

The Current Awareness of Just-In-Time Techniques within the Libyan Textile Private Industry: A Case Study

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Abstract—Almost all Libyan industries (both private and public) have struggled with many difficulties during the past three decades due to many problems. These problems have created a strongly negative impact on the productivity and utilization of many companies within Libya. This paper studies the current awareness and implementation levels of Just-In-Time (JIT) within the Libyan Textile private industry. A survey has been applied in this study using an intensive detailed questionnaire. Based on the analysis of the survey responses, the results show that the management body within the surveyed companies has a modest strategy towards most of the areas that are considered as being very crucial in any successful implementation of JIT. The results also show a variation within the implementation levels of the JIT elements as these varies between *Low* and *Acceptable* levels. The paper has also identified limitations within the investigated areas within this industry, and has pointed to areas where senior managers within the Libyan textile industry should take immediate actions in order to achieve effective implementation of JIT within their companies.

Keywords—Industry, Questionnaire, JIT, Textile

I. INTRODUCTION

LIBYA is a large African country, bounded in the North by the Mediterranean Sea, in the East by Egypt and Sudan, in the South by Niger and Chad, and in the West by Algeria and Tunisia. It is mainly petroleum producing and exporting country. The economy within Libya was formerly based on agriculture, producing fruit, barely, olives, and dates [1]. Libya was relatively poor until the discovery of Oil and Gas in the very beginning of the sixties of the last century. Since then, the country has turned to industrialisation by engaging in petroleum processing as well as some other industries such as Cement and Textile industries. Libya is committed to develop enhanced abilities to produce goods that meet the quality requirements of present markets with all the possible products and services, which could be achieved by providing the most proper and highest technology available [1], [2]. Very little research has been carried out over the recent years in the area of textile industry. However, a little of the published work was in the area of modelling and simulation of the manufacturing operations rather than studying the strategies and implementation status within this industry.

This paper focuses on this area of research to show how the Libyan textile industry is being run with respect to JIT and to provide insight towards future improvement.

II. AN OVERVIEW OF JIT

JIT is a *pull* manufacturing approach, also known as the Toyota Production System, which was established in Japan during the mid 1970's by Taichi Ohno and Shigeo Shingo at the Toyota Motor Company. Toyota was encouraged to be the first company to implement this system to streamline its production with a minimum holding inventory because inventory ties down capital and takes up. Improving the entire production system continuously was the core effort of Toyota, along with a dedicated effort to pursue perfection within its industry. This resulted in an integrated and efficient manufacturing environment [4]. This situation was, in part, responsible for the competitive edge that has been demonstrated in the world market during the last two or three decades. The Westernised version of JIT Lean Manufacturing came into widespread use in the 1990's as a process for reducing inventory and streamlining production through a continuous improvement process [5]. Industrial organisations as well as academic institutions have paid a considerable attention to JIT, as a new manufacturing approach, developed for increasing the value added on the production processes, and reducing the waste to increase productivity. A review of the literature demonstrates that there is an enormous amount of research that has been carried out on JIT and its implementations in various business areas, all discussed the implementations of JIT in various manufacturing and business areas. Generally, these published works described JIT as a manufacturing philosophy, also known as a *PULL* system, used for producing, manufacturing and supplying production goods and services that are needed at the right time and at the exact quantities. In line with this, it has been pointed out that the distinctive feature of JIT is to eliminate waste and losses by organising the entire system operations and activities to take place at the exact time they are needed[1], [4], [5].

The JIT system represents the whole processes of continuous improvement during all operations within companies, and it has been applied to both production and purchasing systems in all production systems. In the line with this, it has been stated that JIT is a continuous process of change focused on delivering the exact needed quantities of goods at the exact needed time [6]. Additionally, JIT also focuses on the complete elimination of waste, which could be

any thing that does not add value to the produced products and services. However, under the JIT production environment, the order release for each operation is according to the actual demand. Furthermore, it was concluded that controlling the flow of materials through the JIT system processes can be achieved by using the Kanban technique, which is a card/sign form, used as a visible record to control any flow of materials throughout the entire production and service systems [7].

III. QUESTIONNAIRE DESIGN

The gathered data were obtained through a detailed, three pages survey questionnaire in order to explore the research proposition. The questionnaire was divided into three sections, the first section was designed to investigate the profile of the targeted companies as well as the respondents. The second section, concerning the investigation of the policy applied towards implementing JIT system within the targeted companies. The third section of the questionnaire was designed to ascertain the implementation level of each of the JIT key-elements throughout the entire working environment within the Textile industry. The developed questionnaire was protested by several academicians and expertise from the area of industry for clarity and completeness. The suggested notions and ideas were considered and appropriate changes were made as per these suggestions. The respondents were given a choice to indicate their answers using a multiple choice answer and Likert Scale, each where applicable, to indicate on the most appropriate answer based on their detailed knowledge. As a first stage before delivering the questionnaire, a letter was mailed to all the targeted companies, providing a general idea about the survey and encouraging the participants to complete the questionnaires seriously. Then, 60 hard copies of the questionnaires were delivered to the chosen companies that working within the area of cement industry. Each copy of the questionnaire was accompanied with another letter providing explanations about the target beyond conducting this survey, and providing some contact details in a case of any clarifications. Out of the 260 copies sent, a total of 136 copies were returned with the full-completed questionnaire, giving a response rate of about 53%. Beside that, three intensive meetings took place between the author and four senior managers working within the surveyed companies. During these meetings, information related to surveyed industry was provided, and three site visits to the correspondent companies were additionally carried out in order to collect more knowledge about the working environment within surveyed industry.

IV. DATA ANALYSIS AND DISCUSSION

A reliability test was conducted for the entire questionnaire as a first step of analysing the collected data. Cronbach's Alpha was used as the Coefficient of Reliability for testing the internal consistency of the constructs of the entire developed questionnaire. The calculated value of Cronbach's Alpha was found to be 0.79. According to Pallant [8], a Cronbach's Alpha Coefficient of 0.70 or above is considered adequate for the reliability of the entire questionnaire. Therefore, in this survey 0.79 gives strong evidence that the questionnaire

responses were reliable. A summary of the analysed data about the approximate total number of employees, working within the surveyed companies are provided in Table I. It shows that majority of the surveyed companies (54.5%) are with an approximate number of employees in the range between 500 and 1000. The lowest percent rate (9.1%) of the respondents were from the smaller companies working within the area of the textile industry, with only less than 100 employees. That indicates that majority of textile companies are large with respect to total number of employees.

TABLE I SHOWS THE APPROXIMATE TOTAL NUMBER OF EMPLOYEES

Apr. number of employees	%
Between 50 to 100	09.1
Between 100 and 500	09.4
Between 500 and 1000	54.5
More than 1000	27.0

V. JIT IMPLEMENTATION LEVEL

Based on the analysed data, the implementation level of JIT within the surveyed companies is shown on Figure I. It shows exactly the half of the surveyed companies did not show any sign of implementing JIT system. Surprisingly, a range of about 41.7% from the surveyed companies could not identify whether they had implemented JIT or not, giving an answer of *Do Not Know*, whereas only 8.33% had implemented JIT system within their companies.

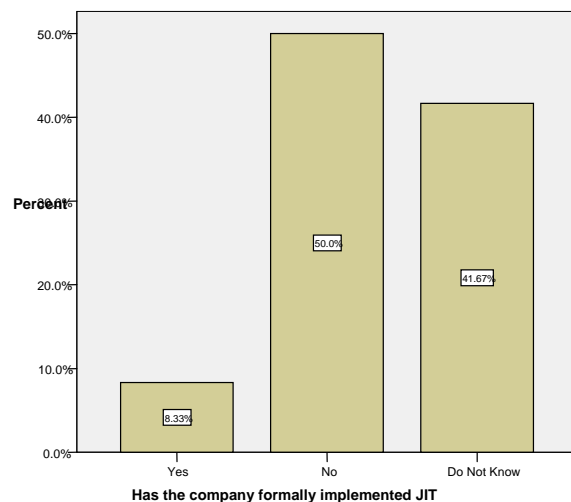


Fig. I shows the implementation level of JIT system

A. Reasons for not implanting JIT

The respondents who indicated that they did not formally adapted JIT were asked to identify the reasons for that. The

reasons with the high rank for not implementing JIT as given by the respondents are shown in Table II. It shows that the lack of familiarity of JIT within about 73% of the surveyed companies. This result reflects the lack of knowledge, which has been indicated earlier by many respondents who could not indicate clear answers in many cases, preferring to answer with *Do Not Know*.

TABLE II
THE GIVEN REASONS FOR NOT IMPLEMENTING JIT

Given Reason	%
Lack of top management support	18.2
JIT does not fit well with company	00.0
The company is not familiar with JIT	72.7
Implementing JIT is too expensive	09.1

B. Top management commitments towards implementing JIT

The management support that applied towards implementing JIT was investigated within all the surveyed companies, whether they have been indicated as implementers of JIT or not. A summary of the analysed data is presented in Table III, showing very little or no commitments applied towards the implementation process of JIT throughout the strategic level. Only 14% from the respondents within the surveyed industry showed some commitments towards implementing JIT. Apart from that, there is no any sign of positive commitment towards implementing JIT system within the companies working within the Textile area throughout the entire strategic level.

TABLE III
THE MANAGEMENT COMMITMENTS ON JIT IMPLEMENTATION

Investigated Areas	%
Implementation programmes of JIT	14.0
Holding clear visionary goals for JIT implementation	21.0
Ensuring necessary resources to implement JIT	13.0
Developing a detailed JIT implementation plan	23.0
Ensuring a clear definition of JIT to all the employees	23.0
Working towards increasing the customer satisfaction	53.0

VI. INVESTIGATION OF THE IMPLEMENTATION STATUS OF EACH JIT KEY ELEMENT

The survey tried to ascertain the implementation status of the JIT key-elements within the surveyed industry in order to provide a detailed picture of the existing JIT environment within this industry. The findings are summarised and illustrated in Table 1. It shows that the implementation status

of the first two investigated key-elements (*implementing programmes to eliminate waste* and *implementing continuous improvement programmes*) are affecting the implementation status of the other key-elements. This is because these two elements are the key-drivers of all the other related JIT key-elements. These two key-elements should be fully implemented in order to achieve effective implementation of the JIT system, whereas in this survey they are found be practiced at lower implementation levels.

The poorest implementation levels across the surveyed industry as expected are with *Group Technology*, *Kanban* and *implementing Levelled/Mixed Scheduling programmes*. The table also shows that the *Preventative Maintenance Programmes* are well-implemented as in this industry breakdown affects are critical and need to be avoided. This implementation of PMP programmes requires multifunctional skills employees which also found to be at high levels of implementation. Worryingly, the *Total Quality Management*, *Quality Circle Programmes* and *Reducing Set-up Time* are implemented at modest levels, where more attention should be paid in order to achieve effective and successful implementation of JIT system. In particular, the overall implementation status of JIT key-elements is poor across all the investigated categories and not exceeding 55%. This situation needs immediate and serious actions in order to achieve the desired benefits of implementing JIT system.

TABLE IV
THE IMPLEMENTATION STATUS OF THE JIT KEY-ELEMENTS

JIT Key-Element	Response Rate		
	Y	N	D
Implemented programmes to eliminate waste	72.2	11.1	16.7
Implemented programmes for continuous improvement	66.7	16.7	16.6
Implementing programmes to reduce set-up times	50.0	22.2	27.8
Implemented programmes for Group Technology and/or Cellular layout	16.7	50.0	33.3
Implemented levelled/mixed scheduling programmes	44.4	27.8	27.8
Used Kanban cards/signals as a production control system	11.1	61.1	27.8
Implemented a multifunctional skills training programme	83.3	11.1	05.6
Implemented preventative maintenance programmes	94.4	00.0	05.6
Implemented Total Quality Management programmes	38.9	44.4	16.7
Implemented Quality Circle programmes	38.9	38.9	22.2

Key: Y=Yes; N=No; D=Do Not Know

VII. CONCLUSION

This paper discussed the strategy applied towards implementing JIT system as planning and control techniques as approaches used for effective managing of the managerial and manufacturing operations within the Libyan Textile industry. The support level of the management body, along with emphasis levels of the senior managers whose involved within the decision making processes were investigated in order to demonstrate the actual current awareness and the applied strategy towards implementing JIT as planning and control techniques within the textile industry in Libya. Based on the analysis of the gathered data from the related managers, the findings demonstrated that the management body does not have a clear detailed strategy towards most of the areas, which are considered as being crucial in any effective implementation of JIT techniques. Also, the finding from this study has identified the limitation levels within the investigated areas throughout the entire strategic level. It has pointed to the areas where the management body should take immediate and strategic actions in order to improve their manufacturing and managerial operations of the textile industry, and to achieve successful and effective implementation of JIT planning and control techniques within their companies. The management body should pay more attention on applying the most reliable training and on-going education programmes to all the involved individuals, and providing more support and flexibility to implement the related up-to-date techniques and technologies throughout their companies. Working towards satisfying the customers, as the majority of the surveyed companies do, could be the starting point for these companies to show more improvements in other related areas where the continuous improvement should be considered in order to avoid any customer dissatisfaction and loss of profits, which could be a direct result from increasing defects. The defects may be related to many aspects of satisfying the customers.

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Dr. Rajab Abdullah Hokoma began his career in Industrial Engineering in 1990, after his graduation from Industrial Engineering, Garyounis University, Libya, he received his MSc in Enterprise Management at Warsaw University of Technology, Poland.

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