THE MANUFACTURING MANAGER'S JOB: DOES ERP IMPLEMENTATION IMPACT THIS MORE?

O TRABALHO DO GERENTE DE PRODUÇÃO: COMO É AFETADO PELA IMPLEMENTAÇÃO DO ERP?

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RESUMO

Este artigo trata do impacto da implementação do ERP no trabalho do gerente individual. O trabalho do gerente se altera significativamente após a implementação do ERP? Esta percepção de mudança é uniforme nas diferentes funções, como compras, produção e planejamento da produção? Foram estas as perguntas exploradas na pesquisa de que trata este artigo. Encontraram-se diferenças significativas nos perfis percebidos das várias funções. Os resultados ofereceram uma idéia da natureza do trabalho dos gerentes nas várias posições funcionais. Encontraram-se também diferenças significativas na percepção das mudanças no perfil das várias funções.

A análise das respostas dadas nas entrevistas ofereceram uma idéia interessante dos resultados observados.

ABSTRACT

This paper deals with the impact of ERP implementation on the job of the individual manager. Does the job of the manager change significantly after ERP implementation ? Is this perception of change uniform across different functions such as purchase, production and production planning? These are the research questions explored in this paper. Significant differences were found in the perceived role profile across various functions. The results gave an insight into the nature of work of managers in the various functional positions.

Significant differences in the perception of changes in role profile across functions were also found. The analysis of interview responses provided an interesting insight into these observed results.

PALAVRAS-CHAVE

ERP, Gerência, Sistemas de Informações

KEYWORDS

ERP, Managing, Information Systems

The paper presents some preliminary results of an in-depth study, in the Indian context, to evaluate the impact of implementation of BPR and ERP system on the organization at the individual level, i.e. at the level of the manager's job.

While earlier studies (Kling (1980), Weber (1988), Medcof(1989) etc.) have reported the effects of IT implementation on job characteristics, they have generally been rooted in the paradigm of 'Job Analysis' and have used instruments like PAQ, JDS etc. These studies do not adequately address the variable and unbound nature of the manager's job, nor do they focus on the mental and cognitive processes which underlie the work of the manager. The present study differs from the previous studies in two respects:

1. It addresses the change due to ERP implementation and the change in processes which either precedes the ERP implementation or takes place during the ERP implementation.

2. It uses the concept of managerial roles to study the nature of change in the manager's job.

Mintzberg (1973) defined a managerial role as an organized set of behaviors belonging to an identifiable office or position. Based on direct observation of five managers at chief executive level, he identified 10 roles for managers based on three major categories – informational roles, interpersonal roles, and decisional roles. The interpersonal role group consisted of figure head, leader and liaison roles, while the informational role group consisted of the monitor, disseminator and spokesperson roles. Decisional roles include entrepreneurial roles, disturbance handler role, negotiator role and resource-allocator roles. Luthans (1988) in a study of successful managers, suggested the role of 'networking' which included the activities of socializing and politicking. Boddy and Buchanan (1992) pointed out that the sample used by Mintzberg (1973) included only Chief Executives and suggested two new roles of manager as a 'subordinate' with the specific activity of managing

upwards, and manager as a 'worker', where middle and junior level managers carry out pre-assigned tasks also known as 'hand on management'.

Kotter (1995), Kanter (1992), Bartlett and Ghoshal (1995, 1996) amongst others suggested the importance of managing and leading change processes within the organization. Quinn et al (1996, Quinn,1988) used the concept of competing values to define four models of management and to identify eight roles for his model of managerial roles. The 'rational goal model' or 'Taylor's scientific management model' suggested the roles of 'director' and 'producer', the 'internal process model' exemplified by 'Weber's bureaucratic model' suggested the roles of 'monitor' and 'coordinator' for the manager. 'The Human Relations model' as exemplified by Mayo (1949) and McGregor's 'theory X and theory Y' suggested the roles of 'mentor' and 'facilitator' and the 'open system model' suggested the roles of 'innovator' and 'broker'.

Hales et al. (1996) quoted studies using broader multi-method or ethnographic approaches, which tried to show how managerial work was embedded in organizational processes. Lawrence and Lorsch (1967) in their seminal paper, enunciated the differences in the perceptions of managers in different functional jobs. This difference was stated to be due to: (a) their orientation towards particular goals, (b) differences in time orientation, (c) difference in interpersonal orientation, and (d) differences in formality of structure.

Grover et al (1993) have cited an instrument developed by McCall And Segrist (as cited in Grover et al., 1993), based on Mintzberg's managerial roles. McCall and Segrist tested their instrument across different functional areas. They found that the role profile varied across functions like manufacturing and finance. Grover et al (1993) studied the comparative profile of middle level information systems managers and Chief Information Officers (CIO) using the instrument of McCall and Segrist (as cited in Grover et al., 1993). Using a sample

of 111 managers, they found that the role profile of middle level information system managers, resembled that of finance. But this profile was different from managers in manufacturing and sales functions. Based on the above observations, the hypothesis that the role profile perception varies with the function in which the job of the respondent is placed can be stated.

The following hypothesis may thus be stated:

Hypothesis 1 The role profile of the manager's job, as measured by the perceived importance of each role to the job, will vary across functions.

VARIATION IN THE PERCEPTION OF CHANGE IN THE DIFFERENT ROLES ACROSS FUNCTIONS

Lawrence and Lorsch (1967), as stated earlier, pointed out the difference in time and interpersonal and goal orientation, of managers in different functional streams. This causes these managers to perceive different aspects of the change, and hence they perceive the change differently.

Grover et al (1993), using the instrument developed by McCall And Segrist (as cited in Grover et al. (1993)), found substantial differences in perceived role profiles of information system and finance managers one hand, and managers of manufacturing and sales function, on the other. Swanson (1994) proposed that implementation of MRP systems (and thus ERP systems) affects the organization as a whole, including the technical, information system and administrative layers. Cooper and Zmud (1990) stated that the MRP systems affect the core technology of the organization, and hence the effect is felt all over the organization. Since ERP systems, extend their reach across more functional departments than MRP systems, it is expected that more functions will be affected due to ERP implementation. In the current study three functions - Production, Procurement, and Production Planning were studied specifically, in addition some other managers from functions such as quality, maintenance, general

administration, etc. were administered the questionnaire, and were clubbed under 'others', thus leading to four separate functional groups. Based on the above observations, the following hypothesis can be stated:

Hypothesis 2 The perception of change in managerial role profile will vary across functions.

THE STUDY

The study involved a 120 day onsite multi-method investigation in three plants from two companies, and included a questionnaire study, interviews, direct observations and a study of company documents.

Design of the Study: The study involved an in-depth study of three plants in two companies.

Company 1 is India's leading manufacturer of utility vehicles and has four plants of which the two plants studied contributed about 80% of the value addition. BPR was implemented in this company since 1995, and ERP was implemented since 1997.

Company 2 is India's second largest refractory manufacturer and is a wholly owned subsidiary of India largest cement manufacturer (based on year 2001 data). No BPR was implemented in this Company, prior to or during ERP implementation, and also the Company had no prior experience with an MRP type of system. The only exposure to IT was the PC based Accounting packages being used in the company. The study was designed such that data was collected three years after the first roll out (going live) of the ERP system. The study covered mainly 4 functions - Function 1: Production Planning, Function 2: Purchase, Function 3: Production, Function 4 : Others (including quality, maintenance, administration etc).

Questionnaire Instrument : A questionnaire instrument was designed using four representative behavioral or task items for each of the eight roles given in the model by Quinn et al (1996). (for details refer appendix 1) These task items were tested using confirmatory factor analysis by Quinn

(1993), based on a sample of about 290 manager. No separate confirmatory factor analysis was done in this study. This questionnaire was administered to 71 managers at the junior and middle management level. Of these 68 valid responses were used for analysis.

The distribution of respondents, by function was as follows:

Function 1: 13 respondents, Function 2: 33 respondents, Function 3: 10 respondents,   Function 4: 12 respondents

The respondents had an average experience of 11.2 years and almost all had a technical degree at the graduate level. The respondents were chosen such that they should have been working In the same functional position for the last five years, and should not have been promoted across decision levels. (Organizations studied had about five major decision levels.)

The model used for analysis was 2 way ANOVA, with split plot factorial design (Kirk, 1995)

The value of Cronbach's Alpha varied between 0.92 and 0.96.

RESULTS

Two way analysis of variance (split plot factorial design (Kirk, 1995)) is used for the analysis of two simultaneous treatment effects. The first effect is due to the grouping of managers by function. The objective is to test the hypothesis that the groups are significantly different, and that such differences are stronger than effects due to interpersonal differences between managers. This is referred to as the 'grouping effect'. The second treatment is due to the various levels of roles, that the managers are exposed to. This effect is referred to as the 'between roles effect'. A final effect tested using this method of analysis is the interaction effect due to these two treatments. This is referred to as the interaction effect. The table given below shows for each hypothesis the results of the test of the hypothesis using the method earlier. For sake of simplicity, the results are shown in a simple manner, and the level of confidence with which the null hypothesis is rejected are shown in cells. (null hypothesis says that there is no significant difference between the groups tested)

Table 1: Results of test of hypothesis 1 and 2

Nove regras do IBGC sobre Conselho de Administração	Itaú	Unibanco	Bradesco
Competências do Conselho de Administração	Artigo 5.6 Estatuto	Artigo 16 Estatuto	Artigo 9 Estatuto
Comitês	4	10	4
Tamanho	Média 13	6	9
Avaliação do conselho e do conselheiro	Nada consta	Nada consta	Nada consta
Prazo do mandato	1 ano	1 ano	1 ano
Limite de idade	Não há	65 anos	
Conselheiro independente	3	1	Nada consta
Presidente do conselho de administração	Nada consta	Artigo 17 Estatuto	Artigo 10 Estatuto
Presidente do conselho e presidente da diretoria	Diferente, mas pessoas da mesma família	Distintos	Distintos

DISCUSSION OF RESULT OF TEST OF HYPOTHESIS 1 USING INTERVIEW DATA

The importance of each role was reported by the respondents with respect to their jobs at the junior and middle management level. The managers in the production function reported the highest score (on a seven point Likert type scale) on the roles of producer and mentor, as compared to their colleagues in other functions. This reflected the component of their job which dealt with producing results (daily production targets) on a day to day basis. The mentor element referred to the elements where the workers were developed as supervisors and trained for problem solving etc. Managing such a large number of personnel made them perceive that this element of their job was significantly higher. However, the lack of information about materials and production schedules made them more dependent on their colleagues (figure 1a and 1b)

with respect to director, facilitator and innovator roles. These responses were reported by the managers during follow up interviews based on the questionnaire results. Purchase managers reported less variation in perception of importance of different roles to their job. They had to meet and manage different suppliers and manage the demands of production and other departments for procurement of materials. Supplier relations management formed the core of their job, and all roles were important in their jobs. The managers in production planning considered monitor and director roles to be very important as the job involved keeping in touch with requirements of the marketing department and the capability of the other departments to meet them, and were intervening with directions to meet these demands. The perception of the roles was significantly before and after ERP implementation as shown by results in Table 1.
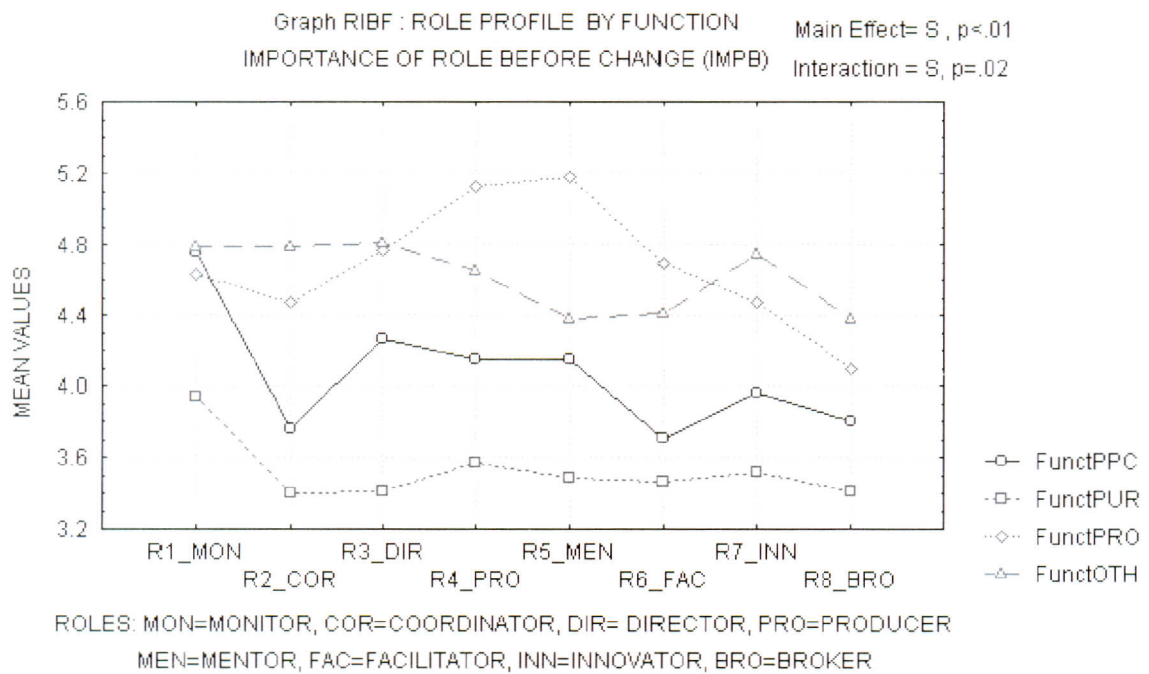

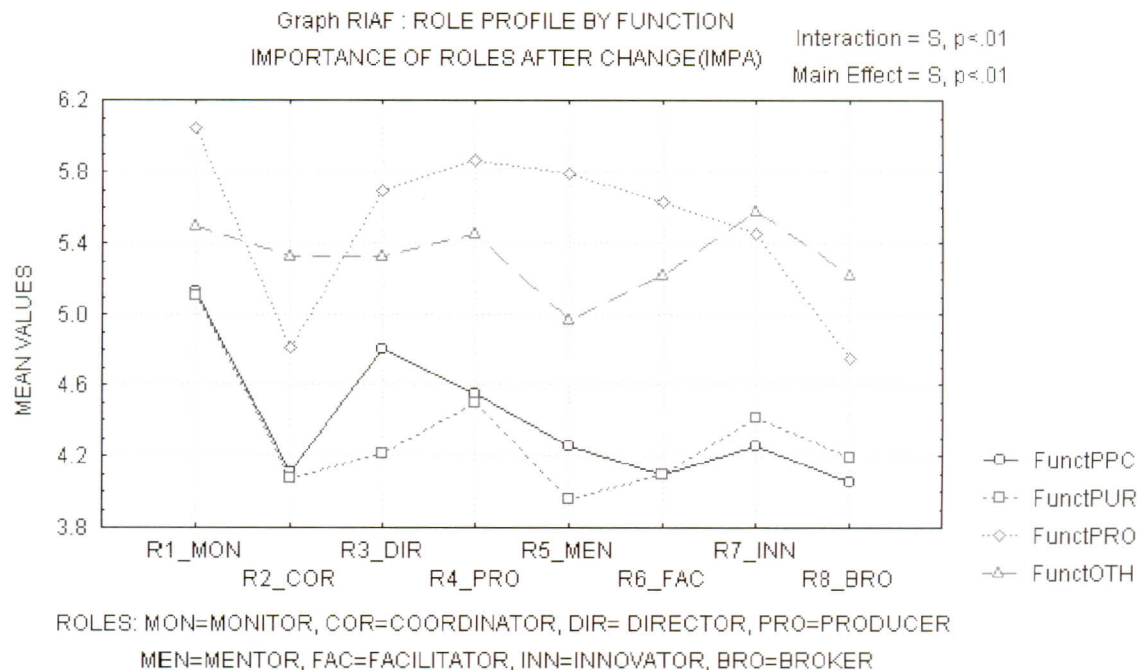Figure 1a – Role profile by Function before change

Graph RIAF : ROLE PROFILE BY FUNCTION
IMPORTANCE OF ROLES AFTER CHANGE(IMPA)

Interaction = S, p<.01
Main Effect = S, p<.01

ROLES: MON=MONITOR, COR=COORDINATOR, DIR= DIRECTOR, PRO=PRODUCER
MEN=MENTOR, FAC=FACILITATOR, INN=INNOVATOR, BRO=BROKER

Figure 1b – Role profile by Function after change

DISCUSSION OF RESULT OF TEST OF HYPO-THESIS 2 USING INTERVIEW DATA

After the ERP implementation, the perception of role profile varied significantly as shown by comparing the graphs in Figure 1a and 1b. the change in perception was however not significant across functional groups. The perception of change varied significantly between groups and the interaction effects were weakly significant. This is shown in Table 1, which shows the results of test of hypothesis 2. The variation across the functional group of production managers was maximum, specially with respect to the roles of director, facilitator and innovator. During the subsequent interviews, the managers reported that the main reason was that the availability of information about production schedules, availability of raw material, components in store, consumables etc., led to their active involvement in the planning of their work and also in their ability to direct the workers, thus increasing the importance of director and facilitator roles in their job. The results (as shown in Figure 2) for production planning and purchase show more even perception of increase in importance all roles, after ERP implementation. The only exception is the increase in importance of monitor role for purchase managers. The reason reported by this group of manages, is that the now with the better tracking of information related to inventory in stores, incoming raw material stores etc. becoming possible, the targets have also been updated, and better management of this inventory is required. This requires enhanced monitoring and management of this inventory.
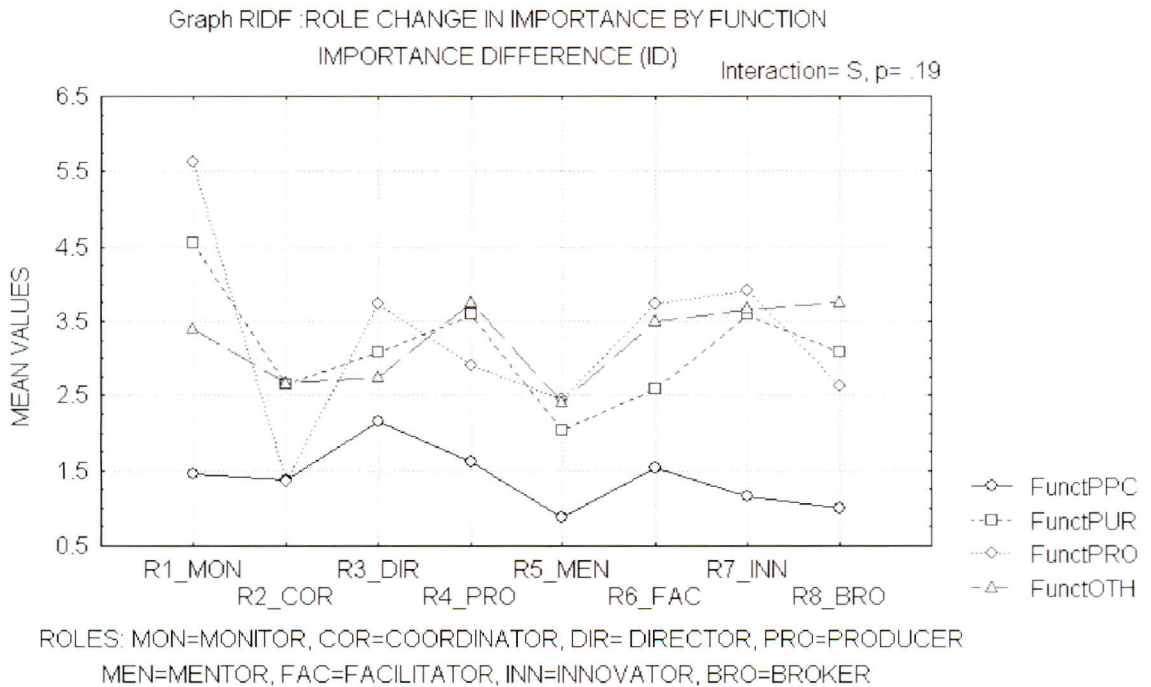
Figure 2 – Change in Role profile by Function

CONCLUSION

The results are broadly in consonance with the results of Lawrence and Lorsch (1967) and Grover et al (1993). The difference is the context of the results i.e. before and after ERP implementation. These results thus highlight the difference in the job profiles before and after ERP implementation. A major reason mentioned by the managers was the clarity and availability of online real time information. Also the availability of this information across levels and across functions, (previously, this information could be made available to only a few select managers) has made a major impact on the job of every manager. The impact on the managerial roles has been analyzed in this study. The applicability of these results across organizations and cultures needs to be tested through extended studies. ◉

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APPENDIX 1 Table showing task items and clubbing by role (Based on Quinn, 1993)

Role	Job Behavior / Task item
Mentor	Listening to individuals, Mentoring / developing people, Showing concern for people, Understanding individuals
Facilitator	Maintaining open climate for discussion, Resolving conflict in groups, Group consensus building, Getting resources for subordinates
Monitor	Working with facts, Seeking information, Recall of facts and events, Reviewing / evaluating reports
Coordinator	Smoothing unstable work processes, Allocating work, Writing / reviewing budgets, Writing plans and schedules
Innovator	Encouraging Innovation, Creative thinking, Introducing change, Providing new vision
Broker	Selling Ideas, Influencing upwards, Influencing peers, Maintaining a power base
Director	Conveying clear direction, Clarifying priorities, Directing work efforts, Specifying objectives
Producer	Stimulating extra effort, Demonstrating full exertion on the job, Maintaining productivity, Achieving unit goals