufacturing systems will permit fast cost-effective responses to unpredictable and ever-changing product demand, and support rapid product launches for previously unplanned products tailored to meet changing customer desires and discuss two simple decision models that provide initial insights and industry
perspective into the business case for investment in agile manufacturing systems. The models are applied to study the hypothetical decision of whether to invest in a dedicated, agile, or flexible manufacturing system for engine and transmission parts machining. These decision models are a first step toward developing practical business case tools that help industry to assess the value of agile manufacturing systems, and results shows that hybridizing the lean and agile system together is technically valid and can be implemented in an industrial setting. On the bases of that White Paper describes how Advanced Information Management and Planning & Scheduling solutions for Aluminium Smelters can transform production performance, leading to greater responsiveness, increased profitability and improved customer satisfaction also presents practical experiences of adopting agile principles in product line planning.

New approach to implementing agile on the bases of AI (Agility Index) and IT (Information Technology) indicate that VE (Value Engineering) and IT had positive influences on business performance for all industries for that proposed a roadmap for successfully deploying agile ITQFD technique and implemented but some tendencies are present in the supply chain so facilitate the choice of a supply chain strategy based on the risk analysis and develop a sustainable system approach culture in supply chain strategy for lean and agile. Many way of separating out conflicting business needs and more closely integrating the supply chain, supply chain strategy and market knowledge decoupling as AM is best suited to satisfying a fluctuating demand and lean manufacturing. Due to imprecise and ambiguous criteria in agility evaluation, a precision-based evaluation may be impractical. Assessments thus are frequently measured linguistically rather than numerically. Ad hoc usage of linguistic terms and corresponding membership functions is characteristic of fuzzy logic. To develop a Fuzzy Agility Index (FAI) some flexibility criteria and evaluation schemes are present as a framework for evaluating supply chain agility and develop a FAI and implemented in Taiwanese company and a case study conducted in GECMarconi Aerospace company also suggests a new agility development method using the QFD relationship matrix and fuzzy logic approach supported agility supply chain assessment model.

A literature review and conceptual generic model is present which covers the quality based function and their interrelationship. Feedback from the 456 firms, tactics of AM are mapped and investigated in each area and structural equation model is proposed, also a questionnaire has been developed to assess theoretical based agile model. A model name agile ITQFD was design, also financial accounting system was designed and implemented in Indian electronics switch manufacturing company. A 30-criteria AM assessment tool has been conceptualized and the assessment has been done using the scoring approach in Indian pump manufacturing organisation also to implement AM paradigm, a model name METAL (Model for Enhancing Total Agility Level) proposed.

III. CONCLUSION FROM LITERATURE REVIEWS

Lean manufacturing paradigm does not effectively support new product development to respond quickly in accordance with customers, dynamic demand. This limitation of lean manufacturing paradigm is overcome by Agile Manufacturing.

During the conduct of this literature review, the Agile Manufacturing (AM) assessment tools and frameworks contributed in the above paper analysed. At the end of this analysis, it was inferred that 30 criteria–based agility assessment tool proposed by...
Sreenivasa and Devasadan (2012) was limitation of the research that, the rationale behind allotting marks under each AM enabler and criterion is not supported by the research finding. This limitation can be overcome by conducting a large number of case studies on assessing agility using 30 criteria AM assessment tool and they also conclude that the research may be further continued by implementing Model for Enhancing Total Agility Level (METAL) in many more companies.

IV. FUTURE RESEARCH

- Investigation to prepare agility assessment model
- Implementation of AM paradigm in moderate organisation
- Enhancing total agility level through assessment and product mapping
- To refine METAL and enhance practical compatibility

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VI. REFERENCES


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