

INTEGRATING JOB CHARACTERISTICS, SOCIOTECHNICAL SYSTEMS AND REENGINEERING: PRESENTING A UNIFIED APPROACH TO WORK AND ORGANIZATION DESIGN

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Abstract

Methods that improve organizational performance in a sustained manner have been proposed and developed for a long time. This article focuses on the Job Characteristics Model, Sociotechnical Systems and Reengineering and identifies common themes among them. The models share several common design principles. A unified approach to work and organization design is proposed.

Introduction

To state that practitioners, academicians and consultants have been greatly concerned with performance improvement in organizations would be an understatement. Many would suggest that fads dominate methods to improve performance (e.g., Burke, 1997), with each formula for performance improvement having its day in the sun. Terms like "flavor of the month" have emerged as a result of the cynicism these attempts have generated. In a recent *Fortune* article, Rigby (1998) suggests that methods to improve performance gain popularity when first introduced. However, they lose ground when quick results are not obtained. Anecdotal evidence would suggest that managers are often impatient for results. Thus, any method for performance improvement that does not immediately demonstrate improved performance tends to be discarded in favor of the next formula waiting in the wings. Each method therefore does not get a "fair trial". As a result, decision-makers in organizations have incomplete and unscientific information on the effectiveness of performance improvement methods.

Rather than propose yet another method for performance improvement, this article examines three popular methods to establish common themes and systematic patterns. These three methods, the Job Characteristics Model (JCM) (Hackman & Oldham, 1976; 1980), the Sociotechnical Systems Theory (STS) (Cherns, 1976; Pasmore, 1988; Trist, 1981; Trist & Bamforth, 1951; Weisbord, 1989), and Reengineering (Hammer, 1990; Hammer & Champy, 1993) have been applied to the design of work and organizations. They were introduced into the literature at different times and focus on different levels of analysis. The JCM, for instance, focuses on the design of individual work. STS, on the other hand, uses the team as a basic building block for organization design (Macy, Thompson & Farias, 1995).

Reengineering uses the "core process" as the unit of analysis. However, the cross-functional nature of core processes makes the organization the appropriate level of analysis for reengineering.

We chose the JCM, STS and Reengineering because of the striking similarities in the design principles of these work methods. Their focus on different levels and units of analysis presents an opportunity to draw on these methods to develop an integrated method of work and organization design that spans different levels of analysis. An integrated approach that spans levels of analysis will help create consistency in design across the individual, group and organizational levels of analysis. We begin with a brief description of each model. This is followed by an integration of the models and some suggestions for effective implementation.

Job Characteristics Model

The JCM focuses on the individual level of analysis (Cummings & Worley, 1997; Hackman & Oldham, 1976, 1980). According to this model, individuals experience high internal motivation if three critical psychological states are experienced. These are: 1) meaningfulness of work; 2) responsibility for the outcomes of the work; and 3) knowledge of the results of the work. To achieve these three critical psychological states, the model prescribes that the work be designed with optimal levels of five job characteristics, i.e., skill variety, task identity, task significance, autonomy and feedback.

Of these five job characteristics, skill variety, task identity and task significance contribute to experienced meaningfulness of work. According to Hackman and Oldham (1980), it would be rare to find all three characteristics at high levels in a particular job. However, they do suggest that higher levels of any one of them could contribute to greater experienced meaningfulness at work. The fourth job characteristic, autonomy, contributes to experienced responsibility for outcomes of work. Knowledge of the results from the work is fulfilled if the job provides feedback to the worker. Note that feedback should be from the job itself and not from other agents. Job enrichment, using the JCM, has been a common intervention to improve performance at the individual level of analysis. Philosophically, the application of the model is seen in sharp contrast to the scientific method which is based on the assumptions of high specialization, narrow division of work and limited autonomy, among others (March & Simon, 1993; Weisbord, 1989). These job enrichment efforts have been moderately but consistently successful (Cotton, 1993; Cummings & Worley, 1997)

Sociotechnical Systems

STS theory (Cherns, 1976; Pasmore, 1988; Trist, 1981; Trist & Bamforth, 1951) proposes that work design should jointly optimize the social and technical systems of an organization. STS proponents argue that work designs based upon purely technical perspectives are sub-optimal. This holistic approach to work and organization design emphasizes fit and interdependence (Lawler, 1996; Macy et al., 1995) between the design features of the organization as well as between the organization and its environment. According to Trist (1981), the STS perspective represents a paradigm shift in the design of work and organizations. This paradigm shift is represented by the seven design principles of STS theory that are presented in Table 1.

Self managed teams constitute the basic building block of organization design under the STS framework (Appelbaum & Batt, 1994; Cotton,1993; Lawler,1996; Macy & Izumi, 1993; Pasmore, 1988; Trist, 1981). While the primary unit of analysis is the work group, the STS approach is clearly concerned with the group and organizational levels of analysis. However, given its open systems perspective, STS requires that the analysis be performed at several levels.

STS has been applied in a variety of settings all over the world (Cummings & Worley, 1997; Pasmore, 1988) and has met with a fair degree of success. Some examples of dependent variables used to assess STS's effectiveness included productivity, product quality, employees' quality of work life and employee behaviors (e.g., safety, absenteeism, turnover). However, the results are not unequivocal. Most of these studies have been conducted (appropriately) in field settings. While such quasi-experimental designs are appropriate for testing the theory, they do present a problem of control (Campbell & Stanley, 1963; Pedhazur & Schmelkin, 1991).

More recently, the ideas from STS have been adapted to design High Performance Organizations (Beatty & Varma, 1997; Farias, 1997; Farias & Varma, 1998; Hanna,1988; Lawler, Mohrman & Ledford, 1992; 1995; Macy et al., 1995; Nadler & Gerstein, 1992; Varma, Beatty, Schneier & Ulrich, 1999). This type of organization design has become popular in the recent literature as organizations search for ways to be more responsive and effective in a rapidly changing environment

Reengineering

Reengineering (Hammer, 1990; Hammer & Champy, 1993) is one of the more recent models for performance improvement to make its appearance. This model for change seeks to take advantage of the power of information and communication technology to simplify work. Arguing that it is no longer appropriate to organize work around division of labor, Hammer and Champy assert that companies must organize work around core processes. The reengineering design principles are presented in Table 2.

Hammer (1990) called for organizations to obliterate, not just automate. He argued that automating systems would merely result in automating inefficiencies. Organizations needed to rethink their core processes and redesign around them by focusing on end results and cutting out waste. With its emphasis on core processes, reengineering enables organization designers to go across functional lines. The results of reengineering are mixed (Burke, 1997). We believe context plays a major role in determining its success. Some authors have, however, raised questions about the process through which reengineering designs take place and are implemented. For example, Lawler (1996) argues that while the principles of redesign in reengineering are appropriate, the redesign process itself needs to incorporate more employee involvement.

Analysis of the Three Models

Taking an open systems perspective (Hanna, 1988; Katz & Kahn, 1978) suggests that integrating the three models presented here makes good sense. By integration, the interdependence between the individual, group, organizational and supply chain levels of analysis is taken into account. Integration also enables consistency in design principles across the different levels of analysis. Creating consistency across levels of analysis ensures that contextual factors are also addressed. For example, the adoption of self managed work teams needs to be accompanied with training so that individuals have the opportunity to become multi-skilled and appropriate pay and reward systems that support both multiple skills and team work. At the organizational level, the structure needs to be flattened because teams now make decisions that were the prerogative of managers and supervisors. We begin by examining the degree to which the three models overlap and differ. This analysis is presented in Table 3.

Row 1 of Table 3 indicates that all the three models require workers to learn multiple skills, albeit for different reasons. In the JCM skill variety is expected to enhance the experienced meaningfulness of work. According to the STS theory, redundancy of functions (as opposed to redundancy of parts) is expected to enhance the flexibility and responsiveness of the work group and the organization. Similar to STS, Reengineering also combines jobs into one to achieve greater flexibility.

In row 2 of Table 3 we see that all the three models seek to draw boundaries around work so that each work unit is seen as a meaningful whole. The new boundaries create task identity according to the JCM. STS adopts this design principle not only to create task identity, but also to ensure consistency between the responsibility and authority of the work group. Under the Reengineering framework, the design of work around core processes is probably the most important design principle. Even while task identity is not a stated objective, this focus on the core process is consistent with the design principle. Further, designers may find it difficult to create task identity at the individual level of analysis. Industry and technology factors may make it difficult to design jobs that have high levels of task identity and are yet within the capacity of a single individual to perform. With their emphasis on the group and core process, STS and Reengineering provide a viable alternative.

People like to do work that is meaningful. While meaningful work is a function of the industry and the individuals involved, all three models either incorporate meaningfulness of work directly or indirectly. According to the JCM, task significance should be incorporated into work design. As stated earlier, both STS and Reengineering models seek to create task identity. We believe task identity and task significance are complementary to some degree. Because of their emphasis on task identity, row 3 of Table 3 indicates that all these models also emphasize task significance.

All three models are based on the assumption that people like to exercise autonomy over their immediate work environments. While autonomy is an explicit characteristic of the JCM, both STS and Reengineering have worker decision making as a design principle. Both of these models also adopt self regulation (by teams) as the preferred alternative to external control. Thus, as indicated in row 4 of Table 3, all the three models adopt the principle of autonomy.

While the JCM incorporates feedback from the job as a motivating factor for individuals, STS and Reengineering implicitly require feedback because they include self regulation as an integral aspect of the job. Thus row 5 of Table 3 indicates that all three models incorporate feedback from the job.

The three models focus on different levels of analysis. The JCM is concerned with the individual level of analysis. The model indicates that the incorporation of its design principles into the design of work results in the achievement of the critical psychological states which, in turn, motivate individuals to perform better (Hackman & Oldham, 1980). Trist and his colleagues developed STS in response to the predominant role of technology in the design of work. The work group is a central aspect of design under STS because groups enable the fulfillment of the social needs of workers. Interestingly, reengineering was developed to exploit the potential of (information) technology. Yet, as we see in Table 3 both STS and Reengineering recommend similar design principles. The major contribution from reengineering is the use of the "core process" as the unit of analysis, thus forcing organizational designers to look and design across traditional departmental and functional boundaries. Rows 6, 7, 8 and 9 present the similarities and differences across the three models and indicates that even while differences exist, the three models complement each other.

However, it is appropriate to focus on the differences at this point. Reengineering suggests a Case Manager as a structural arrangement. The position of a Case Manager might result in reduced autonomy for a work group. We do not see this as an insurmountable problem. Firstly, the position may be rotated to enable all team members to perform the role periodically. Secondly, the person performing the Case Manager role may adopt a participative style of decision making.

Integration of the Three Models

The analysis presented in Table 3 indicates the high degree of overlap among the three models, and suggests an opportunity for integration into one model. To enable this integration the following suggestions are made. The reader may note that any integration of these frameworks would enlarge the possible set of interventions or action levers that may used. Actual adoption of specific action levers should be based on the contingencies of each specific situation.

1. Take a holistic perspective

The need for a holistic perspective has been reiterated often in the "high performance work system" literature (Beatty & Varma, 1997; Farias & Varma, 1998; Macy et al., 1995; Lawler et al., 1992, 1995; Nadler & Gerstein, 1992; Varma et al., 1999). Effective diagnosis will enable determination of the appropriate level at which an intervention is necessary. Both the prescriptive and empirical literature on organizational change and design have been consistent in their calls for a holistic and integrated perspective (e.g., Lawler, 1982; Macy et al., 1995; Nadler, 1998; Porras & Robertson, 1992). Addressing the issue of design holistically ensures consistency across levels of analysis. Thus, work design and organization design will be more consistent with each other.

2. Focus on core work processes as the unit of analysis.

Reengineering has pointed out the power of information technology in enabling process-based designs. STS principles can be applied as much to core processes as to the more traditional work boundaries. Applying STS design principles to the design of work around core processes will enable organizations to take advantage of the positive aspects of both Reengineering and STS. Social needs will be addressed even while focusing on process. Thus the principle of joint optimization of the social and technical systems will be strengthened. From an organizational design perspective, using the core process as the unit of analysis can achieve greater coordination across functions, thus enabling organizational structures that are more responsive to customer needs. At the individual level of analysis, design around core process would create greater task identity and task significance. Workers would experience skill variety as individuals would acquire and apply cross-functional skills and the principle of redundancy of functions (in contrast to redundancy of parts) would be strengthened.

3. Strengthen the principle of autonomy.

All three models call for autonomy, albeit to different degrees. We argue that this principle be strengthened. A key argument made by the proponents of higher levels of employee involvement is that it is effective only when changes are made in organization structure (Macy & Izumi, 1993). Autonomy therefore may be expected to be effective only if employees are empowered to manage their work environments.

4. Keep all levels of analysis in focus.

Designers need to watch for implications of their designs on other levels of analysis. This ensures that macro and micro design components are compatible. For example, autonomous teams designed around core processes need to be trained to make decisions that are consistent with the organization's business objectives. The reward system should reflect the higher levels of responsibility.

5. Focus on the process of design.

STS design tends to use temporary employee involvement methods for organization redesign (Pasmore, 1988). From a longterm implementation perspective, this employee involvement becomes extremely important as it creates a better understanding of change. There is evidence to show that direct participation through the use of "parallel learning structures" (Bushe & Shani, 1990) results in more satisfied employees (Macy, Peterson & Norton, 1989).

6. Underlying philosophy.

An important issue to consider is the underlying philosophy that drives these methods of performance improvement. The JCM and STS theories are driven by humanistic values. This is not the case with reengineering and may be a reason why some organization development professionals (e.g., Burke, 1997) have critiqued it. However, interestingly, the three models share common design principles despite these philosophical differences.

Reengineering brings to the forefront the potential of information technology. In its early conceptualization the social implications of exploiting this potential were not considered. Adopting the STS philosophy will help the joint optimization of social and technical perspectives even as organizations attempt to exploit the vast potential of information technology. The increasing use of information technology is inevitable. Reengineering offers a design alternative that helps exploit this technology effectively. We agree with Burke (1997) that O.D. practitioners have a role to play in ensuring that humanistic values are not lost in the process of reengineering. STS methods provide both a philosophy and a framework to keep these values at the forefront. An integrated model adopting the recommendations made above would need to follow the steps described below to ensure effective transition and implementation.

1. Develop temporary participative structures to design/redesign the organization.

Several authors (e.g., Bushe & Shani, 1990; Cummings & Mohrman, 1989; Macy, 1982) have proposed that parallel learning structures be used to diagnose and redesign the organization. The membership of the groups that comprise these structures should be drawn from all functions and levels in the organization. Training should be provided to the members of these groups. Their role involves not only the design/redesign of the organization, but also communication with other members of the organization on the progress and direction of the redesign. Naturally, feedback received from organizational members is fed back into the design effort.

2. Discover the vision, mission and values of the organization.

While this important aspect of organization design has not been discussed in this article, the vision, mission and values of an organization are an important starting point for any large-scale change effort. Several authors (e.g., Collins & Porras, 1996) have recommended methods to discover the vision of an organization. Large group interventions (Alban & Bunker, 1996) have become popular because they enable the inclusion of a large group of organizational stakeholders in the process. We support the view that large-scale involvement creates a more commonly shared vision (Senge, 1990) and develops greater commitment towards achievement of that vision.

3. Conduct a detailed diagnosis.

The three models discussed in this article as well as the vision, mission and values of the organization present a backdrop against which the organization may be assessed. The gaps arising out of this diagnosis become specific targets for change. Naturally, at this stage core processes should be identified and priorities set for redesign.

4. Redesign.

It is at this stage that an integrated view should be taken. Design teams should test their designs for consistency across levels of analysis. They should also project the impact of their design decisions over a long period of time. For instance, in the short term it may seem appropriate to downsize in order to cut costs. However, as much of the downsizing literature suggests (e.g., Burke, 1997) these short-term gains may be lost in the long term. Further,

designers should also look for congruence (Nadler, 1998) or harmony among design features. If the design emphasizes teams and requires multiple skills, the pay system should reflect this design philosophy.

The sequence of activities outlined above represent only a broad recommendation of how organization designers may achieve more effective designs. Each organization should adopt design features that are appropriate to its own unique situation. Designers would need to make appropriate choices from the large number of design features that are available as well as develop new design features if appropriate. The important principle that needs to be applied is "congruence" or "harmony" among the design features.

Conclusions

In this article we have presented a unified approach to work and organization design. By adopting a unified approach, practitioners will help organizations develop consistency and harmony in their designs, particularly across levels of analysis. We have analyzed only three approaches to performance improvement. Practitioners may widen their search for appropriate interventions to fit their specific situations. As practitioners become more eclectic in their approaches, researchers will need to adopt innovative methodologies to assess and report the results of change efforts. They will need to recognize that each change effort in the field will be unique (appropriately) and comparisons will be difficult.

In conclusion, we have analyzed the design principles of three popular work and organization design models and indicated the high degree of overlap between the three models. While these models were developed in different decades of the twentieth century, their consistency is remarkable. This consistency may seem like a case of "old wine in a new bottle." However, we believe that the consistency is an affirmation of several principles of work and organization design. By adopting an integrated model, organization designers will affirm the eclectic nature of the field of organization development and yet be true to their humanistic values.

[Sidebar]

Table 1

STS Principles of Design

1. The work system, comprising a set of activities that make up a functioning whole, is the basic unit (rather than individual jobs).
2. The work group is central.
3. The work group should regulate the system internally (rather than be externally controlled by supervisors).

4. Redundancy of functions rather than the redundancy of parts, thus focusing on the development of multiple skills in the individual (and therefore increase the "response-repertoire" and flexibility of the group).

5. Focus on the discretionary rather than the prescribed character of work roles.

6. The individual is seen as complementary to the machine rather than an extension to it.

7. Increased variety, for both, the individual and the organization (rather than variety decreasing).

(Source: Trist 1981)

[Sidebar]

Table 2

Reengineering Principles of Design

1. Several jobs are combined into one.
2. Workers make decisions.
3. Steps in the process are performed in the natural order.
4. Processes have multiple versions.
5. Work is performed where it makes most sense.
6. (External) Checks and controls are reduced.
7. Reconciliation is minimized.
8. A case manager is the single point of contact.
9. Hybrid centralized/decentralized operations are prevalent.

(Source: Hammer & Champy 1993)

Footnote:

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