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Abstract

Techniques to facilitate cultural changes in the organization resulting from JIT implementation.

TECHNIQUES TO FACILITATE CULTURAL CHANGES IN THE ORGANIZATION RESULTING FROM JIT IMPLEMENTATION

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ABSTRACT

Implementing the Just-in-time (JIT) approach to manufacturing planning and control results in changes to an organization's culture. The ability of a company to facilitate these cultural changes is a critical success factor for JIT implementation.

Case studies of JIT implementation are analyzed in conjunction with techniques to ease cultural changes. Recommendations are made to utilize techniques which reduce the resistance to change in combination with the Lewin-Schein Organizational Change Theory. Insight is gained from review of other JIT and TQM implementations. Additional applied research in this field is necessary to determine the relative importance of the techniques and their various components.

INTRODUCTION

Just-in-time (JIT) is an approach to manufacturing planning and control which has received much attention over the past twelve years in the United States. JIT is both a philosophy as a set of techniques.[10] It has been used extensively in Japan to effectively minimize waste and inventories. The success of JIT in Japan was the catalyst for its adoption in the United States.

Implementing JIT involves making many changes in a manufacturing organization. Some of the changes are tangible, such as the redesign of a plant layout for maximum efficiency or changes to purchasing arrangements. Others are more intangible, such as the acceptance of the JIT philosophy.

Acceptance of the JIT philosophy by all employees is critical to the success of a JIT program. JIT is highly dependent on the employees for generating ideas on how to improve the efficiency of their operations and avoid problems. Accepting the philosophy involves changing the culture of the organization. The cultural changes required are often overlooked when compared to the more tangible changes necessary.

In implementing JIT, the challenge to facilitate the change of an organization's culture must be addressed. Once the cultural changes have been accepted the JIT program will be more successful.

CHANGES TO THE ORGANIZATIONAL CULTURE JIT REQUIRES

One of the key concepts with JIT is demand pull. Parts should not be made unless they are required by the users of the

parts in the "downstream" manufacturing operations. This can pose challenging scenarios for workers when no parts are required. During these periods they need to perform maintenance on equipment or other slow time duties. This involves a change from the traditional philosophy of making as many as possible.

In JIT's drive to eliminate waste, zero inventories are expected. Most people are initially uncomfortable with this idea.[4] Past practices have always been to have inventory on hand, which acted as a buffer in the event of problems in an area. With JIT, slack time should be used in conjunction with increased maintenance to assure the reliability of the equipment, such that demands are always met. In addition, relationships with suppliers must also be improved.

Another change JIT requires is the move from a functional to a team environment. People are expected to work closely with those whom their work might influence. The goal of this is for employees to work together to anticipate and eliminate problems and better understand the whole manufacturing operation.

One of the goals of JIT is zero waste. This also requires changes to the organizational culture. Over time employees have become tolerant to the level of waste in the organization. Changes are necessary to acknowledge these wastes and implement methods to eliminate them.

A final topic which effects organizational change is plant layout. JIT stresses that work areas should have a U-shaped layout.[10] While this is primarily a tangible change, it has

cultural implications. For example, it could require revising the organizational structure. This would result in changing the members of work groups and in turn how they interact both among themselves and with other groups.

JIT IMPLEMENTATION CASE STUDIES

Case studies of U.S. and European manufacturing plants are presented to illustrate the difficulties and successes these companies experienced in changing the company's culture by implementing JIT. From their experiences insight is gained on how to improve JIT implementation strategies.

Dover-OPW

The OPW division of Dover implemented JIT between 1984-1988. They are a manufacturer of products for the petroleum and chemical markets. JIT has been very successful for OPW.

OPW operates in a very strong union environment. In the planning phase, OPW and the union were successful in negotiating mutually agreeable terms to the JIT implementation. The union management agreed to promote an adjustment of the hard-line union culture. This was a key point in opening the union workers' minds to all the changes JIT requires. In addition, the union agreed to accept reclassification and cross-training. Together the union and OPW trimmed nine worker classifications down to three. OPW provided both job-related and general training for the employees.[7]

The biggest challenge OPW faced was with the middle management. They were very reluctant to accept the demand pull

model and were concerned this would result in missed shipping dates. It was not until the manufacturing manager and project champion said he would take the blame if the shipping dates were missed that the middle managers agreed to proceed.[7] This clearly illustrates how resistant people can be to changes in the system.

U.S. Engine Plant

In this case, the plant was operated from day one with a highly empowered work-force. They met their own schedules, laid out their own work areas, and performed assembly tasks in the manner they thought best.

Once operations were well established, top management decided to implement JIT due to market pressure for lower prices. The implementation of JIT had some very interesting results in how it made the workers feel. Under most conditions with JIT implementation, the management expects the employees are very willing to actively participate in making things more efficient at the plant. However, in this case the workers already were doing this, and they perceived JIT to limit the autonomy in their jobs.[5] Overall, the JIT implementation was not very successful.

The JIT implementation was perceived to be a change to traditional management control mentality and was met with much resistance. The workers resisted the rigid methods and procedures required with SPC. Schedules were also tightened to focus on production, resulting in less time for team meetings.[5]

Parallels are drawn to practices at Toyota were multi-skilled operators had to attend to as many as 16 machines at once. The operators resisted running this many machines. This mode of operation resulted in an increase in major accidents for the operators and higher suicide levels.[5] This raises a critical question - how far can people be pushed? What exactly does zero waste mean? These are questions that need to be answered by individual companies depending on their philosophy and situation. Clearly, there is a point where the company can expect too much from the workers. This has detrimental effects.

The workers at the engine plant felt these pressures. They felt as if they were under the gun all of the time. The workers also had the perception that the management did not trust them anymore due to reduction of their autonomy and the increase in standardization.[5]

The engine plant JIT implementation could have been much more successful if management applied different implementation strategies. Some possibilities include; explaining the overall market forces to the workers and starting JIT before the situation became critical. The two main problems they experienced were the employees resistance to change and the fact that the changes they made were so drastic. Another potential improvement would have been to use a pilot program.

Kawasaki - Nebraska

Kawasaki opened their Nebraska plant in 1975 and was the first company to implement JIT in the U.S. in 1981.[3] The

company had concerns about implementing JIT in the U.S. due to the traditionally adversarial relationship between management and labor compared to Japan.[8] The plant is not unionized.

The JIT implementation at Kawasaki was hailed a success. Little is published about how effectively the cultural changes resulting from JIT were made. However, it was clear to the employees that the company was in trouble and some changes were necessary. They were very accepting of the JIT program and worked in an environment where problems were solved without assessing blame.[3]

Two U.K. Factories

These cases from the United Kingdom are considered useful as a comparison between Western and Japanese manufacturers. Granted there are some differences between the U.K. and the U.S.; however, the cases illustrates similar problems are encountered in the U.K. and the U.S..

The driving force for the U.K. company to implement JIT at two of their factories was global competition with Japan. They found their sales per employee were just over 50% of their Japanese competitors and it took them twice as long to develop and manufacture similar products.[6] These are commons reason to implement JIT in the U.S..

Both factories required significant redesign to move from a functional task basis to a work flow basis. Many workers feared the team approach and cross training, thinking it would result in an erosion of their skills and a loss of status. One example is

expecting skilled operators clean up their own areas. In the past, unskilled labor was used for this function.

Other problems were encountered with the demand pull concept. When there was no demand some employees would try to create work which did not add value. It was difficult for them to be idle. They often found workers would perform activities which added cost to protect their positions.[6] Perhaps the management should have identified specifically what they wanted the workers to during idle time and explained that some idle time was expected. It appears the employees either did not trust the management or possibly the management had not explained their overall plans to them.

Additional resistance was encountered in efforts to reduce set up times.[6] This is the same problem the engine plant experienced. It clearly shows the importance of how these types of changes are communicated. The management needs to put themselves in the position of the employee. Recognition and reward programs might help smooth this transition. Another key point is setting goals which are both reachable and sustainable.

TECHNIQUES TO FACILITATE CULTURE CHANGES

Resistance to Change

Resistance to change is one of the primary organizational problems in implementing JIT. Many people feel threatened by change. They fear they may loss their job or status, or they are unsure as to what might happen as a result of the change. Additional problems can be encountered because the employees lack

self confidence.[2] Deming stressed the importance for top management to eliminate fear. The goal is build a relationship of trust between the employees and the management to minimize the resistance.

A starting point to limit the resistance to change is to communicate the needs for change to the employees. This involves sharing the information with them which resulted in the firm deciding to implement JIT. For example, comparisons to competitors may be used to illustrate how far behind a company may be in a field. Other measures such as market share may also be used. In addition, employees should be able to initiate questions and receive information.[2] Open discussion is to be encouraged.

The resistance is often hard to break down. A technique to help reduce the resistance is to use employees who have accepted the changes to try to win over the resistors. These people are referred to as "change masters". They can be more effective at convincing their peers to accept the changes due to their informal power.

New employees are typically the least resistant to change. It is important to work with them from day one to train them on the JIT operations and culture. These employees are expecting changes by starting a new job and do not experience the same degree of changes the senior employees do.

A key point in reducing the resistance to changes is to solicit the employees' participation and involvement in the

changes. Often employees have ideas on how to improve the company's operations. An example with JIT might be the layout of a workstation or how to solve certain problems. Good employee ideas need to be implemented by management to show the employees their ideas are valued. An additional benefit of implementing the employees' suggestions is they will take ownership of them and work harder to assure their ideas result in successful improvements.[2]

Cultural Change Theory

Traditional cultural change theory is applied to all types of organizations undergoing a cultural change. JIT implementation is a specific example of a cultural change. Changes are made by convincing organizational incumbents to "buy into" the new organizational beliefs and values.[1] Five key intervention points and processes can be used to make the desired changes. These points have many elements which are in common with the techniques used to reduce resistance to change. They are discussed below.

One intervention point is behavioral change. This is best accomplished by managers communicating the outcomes they desire from workers by setting explicit expectations and performance standards. Then rewards are provided for the desired behaviors. Employees' attitudes and values themselves are extremely difficult to change; however, a start to use extrinsic motivators to bring out desired behaviors.[1]

Justification of behavioral change must go beyond extrinsic

motivators and the "requirements to keep ones job" to be successful. Over time, the goal is for the employees to see the inherent value in the change, which is the key for them to genuinely accepted the change in the organization's culture.[1] This means the management must take time to explain and justify the changes required to the employees. In addition intrinsic or intangible motivators must be desired and made available.

Cultural communications can be used to ease organizational change. These include announcements, memos, speeches, and other direct forms of communication. Indirect forms of communication, such as ceremonies can also be used.[1] Management must take action on the changes they propose to show the workers they are committed to them.

The easiest way to change the culture of the organization is to hire new people as was previously mentioned. Along with the hiring of new people who fit the new culture, those who do not accept the new culture and the changes it requires, can be encouraged to find new jobs. Care must be taken to avoid a mass exodus and assure no discriminatory practices are used.

Lewin-Schein Theory of Organizational Change

Vora applied the Lewin-Schein theory to study JIT implementation at 14 electronics plants in Minnesota. He used semi-structured interviews with open ended questions to collect data from the company's management.[12]

The Lewin-Schein theory divides an organization's cultural changes into three stages. First there is the "unfreezing"

stage, in which involves initiating and planning for JIT. The second phase is the "changing" stage in which JIT is actually implemented. The last stage is the "refreezing" where the implemented changes take hold and are accepted.

The results of Vora's research indicated the higher a firm's efforts and commitment to unfreezing, the greater the changes in the changing stage. This supported his proposition. Another main conclusion drawn from the research is the levels of refreezing were lower than those of changing.[12] This is not surprising, it would be unusual to have the employees openly accept every change that was made.

High levels of unfreezing were positively correlated to high levels of refreezing. Yet, a construct that higher unfreezing leads to higher changing and in turn, higher refreezing was not supported.[12]

One common conclusion that can be drawn from this work is that the unfreezing, or planning stage, is critical to the success of the other stages. Companies should allocate ample resources to properly plan for JIT implementation and acceptance.

The interviews identified problems with acceptance among first line managers.[12] These can be traced to resistance of changes. Top management needs to find the root causes of their concerns and do their best to address them.

General Living Systems Theory

Miller's General Living Systems Theory identifies 19 key characteristics that all living systems must have to survive. If

a system lacks any of the characteristics it will not survive. The characteristics are quite broad and have open definitions. Some examples of the characteristics are "reproducer", "extruder", and "associator". It has been suggested this theory should be applied to JIT implementation.[9]

This theory is difficult to apply to JIT. A primary problem is the theory would first need to be explained to the management of the company. This takes time, and it is possible some managers may not readily understand the theory due its numerous and broad definitions. No research has been presented to validate the theory's applicability to JIT implementation. Other techniques presented have a more direct application to JIT implementation.

Parallels to TQM

It is interesting to note the parallels between JIT and Total Quality Management (TQM) implementation. Both of these techniques originated in Japan and now are spreading in the United States.

One parallel is the commitment of top management. While not all researchers agree this is important in JIT, most do.[4] An analogy is asking someone to do something in that you yourself do not do. In its simplest form this means leading by example and showing the employees JIT implementation is one of the company's top priorities.

Another common technique is to use a pilot program to demonstrate that JIT can make improvements. Over half of the

firms that implement JIT use pilot programs.[11] Pilot programs have the advantage of reducing the resistance to change by demonstrating the results the proposed changes can deliver. Most people are anxious to be associated with success. Additionally, pilot programs can be used to train employees.

Training is another common area of emphasis. Operators must be trained and educated about the current problems the company may be experiencing, along with the details of what JIT is.[11] Training can be provided in house or through a consultant, or a combination of the two.

A final common implementation tool is the involvement of all employees. The company's goal is to tap the valuable resource of the employees' ideas and suggestions to reap benefits for all. The use of teams is very common to solve problems and explore better ways of doing things.

DISCUSSION

Measurement Difficulties

Measurement of the cultural changes required by organizations implementing JIT is difficult. People are different, what works in one situation may not work in another. Furthermore, any measurements are subject to an individual's perceptions which can be readily distorted through another's interpretation.

Most of the publications are lacking in the measurement area. Additional work should be done. A possibility for further research is a study on which techniques are the most successful

at reducing the resistance to change. Another is the applicability of JIT implementation strategies to other advanced manufacturing methods and vise-versa.

Vora is the only researcher analyzed who has made comparative measurements through semi-structured personal interviews. Possibilities for extensions to his work include a specific study of which JIT implementation components are the most important and expanding his research to outside Minnesota. Interviews may not be an ideal form of data collection, yet with "soft" areas it is the primary source of information available.

Selection of Preferred Implementation Techniques

Based on the limited applied research in analyzing the degrees of success in using the various techniques, no single one can be selected as being the best.

Two areas to focus on are the application of techniques to reduce the resistance to change and Lewin-Schein Organizational Change Theory. The success of reducing the resistance to change has been shown in TQM. With less resistance to change the probabilities for success increase. Vora has shown the correlation of the Lewin-Schein theory to JIT implementation and the importance of the planning process. The two techniques can be used together in conjunction with one another.

Cultural change theory and the General Living Systems Theory may be applicable to JIT implementation, yet their application does not fit JIT as well as the other techniques presented. Research will need to be performed to better demonstrate their

applicability to JIT.

Customized techniques should be the first utilized as more people will see their direct connection to the JIT implementation. This should increase their probability of being effective.

CONCLUSION

The cases presented in this paper have shown the importance of cultural changes in JIT implementation. These changes must be anticipated. Strategies need to be prepared to make the JIT implementation result in a smooth and gradual change of the company's culture.

Some of the cases illustrate situations where JIT implementation resulted in no major cultural change problems. Tips can be taken from these cases. However, caution is warranted for two reasons. First, most people are not anxious to discuss their failures. Secondly, many of the JIT implementation studies focus on the nuts and bolts of implementing JIT and pay little attention to the cultural changes required.

The two best techniques to facilitate the necessary cultural changes are to minimize the resistance to change and spend as much time as is available to plan the JIT implementation considering the Lewin-Schein organizational change theory. Additional insight can be gained from other companys' experiences in JIT and TQM implementation.

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