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The Management of Productivity and Resources: A Case Study in a Culturally Diverse Environment

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Abstract: Growing competition in the construction industry has forced key players to focus on maintaining high quality and performance within their firms. An engineering consultant has a vital role in the construction market as he represents a client and facilitates the contractor during construction (Turner, 2003). This paper presents a case study of an engineering consultancy firm in the United Arab Emirates (UAE), which is having a problem in maintaining the productivity rate of its computer-aided design (CAD) department whilst dealing with diversity issues within the organization as a whole. The research focused on identifying the causes of the problems through analysis of reports and interviews. Firstly, the policies and incentive mechanisms of the firm were reviewed. Secondly, a series of interviews were conducted with key players within the process, including the Market Sector Manager, Head of the CAD department, Design Engineer and CAD personnel. Thirdly, the productivity rate of the CAD department was calculated from the archived project reports. Through analysis, it was found that the main causes for the decrease in the productivity of CAD department were the improper development of teams due to cultural biases, lack of clear and precise instructions on tasks undertaken and the rigidity of functional structure of the organization.

Keywords: Management, Productivity, Culture, Diversity, Change, Construction

Introduction

THE RECENT BOOST in construction worldwide has significantly affected related markets. There are three key players in this industry, namely the client, the consultant and the contractor. An engineering consultant plays a vital role in that he is responsible for advising, managing, designing and supervising construction work for the client. The consultant's performance is measured by its technical competence and efficiency in delivering feasible engineering solutions on time.

This paper focuses on an engineering consultancy in the UAE. It is a multinational engineering firm and has been working in the country since 1973, with offices in the cities of Sharjah, Dubai and Abu Dhabi. The firm provides services in the UAE ranging from large projects such as preparing master plans of cities, to smaller ventures such as detailed designs of small car parks. Due to rapid growth in the construction sector in the UAE, the firm currently enjoys increasing numbers of projects. However, to deliver these projects efficiently and on time the consultancy requires ever higher performance from employees. These include CAD personnel who are responsible for translating engineering concepts into computer-based engineering working drawings.

The consultancy is structured in a functional or hierarchical organizational form not uncommon to

the region. Each engineering activity or field has its own department, for example, bridges, highways, water, structural, electrical, mechanical and so on. However, they have a common CAD department that provides drafting services to all other departments. As such, the performance of all engineering departments is linked to the production of the CAD department.

The measure of productivity for the CAD department is the number of drawings finalized in a day. The key issue posed to the company is that productivity within the CAD department is decreasing at the same time as volume of work is increasing, even though the number of CAD personnel seems to be increased proportionately to workload. It is further of great concern that this decrease in productivity is affecting the performance of other engineering departments as there are clear inter-dependencies between divisions.

Research suggests that employee behavior within a company has important implications for organizational performance (McClelland, 1961). Further, human resource management practices can affect individual employee performance through their influence over employees' skills and motivation. Organizational structures also play a role in allowing greater employee autonomy and organizational participation. Baily (1993) noted that the contribution of a highly skilled and motivated workforce will be



limited if jobs are structured, or programmed, in such a way that employees, who presumably know their work better than anyone else, do not have the opportunity to apply their knowledge more independently. Thus career training, team building, developing a team culture and professional development all have a part to play.

Productivity

There are four key factors which affect productivity and efficiency, namely, job flexibility, motivational factors, affects of organizational structure and affects of organizational culture.

Job flexibility affects the productivity of employees in organizations since the contribution of even a highly skilled and motivated workforce will be limited if jobs are structured, or programmed, in such a way that employees are denied the opportunity to use their time in the most efficient manner (Baily, 1993). Furthermore, Huselid (1995) demonstrated that highly effective industrial relations systems are defined as those with fewer grievances and disciplinary actions and lower absenteeism, increased product quality and direct labor efficiency. Thus flexibility and freedom afforded to employees will, in return, provide high productivity to a firm. Research further suggests that the behavior of employees within firms has important implications for organizational performance (Yeo, 2003). Consequently, one of the causes of the engineering consultancy's problems is that working practices as dictated by the HR Department are too rigid and job definition may need revision in order to provide greater flexibility to employees.

Motivational factors are clearly important to increasing the productivity of available resources. From contemporary economic theory it is certain that a prerequisite for success is that firms have incentives which encourage employees to put more effort into their work. Employee performance is greatly influenced by their expectation of what the job will provide them beyond merely a salary. Thus, their attitudes toward personal achievement and advancement and their wish for harmony in the workplace must also be catered for (Irwin, 2001). There are several theoretical approaches underlying a firm's strategy to raise the motivation of its employees (Cascio, 1989). One is that a worker will exert more effort if a personal physical or psychological need is being satisfied. Such theories include Maslow's (1954) hierarchy of needs, Herzberg's (1966) two factor theory suggesting that satisfaction of needs causes either job satisfaction or lack of job dissatisfaction, and McClelland's (1961) classification of needs according to intended effects. There are two further theories for elevating workforce motivation. The first theory, the Equity Theory, aims to ensure fair practice through such measures as equitable

distribution of workload. This theory boasts an increase in motivation and morale but fails to increase direct productivity through tangible measurable criterion, for example, meeting project deadlines or a rapid increase in performance. The second theory, Vroom's Expectancy Theory, states that motivation is determined by expected outcomes and performance related rewards and essentially holds the view that people will be motivated when they expect that they will be additionally rewarded proportionately with achievement (Rotter, 2005).

The *affects of organizational structure* are related to productivity and efficiency. Managers often perceive the organization as a mixed collection of functions managed by heads of individual departments bound by hierarchy. This leads to departments working with a focus on meeting internal departmental targets to the detriment of the collective organization. This introspective view discourages the transfer of information and sharing of knowledge and diminishes team culture (Castka, 2001). Llewellyn and Armistead (2000) define a business process as a series of inter-related activities that cross-functional boundaries with individual inputs and outputs. Therefore it is important to see the whole organization in terms of the relationships between the interdependent elements and understand these relations (Senge, 1990). The functional organizational structure can therefore be argued as a factor leading to a decline in productivity and a hindrance to the development of high performance teams. However, in some of these organizations the legacy of the traditional hierarchical structure still remains causing conflict with contemporary organizational forms and a new process-based approach. Hammer and Stanton (1999) stated that "*the combination of integrated processes and fragmented organization has created a form of cognitive dissonance in many businesses . . . confusion and conflict ensues, undermining performance*" (Telleria *et al.*, 2002). This has resulted in many process and team inefficiencies, mainly due to the lack of alignment of team performance with business process objectives and organizational strategy. Teamwork has been increasing globally within organizations in order to enhance flexibility and responsiveness of the workforce, so adding to core competencies and giving a competitive advantage (Parry *et al.*, 1998). This leads to the development of transformational organizations which integrate the roles and designations in a way that transcends beyond the individual achievements and help in forming Integrated Project Teams or IPTs. The engineering consultancy should thus aim for such IPTs that can transform it from a functional organization to a transformational one.

The *affects of organizational culture* take this argument one step further. Corporate culture transcends

individual satisfaction and hence has a greater impact on quantifiable outcomes (Beech & Crane, 1999). In the field of leadership a new paradigm has been suggested (Horner, 1997; Drath and Palus, 1994) which argues that leadership should be a process integrated within a group which shares meanings, understandings and roles, rather than a set of traits, styles or behaviors which are applied by one person to a group of differentiated others. Huselid (1998) found that investment in such practices led to lower employee turnover, greater productivity and improved financial performance. Writers and management theorists have been hinting for decades at correlations between organizational culture and performance. Of outstanding note has been a study published by the Institute of Personnel and Development (IPD 1998). Researchers from Sheffield University and the London School of Economics were keen to determine whether organizational culture significantly predicts variation between companies in their performance and, if so, which aspects of culture appear most important. They interpreted organizational culture as “the aggregate of employees’ perceptions of aspects of the organization” and developed an or-

ganizational Culture Indicator which identified the cultural dimensions most frequently evaluated in organizations. The results of their investigations enabled them to explain that 29 percent of the variation in the productivity of the companies studied could be attributed to human relations dimensions, confirming their hypothesis in terms of the importance of culture in relation to company performance.

Research Methodology

The methodology adopted for identifying the cause(s) of the problem was firstly to investigate the policies of the firm and number of staff from human resources department, secondly a series of interviews were carried out with key persons involved in the process such as Market Sector Manager, Head of CAD department, Design Engineers, and CAD personnel. Thirdly, the rate of productivity was calculated from archived project reports of two main departments. This process helped in identifying the causes of low productivity in the CAD department. The research methodology adopted to identify the causes for the low productivity of the CAD department is represented in a flowchart as shown in Figure 1.

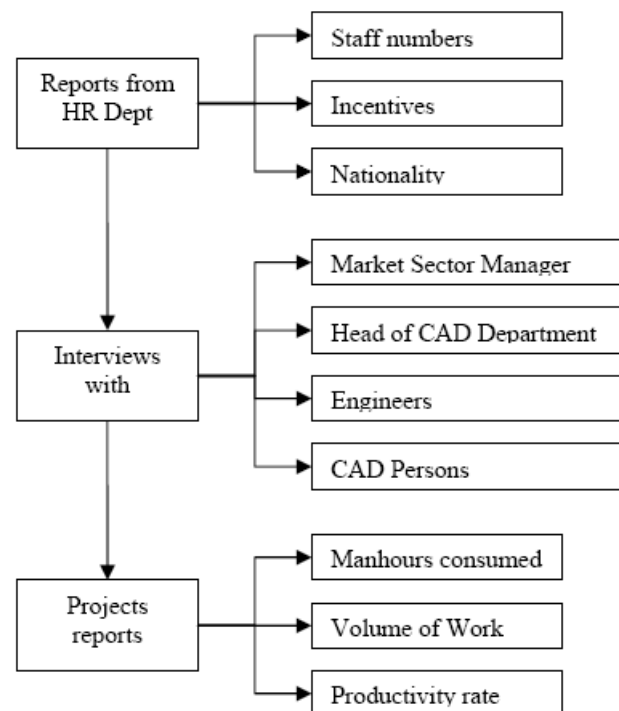


Figure 1: Three Pronged Research Methodology

The investigation began with Human Resource department reports which were analyzed to determine the number of staff, incentives given and nationality

of the staff in the department. Confidentiality prevents the inclusion of detailed reports in an appendix, though a summary is given in Table 1.

Table 1: Staffing Levels and Representative Nationality in the CAD Department

Years	No. of Staff	Indians	Pakistanis	Sri Lankans	Philippines
2003	8	6	0	2	0
2004	10	6	0	2	2
2005	14	11	1	1	1
2006	19	16	2	1	0

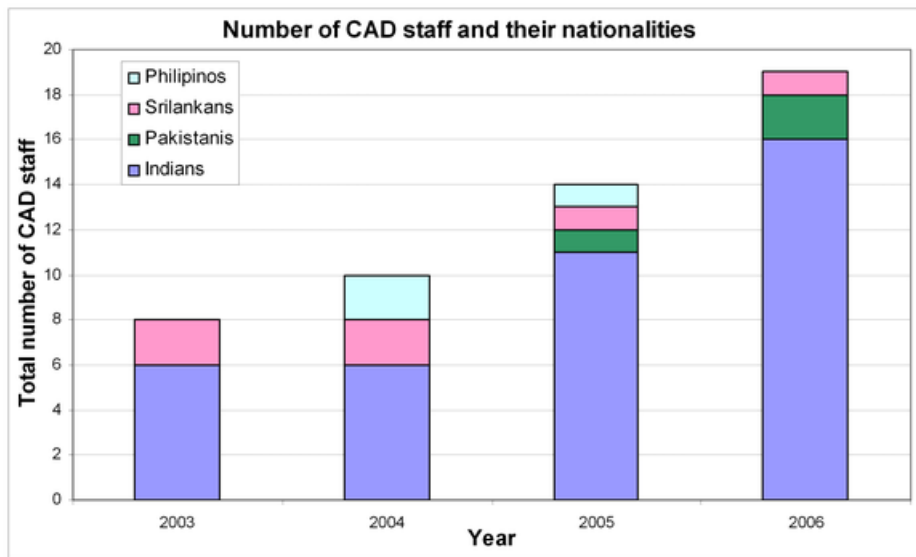


Figure 2: Graphical representation of number of CAD Personnel and Nationality

The causes of low productivity were then explored by interviewing key individuals involved in the process. These were carried out on an individual basis. In total, six interviews were conducted - Market Sector Manager, Head of CAD Department, two

Design Engineers and two CAD draftsmen. A set of common questions were put forward to all the individuals during interview sessions as outlined in Table 2.

Table 2: Qualitative Survey of Key Personnel in the CAD Department.

Number	Question
Q1	Do you think there is a problem with CAD resourcing or managing them effectively?
Q2	What kind of problems do you face during your daily office works?
Q3	What is the measure of productivity for you?
Q4	What are the reasons you feel are contributing to less productivity?
Q5	How would you prioritize your causes identified?
Q6	What best steps you would take to increase productivity?
Q7	Do you feel there is a cultural biasness among the employees?
Q8	What are the measures/steps taken towards knowledge management and team building?

Qualitative Analysis

The key findings of the interviews were as follows:
 The Market Sector Manager (MSM) strongly agreed that there is a problem with drafting resources because clients were not pleased by the quality of presentation and resident engineers from sites were

constantly pursuing him for construction drawings to be issued on time. The MSM considered that the CAD department requires additional resources and should increase the number of staff. Furthermore, he raised the point that there is considerable repetition of work due to the negligence of CAD personnel. On querying about the affects of cultural back-

grounds, he did acknowledge that there is some cultural bias in the office.

The Head of CAD Department showed reluctance to accept that there is any serious problem within the CAD department. Furthermore, he held the view that the work is being repeated as there lacks clear instructions from design engineers. However, a set of instructions and procedures are documented for new CAD personnel.

The two Design Engineers (DE-1 and DE-2) are in direct contact with CAD personnel on a day-to-day basis. DE-1 reported the lack of competency and skills as a prime cause for loss in productivity. He also stressed that CAD personnel show reluctance in improving professionally and demonstrate a low commitment to the organization. DE-2 adds that cultural bias exists among employees and people favor persons of their own nationality while carrying out the tasks requiring teamwork. Furthermore, DE-2 acknowledged that CAD personnel consume more time than actually needed in completing tasks. Additionally, DE-2 reported that there is no preliminary check by the CAD personnel on their work done against the marked-up drawings provided by the design engineers.

The final interview was carried out with two CAD personnel (CAD-1 and CAD-2). CAD-1 in reaction to Question 1 (Table 2) commented that there was no problem with drafting issues but a heavy workload had created stress amongst CAD personnel. CAD-2 had a different point of view, considering delays in progress being due to a lack of clear instructions. CAD-1 in response to Question 3 (Table 2), commented that his measure of productivity is the number of drawings that gets a design engineer's approval. CAD-2 agreed to CAD-1's comment adding that drawings often require more time due to complexity.

These interviews proved very useful in identifying the causes for decrease in productivity in the CAD department.

Quantitative Analysis

The final stage in analysis given in Figure 1 was to quantify productivity and relate it to working attitudes of CAD personnel. The best source of data for this information was archived project reports from different departments. A sample of this data was taken from two main departments namely the design sections of the Highways Department and the Water Department. The measure of productivity for the CAD department in the engineering consultancy was the number of drawings being produced without an error. This was also confirmed during the interviews. Thus project reports assisted in finding the number of projects completed and the number of drawings produced for an average project. Therefore, the volume of work was calculated as follows and recorded in Table 3.

$$\text{Volume of Work} = \text{Number of Projects} \times \text{Number of drawings for an average project}$$

Equation 1

The project reports obtained from the in-house financial management software of the company provided the data of actual man-hours spent by a CAD person for a project (and even for a single task). This helped in determining the average number of man-hours consumed for an average drawing as shown in Table 3. Thus the remaining variables were calculated from Equations 2, 3 and 4.

$$\text{Drawings per CAD person} = \frac{\text{Volume of Work}}{\text{No. of CAD personnel}}$$

Equation 2

$$\text{Total man-hours consumed} = \text{Average man-hours consumed for an average drawing} \times \text{Drawings per CAD person}$$

Equation 3

$$\text{Productivity Rate} = \left(\frac{\text{Drawings per CAD person}}{\text{Total man-hours consumed}} \right) \times 100$$

Equation 4

Table 3: Number of Staff, Volume of work and productivity rate in recent years

Year	CAD persons	Volume of work	Average Man-hours consumed for an average drawing	Drawings per CAD person	Total Man-hours consumed	Productivity Rate
	(No.)	(No. of Drawings produced)	(Hours)	(No.)	(Hours)	(%)
2003	8	3600	1.15	450.00	517.50	86.96
2004	10	4500	1.23	450.00	553.50	81.30
2005	14	6750	1.26	482.14	607.50	79.37
2006	19	8550	1.3	450.00	585.00	76.92

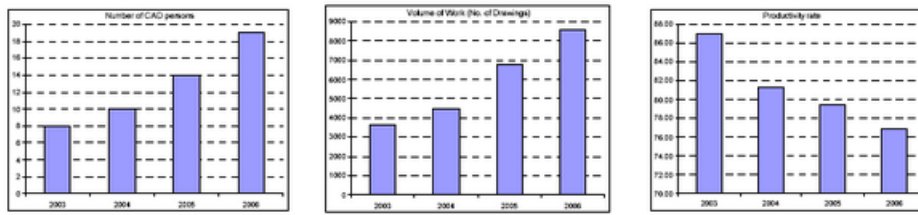


Figure 3: Graphical representation of Number of CAD staff, Volume of Work, Productivity rate over number of years

Hence, the causes of reduced productivity in CAD department can be summarized as being for four reasons. Firstly, absences of a team approach within the office due to cultural biases. Secondly, a lack of clear and precise instructions on delegated tasks. Thirdly, the office has few measures to motivate the workforce. Finally, the functional organizational structure of the company is obstructive to productivity.

Recommendations

In light of this analysis a number of actions were recommended. The number of staff in the CAD department was to be increased since current personnel handle the same workload as earlier staff members as shown in Table 3, even though the volume of work is increasing annually. There is an urgent requirement for the start of professional development activities focused on developing a team-based culture within the office. This should also focus on reducing the gap between people from different ethnic backgrounds. The office should also formulate an incentive scheme for meeting project deadlines and introduce performance related bonuses for deliverables that exceed expectations. The transactional and hierarchical structure of the organization needs to be

reformed with a view to developing a transformational organization. This can only be achieved by raising motivation of the workforce and cultivating teamwork among the staff. It is further recommended to allocate CAD personnel directly under the supervision of the design engineers to obtain better results and higher productivity. This would help in their career development as well as act as a motivating force. Recruitment standards for CAD personnel should be revised by incorporating more criterions such as minimum years of work-related experience, type of projects involved, cultural awareness, and attitude towards teamwork.

Conclusion

The research supports the identified causes of loss in productivity which were classified into four categories, namely, job satisfaction, motivational factors, affects of organizational structure, and organizational culture. In light of this research and present situation within the organization that is the subject of this case study, the main recommendations proposed were to increase the number of CAD staff, improve their career training and development and develop a culture of teamwork.

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Dr Kasim Randeree is Programme Director and Lecturer for the MSc in Project Management programme at The British University in Dubai in the United Arab Emirates. Dr Randeree has an academic career spanning the past 15 years, with experience both in the United Kingdom and the Middle East. He is dedicated to the development of contemporary Middle Eastern society and has worked in the past at the United Arab Emirates University in Al Ain, The American University in Dubai as well as conducting research across parts of the Arabian Gulf and North Africa. He has a broad portfolio of research with related current interests in the legacy of early Muslim practitioners to contemporary management and the advancement of Arab women in the Middle East. A number of postgraduate research students are active in these areas under Dr Randeree's supervision. He has numerous supporting publications both internationally and across the region.

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