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Innovative JIT implementation in manufacturing industry

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Abstract: The study discusses the best ways for manufacturers to introduce JIT systems successfully. In order to achieve this aim, a survey is carried out to evaluate the relative significance of choosing JIT implementation strategies and to analyze expert results. It is also used to research and factors influencing the implementation of JIT and to study the implementation of JIT challenges. In order to analyze the primary data, various analytical methods such as frequency analysis for demographic issues, regression for the comparison of the dependent and independent factor were analyzed using SPSS software. The results of this study may provide some insight into the relative value of JIT techniques with regard to the objective of increasing production quality and efficiency. The findings may provide some guidance to those companies that are interested in restructuring their own production systems according to the concepts of JIT.

Keywords: Implementation, JIT, Kanban, Manufacturing, Efficiency, Quality, Employees

INTRODUCTION

JIT is a method of production/management that was originally developed by the Toyota Motor Corporation of Japan. The Toyota Development System is referred to as JIT in most regional analysis. The following points are given as the concept of JIT by Ohno (1988), a former executive vice president at Toyota Motor Corporation.

In recent years, inventory management has been an ongoing problem for all organisations, not just because of the high costs associated with inventory keeping, but also because it has a lot to do with the manufacturing process of organizations. The main techniques for the effective implementation of just-in-time (JIT) management are described in this report. The research uses survey responses from company workers to learn about the advantages and benefits experienced by the implementation of Just in Time (JIT) by the industry. The findings show that the implementation of the efficiency, product design, inventory management, supply chain and production plans expressed by the infecting JIT theory increases the competitiveness of the industry.

Implementation of JIT improves efficiency through lower inventory levels, reduced operations & inventory costs have been reduced, removing waste from processes and reducing unnecessary output, which is a major challenge for the manufacturer who is trying to maintain continuous flow processes. Implementation of JIT is a critical production strategy that achieves capacity utilization and minimizes the defect rate in continuous flow processes. Teams containing multi-skilled staff who have been educated on the job handle the organizational framework of a production site. A multi-skilled worker refers to a worker who is in charge of multiple successive operational steps. This makes it possible to control the type and amount of manufactured goods according to changes in demand, and allows for adjustments to be made to the allocation of employees needed for a job.

Total Quality Control (TQC) is implemented on the principle of full participation by all personnel. Process control is performed based on a principle of JIT. In response to demand generated by customers, JIT seeks to shorten production process times, and contributes to the company's return on sales and capital turnover ratio. JIT also seeks the productive use of machinery and manpower at the same time as eliminating excess inventories of components. In order to reduce excessive costs, stringent cost controls are used. It is necessary for both car assemblers and parts suppliers to be connected by an electronic information network and to cooperate in a JIT-based production system to implement JIT even more efficiently.

LITERATURE REVIEW

(Thanyavanich, 1991) researched effective ways to effectively introduce JIT systems for manufacturers. A survey is conducted to evaluate the relative importance of selecting JIT implementation techniques in order to achieve this objective, and the AHP (Analytic Hierarchy Process) model is used to analyze the experts' knowledge.

(Ramarapu et al., 1995) Compares the research carried out in the last decade in the field of JIT implementation, defines essential elements of JIT, and groups the elements into broader variables. To find over 130 JIT

implementation papers published in both technical journals and proceedings, a comprehensive literature search was carried out.

(Sukarma, 1997) incorporates a critical study of the possibility of implementing JIT in developing country (DC) manufacturing firms, with the goal of developing guidelines for implementing JIT in the DC environment. However, only general recommendations can be provided because of the wide reach of the targeted population.

(Kojima et al., 1998) Analyzes that two kinds of Kanbans are used in a Just-in-Time(JIT) production system as tools to regulate the production and withdrawal quantities at each point. The efficiency of the JIT production scheme is determined by the number of Kanbans used in phases. It is studied in this paper under stochastic demand and deterministic processing times.

(Omusebe, 2006)The use of JIT activities by the companies listed on the Nairobi Stock Exchange was investigated. The report set out three targets to be accomplished. The first goal was to record just-in-time activities between companies operating in Kenya. Secondly, the study aimed to define the advantages of implementing just-in-time systems in organizations in Kenya.

(Fateha et al., 2012) reviewed Elements of the introduction of Just-InTime (JIT) in the automotive industry. JIT is considered to be one of the most successful manufacturing management systems since it was introduced. Toyota has been the world's best producer with the introduction of JIT.

(Singh and Inderpreet, 2014) studies The similarities between different dimensions of JIT implementation and performance parameters have been worked out by the use of various statistical methods and important factors that contribute effectively to the achievement of output performance measures.

(Xu and Chen, 2016) discussed the fact that manufacturing just in time (JIT) is one of the key methodologies used to increase the productivity of manufacturers by reducing inventory and lead time.

(Dange et al., 2014) has investigated that, partly because of its popularity in the Japanese industry, Just in Time (JIT) has become a very successful operating strategy. Various advantages, such as inventory reduction, increased quality of operations and quicker response.Until the desired result is achieved, JIT implementation can require a series of gradual steps and missteps.

(Khan et al., 2017) The just-in-time approach is used to increase the quality, level of service and reduce/eliminate waste from the end-to-end system of companies. Undeniably, in today's world, just-in-time plays an important role in achieving the target of businesses in terms of high service levels with low costs.

(Phogat and Gupta, 2017) recognizes that since its evolution and has been successfully applied in manufacturing, theory has evolved to a new high level just in time (JIT). SihleMankazana., Charles Mukwakungu, & Sambil.

(Bashar and Hasin, 2019) defines that the aim of this paper is to investigate the JIT implementation status, identify the JIT practice's relationship with the organization's on-financial (operational) and financial (business) results. Empirical data were collected using non-probability convenient sampling method from 227 apparel factories

RESEARCH METHODOLOGY

The researcher focuses on the implementation of JIT in the manufacturing industry, and this study has examined and analyzed its consequences for JIT implementation problems in the manufacturing industry. Our research idea is based on the rich knowledge acquired by our peer teams across the university.(A.C.Gomathi, S.R.Xavier Rajarathinam, A.Mohammed Sadiqc, Rajeshkumar, 2020; Danda et al., 2009; Danda and Ravi, 2011; Dua et al., 2019; Ezhilarasan et al., 2019; Krishnan and Chary, 2015; Kumar et al., 2020; Manivannan, I., Ranganathan, S., Gopalakannan, S. et al., 2018; Narayanan et al., 2012, 2009; Neelakantan et al., 2013, 2011; Neelakantan and Sharma, 2015; Panchal et al., 2019; Prasanna et al., 2011; Priya S et al., 2009; Rajeshkumar et al., 2019; Ramadurai et al., 2019; Ramakrishnan et al., 2019; Ramesh et al., 2016; Sankar et al., 2020; Venugopalan et al., 2014)The research-related questionnaire is produced and sent to the target respondents for review by the research. The researcher was completely designed the questionnaire based of the five point Liker scale. 5=Very significant, 4=Signficant, 3= Moderately significant, 2=Not significant and 1=Negative significant. Some statistical methods, such as frequency analysis and regression analysis, have categorized, tabulated and analyzed the collected data. The sample profile of the study is represented through pie charts

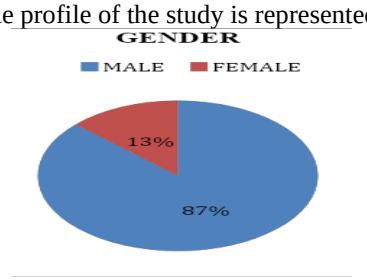

Fig.1: The pie chart indicates the percentage of gender of the respondents. It is clear that majority of the respondents are Male (87%), female respondents are only (13%).

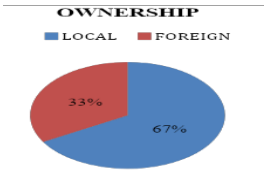

Fig.2: The pie chart indicates the percentage of ownership of the respondents. It is clear that majority of the respondents (67%) find the ownership of the company as local, the respondents finding the ownership of the company as foreign are only 33%.

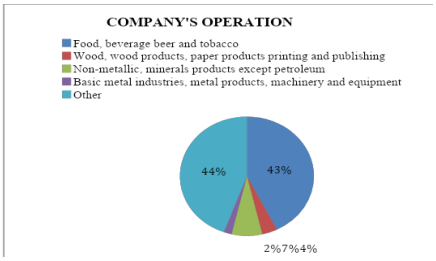

Fig.3: The pie chart indicates the percentage of company operation of the respondents. It is clear that majority of respondents (44%) find the company's operation as other.

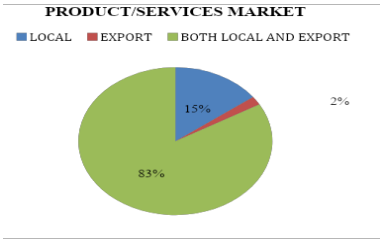

Fig.5: The pie chart indicates the percentage of product/services market of the respondents. It is clear that majority of respondents (83.3%) find the product/services market as both local and export

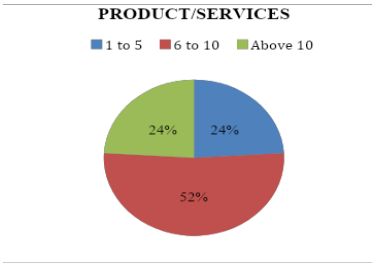

Fig.4: The pie chart indicates the percentage of product/services of the respondents. It is clear that majority of respondents (52%) agree that the number of products or services are from 6 to 10.

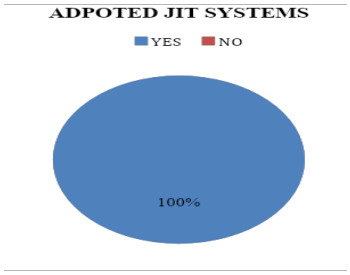

Fig.6: The pie chart indicates the percentage of adopted JIT systems of the respondents. it is clear that majority of respondents (100%) agree yes to the adopted just in time systems.

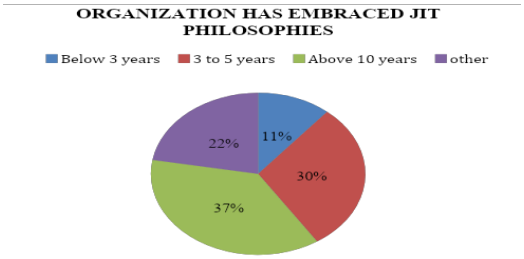

Fig.7: The pie chart indicates the percentage of time period organization has embraced just-in-time philosophies of the respondents. It is clear that majority of respondents (37%) agree that the organization has embraced JIT philosophies above 10 years

Table 1: Regression

MODEL	R	R SQUARE	ADJUSTED R SQUARE	SIGNIFICANCE
1	.423[a]	.179	.112	.043

INFERENCE

The above tables 2 Provides the R and R^2 values. The R value represents the simple correlation and is 0.423 ("**R**" column), which indicates the degree of correlation. The R^2 value (the **"R square"** column) indicates how much of the total variation in the dependent variable can be explained by the independent variable. The adjusted R square value 0.112 which indicates 11% of the variance in dependent variable has been explained by independent variables.

Table 2: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.280	.555		5.911	.000
	Work-in-process reduction	.023	.080	.039	.290	.773
	Wastage reduction	-.071	.073	-.128	-.970	.337

1	Warehouse space reduction	.122	.076	.215	1.602	.116
	Product and service quality improvement	.136	.065	.284	2.098	.041

INFERENCE

The above table 3 indicates regression analysis with B & Beta value for the independent and dependent variable which are assumed. As a rule of thumb, we say that a b coefficient is statistically significant if its p-value is lesser than 0.05. From the analysis it is found that work in process (0.039),warehouse space reduction (0.215) and waste reduction(-0.128) do not have relationship with the jit implementation. The product and service quality (0.284) found to have positive is relationship with JIT implementation.

Table 3: Regression

MODEL	R	R SQUARE	ADJUSTED R SQUARE	SIGNIFICANCE
1	0.469[a]	0.220	0.156	0.015

INFERENCE

The above tables 4 provides the R and R^2 values. The R value represents the simple correlation and is 0.469 ("**R**" column), which indicates the degree of correlation. The R^2 value (the **"R square"** column) indicates how much of the total variation in the dependent variable can be explained by the independent variable. The adjusted R square value 0.156 which indicates 15% of the variance in dependent variable has been explained by independent variables.

Table 5: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.431	.429		8.000	.000
	Government policies	.240	.076	.436	3.158	.003
	Poor information/data accuracy	.005	.073	.008	.063	.950
	Employees' resistance to change	-.116	.069	-.222	-1.675	.100
	Problem with accounting practice	.030	.069	.063	.442	.661

INFERENCE

The above table 5 indicates regression analysis with B & Beta value for the independent and dependent variable which are assumed. As a rule of thumb, we say that a b coefficient is statistically significant if its p-value is lesser than 0.05. From the analysis it is found that government policies (0.436) are considered to be a challenge for jit implementation having strong positive linear relationship with the JIT implementation barriers/challenges. The employee resistance to change (-0.222) is having negative linear relationship with JIT implementation

CONCLUSION

The objective of this research is to record JIT practices among manufacturing firms. Primary information was gathered through a questionnaire of open and close questions. This study shows that in all of the assessed fields, managers implementing JIT practices have experienced significant benefits: quality improvements, time-based responses, flexibility of staff, simplification of accounting, firm profitability, and reduction of inventory. In addition, this study also provides compelling evidence that the more extensive the adoption of JIT is (both in scope and depth), the greater the overall returns are. When their emphasis is restricted to JIT manufacturing activities, both low and high adapters earn similar advantages and quality maintenance contributes to greater benefits. The primary concept of this study is to help to take JIT assessment measures in the manufacturing sector in order to become more cost-effective and quality in the global market today.

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