Model of Radical Changes and Introduction of Discrete Production Management System

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Keywords: Instrument-making Industrial Production, Production Plan, Organizational Changes, John Kotter's Model.

Abstract: This article describes the information system of the discrete type production management and its implementation using the model of radical changes by J. Kotter. The need for organizational changes is caused by the necessity of a deep transformation of business processes of discrete production in the light of significant changes in the modern information technology. These changes offer great opportunities for improving the efficiency of enterprises in their main area of activity. However, the resistance of the staff changes makes it necessary to find solutions to overcome it.

1 PROBLEM STATEMENT

Discrete production, when serial and pilot production are combined, as well as wide range of products, has a number of features in terms of automation. These features include the need for dynamic change of production plan based on the changes in documentation and terms of delivery of components and materials; the need for management decision-making under conditions of uncertainty at various levels of management; the need to improve the efficiency of production process and implementation of operational management systems. The emergence of modern concepts and systems in the area of information technology, especially the Internet, of items and systems for supporting management decisions opens up new horizons for improving the efficiency of processes. Note that the complexity of business has significantly increased in the recent years, and the rate of these changes is also increasing. Information technology can help manage the complexity of business or bring additional complexity, which can be caused, inter alia, by the behavior of the staff while performing the new solutions in the field of management (Mocker, 2015).

Features of organizational behavior in case of need for using of new information technology require the application of modern concepts of performing organizational changes. These concepts include both classic ones, like the model by Kurt Lewin and Canter, and more modern, such as the model by John Kotter *(Kotter, John P, 1996, 2014)*. Thus, today the problem of efficient transformation of processes using modern information technology lies, inter alia, in the area of using technology for conducting organizational changes.

2 WAYS TO SOLVE THE PROBLEM

Considerable attention is given in present-day papers to virtual organizations and respective support for transformation of organizations into virtual form (Thimm, 2008). However, organizational difficulties and specific features of organizational behavior of emerging market participants lead to the necessity of maintaining processes at classical enterprises and nondecreasing relevance of MES class systems implementation. The European countries discuss the issues post-implementation stage of using information systems (Hasheela, 2015).

Discrete manufacturing requires a series of information solutions. Consider one of the levels of information systems of this type: job of foreman and workers directly. The purpose of the information system is operational planning, information support of foreman concerning the distribution of

Abakumov, E.
Model of Radical Changes and Introduction of Discrete Production Management System.
DOI: 10.5220/0006349004830486
In *Proceedings of the 19th International Conference on Enterprise Information Systems (ICEIS 2017) - Volume 2*, pages 483-486
ISBN: 978-989-758-248-6

manufacturing tasks throughout the work centers, and collection and accounting of feedback from working stations on implementation of the production process. The transition from manual data processing to information systems that involve the information on the status of equipment causes considerable difficulties for the manufacturing staff, which manifests itself in resistance to the introduction of the system. This resistance is expressed in erroneousness input of information, intentional damage to the monitoring equipment, blackmail concerning impossibility of performing the manufacturing functions using the system. The complexity of the implemented business process increases not only due to modification caused by the need to respond to external changes, but also due to disturbances caused by the organizational behavior of its members. Thus, it is needed to manage the process of change in the implementation and development of information management system and to reduce the influence of organizational behavior through the use of change management techniques. Undoubtedly, this is not the only factor and a number of other aspects has been considered by the author previously (Abakumov, 2014, 2015)

Change model by J. Kotter contains a number of stages: creating a sense of urgent need for change; establishing a group of people to manage changes; developing vision and strategy, communication for communicating the information; authorizing to achieve quick results; consolidating the gains, and new approaches in the corporate culture. This article describes a case study on management of organizational change in large companies in the implementation of the production management system on the lower level of production process management at the stage after the implementation of a common resource management system.

3 MANAGEMENT OF ORGANIZATIONAL CHANGES AT PRODUCTION SITE LEVEL

The production area in question has the following parameters: there are about 20 workers and 1 foreman, they maintain more than 50 pieces of equipment in shifts. Manufacturing automation is a resource-demanding task that requires coordinated work of a group of analysts and programmers, which number is limited to the enterprise staff. In addition, necessary condition for successful implementation of the automated system (AS) is also a desire and readiness of the employees to work with the automated system. Besides, for the AS operation it is often required to modify business processes.

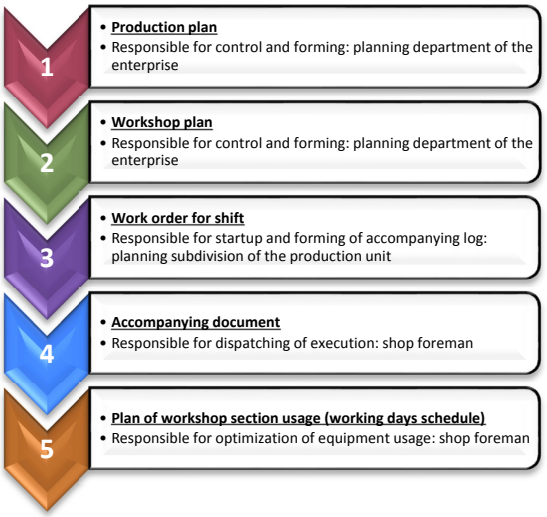

Figure 1: Operations dispatching.

Due to all above-said an iterative approach was applied to the AS development, i.e. the automated system modules were developed and implemented by turns. Implementation of one module and connection of users to it led the latter to understanding and desire to transfer to the next stage of automation (automation of new functions and processes); implementation of the following module led to practicability and readiness for the development of the next one.

Overall flowchart of the process covered information system shown in Figure 1. At the last stage production scheduling during calculating and optimizing the schedule using the criterion of minimum time of batch traceability in the shop, or the criterion of maximum productivity of a group of working centers of different types, feedback on the production status was obtained from the equipment with programmable control. And in case of an uncontrolled shutdown of equipment or work without load, the system required to manually input the reason for the shutdown within 5 minutes after stopping.

The list of reasons was determined based on the principle of clear responsibility of the of appropriate services for fixing it: e.g. problems with materials should stimulate the response of the planning structure and affect its key performance indicator; problems with the equipment must be tied to the repair service, etc. Previously, there was no duty of the workers to put marks in the information system, this function is performed by the foreman. The system was set up, and the operation rules were explained.

The dominating response of 90% of workers was the opposition to the system, because they did not understand the need for further action. The implementation team together with the management of the department demonstrated the statistics of the shop performance, gave the instructions to increase the shop productivity by 20% without using the system, and explained the allocation of responsibility for the overall result between all the repair and support services.

This work was consistent with the first stage of model by John Kotter: creating a sense of absolutely urgency of change. At the second stage, the foreman of the shop was replaced by a person who shared the benefits of implementing the system, then the communications of the result of the system introduction were continued: the operating principles were conveyed, as well as the staff evaluation based on the results of the system, and the transparency of actions to counter the system was explained. During the first week of the system operation there were frequent equipment malfunctions for unknown reasons, and when IT service staff came, the malfunctions disappeared. Nevertheless, the production scheduling information was monitored by the production managers and individual interviews with the specific staff members were conducted devoted to capabilities of the system and transparency of action.

Quick results in information transparency and the possibility of identifying the time and place of each batch of products at the working centers demonstrated the capabilities of the system. Note that the actions of the staff were performed within the business process supported by the information system, and other results of their work were not accounted in the performance of the shop, and therefore not paid. The number of reasons for shutdown minimized to the number of services, which should respond. If the reasons for shutdown were not indicated for more than 5 minutes, the workers were fined. Strengthening of the achievements was demonstrated by the results of improved shop performance and the application of the information system as a production culture element. In general, despite the fact that the change model by Kotter relates to organization in general, it can be applied to modify individual production shops using the information technology.

4 BASIC SCIENTIFIC AND TECHNICAL RESULTS

The following of the scientific statements can be emphasized:

1. Model of radical changes by Kotter can be applied not only to enterprise-scale organizational changes in general, but also to changes at local production shops.
2. The introduction of information technology for production scheduling and monitoring of the production process causes the organizational resistance of the staff. This resistance complicates the processes in the organization, bringing additional uncertainty into the dynamically changing environment of business processes.
3. At individual shops, the strategy development stage should be performed prior to a clear understanding of the results of implementation by the involved parties.

5 BASIC PRACTICAL RESULTS

The main practical result is the application of the method of radical changes to improve the effectiveness of implementing the discrete production automation systems.

The main resolved issues are:

- Upgrade of the discrete production management system at the ERP post-implementation phase,
- Implementation of the production management system that accounts for the feedback from the equipment and the production staff,
- More than 50 pieces of equipment and 20 members of the production staff felt the impact of the organizational changes methodology to improve the shop performance,
- Application of the Kotter method at the local production shop reduced the system implementation time by 20-30% (typical time of 1÷2 months).

6 CONCLUSIONS

The paper describes the application of radical changes model by Kotter for implementing discrete production information management system at the shop level. The reduction of the system implementation terms is demonstrated by using organizational change management technique.

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