

ANALYSIS OF PHENOMENOLOGICAL PERCEPTIONS OF EFFECTIVENESS OF INFORMATION TECHNOLOGY IN COMPUTERISED MAINTENANCE MANAGEMENT

Effectiveness of information technology

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Abstract

The general aim of this empirical research was to examine the phenomenological perceptions of both asset managers and support or ancillary staff using qualitative and quantitative analysis for the purpose of assessing efficiency of information technology in a public sector building construction maintenance management environment, particularly to develop a framework technique that will be useful to investigate such fundamental phenomenological facets as efficiency of training and information technology, the effect of information technology on human relations within the workplace, the perceived impact of information technology on the efficiency of occupational performance, and a summative evaluation of information technology in the asset management environment. Empirical investigation by structured interview with both management and support staff within a public sector asset management organisation was undertaken. The data was analysed through unpaired t-tests between asset managers and support staff, and dichotomous questions for experienced versus inexperienced employees and employees as differentiated by age. The results of the analysis revealed that both asset managers and support staff perceive information technology as beneficial in terms of both qualitative and quantitative outcomes. Further it would appear that individually at all levels within the maintenance management sphere exhibited phenomenological perceptions of information technology that were particularly favourable and overall were consistent with the conclusions of researchers who had observed information technology's benefits in terms of other quantitative and qualitative outcomes, in industry. Further research is suggested in the areas of customer satisfaction both prior to and subsequent to the implementation of more sophisticated information technology systems in addition to investigating the interaction between actual productivity levels and phenomenological perceptions of beneficial outcomes as a function of information technology.

Keywords: Phenomenological perception, efficiency, information technology, asset management, organisational change



1 Introduction

Information technology is perceived by a multiplicity of researchers and practitioners within industry to be extremely useful in terms of increasing both quantitative and qualitative outcome factors (Mathews, 1994). It has been identified by Mathews as the fifth paradigm shift in the industrial revolution. "Information technology is having pervasive effects throughout the economy that are entirely analogous to the previous paradigm shift" (Mathews, 1994, p.84). This paradigm shift has resulted in the transformation of a plethora of existing organisations within the building construction industry. Mathews purports most programs of organisational change end up as failures. Accordingly this study focuses upon one evaluative aspect of information technology's implementation, namely, the phenomenological perspectives of both asset managers and support staff in terms of both qualitative and quantitative outcomes. More specifically this attitudinal research evaluated phenomenological perceptions with regard to computerised maintenance management in a large public building construction industry organisation in a number of diverse areas which have been demonstrated to be potential influences of both qualitative and quantitative output.

Additionally the research investigated managers versus support staff's attitudinal evaluations of information technology as this area is considered to be under researched, within the building and construction industry literature. Experience with the use of information technology in the building construction industry was also examined as a function of individual's phenomenological perceptions of information technology.

The initial fundamental area of importance investigated within the present research is that of information technology's effects upon human relations within the workplace for both asset managers and support or ancillary staff. Lansbury purported that in order to optimise information technology's benefits for management and support staff alike effective planning, consultation and implementation by management in co-operation with other employees is necessary (Lansbury, 1986). Australian Science and Technology Council's Report on "New Office Technology" (1986, vol 3, p.67) observed "the immediate office effects of the technology were judged more beneficial more frequently than were the broader 'organisational' effects". However this report focuses more on the quantitative output as apposed to information technology's effects on qualitative human relations. Areas examined within the context of this research include an investigation of information sharing between employees within the workplace, perceived level of control in completing duties, feelings toward information technology, fear of being made redundant and the perceived impact of information technology on chances of promotion. Gately, in an investigation of banking, retailing and data processing suggested a polarisation of skills levels would occur, as a result of the implementation of information technology (Gately, 1984). These observations could have a potential impact upon morale within the building construction industry also, if the results were generalised. Chishti, Martin and Jacoby claim, in a study of information technology's effects on a diverse range of Australian companies, that a "negative effect on the mental health and morale of employees was reported by a noticeable percentage of respondents"

(Chishti, et al, 1997, p.11). This is argued to support 'resistance to change' theories as organisational change may force members to move from their comfort zone and may impact on their mental health (Lansbury, 1983).

The second area of investigation concerns both asset managers and support staff's perceptions of adequacy of training in the use of information technology. Bodi states that "there is a gap in the training market in terms of providing a conceptual understanding of systems and how to use them for the organisations benefit" (Bodi, 1987, p.7). Obviously within the building construction industry there is a need to adequately train employees in the use of new information technology developments. Coleman and Joseph argue that Australian history at present does not have a high commitment to training, instead educational institutions are criticised for their failings in this area (Coleman and Joseph, 1986). Inadequate training or problems in handling job changes may interact with human-computer interface issues and visa versa, Bodi states that "A poor interface may undermine an otherwise well designed job" (Bodi, 1987, p.13). Hence the study aimed to investigate manager verses support staff's phenomenological perceptions of sufficiency of training, effective forms of training and adequacy of training in terms of new information technology developments.

The final area of investigation was that of examining whether or not a difference existed between management and support staff in terms of phenomenological perceptions of both the quality and quantity of output. Staff perceptions of quality of output, quality of customer service and quantity of output in relation to information technology were analysed.

In summary, each of these areas is crucial to an understanding of an individual's phenomenological perceptions of the relationship between information technology and qualitative and quantitative output. From this study it was anticipated that other research topics would become apparent, leading to an investigation of fundamentally important areas of the building and construction industry with regard to information technology.

2 Method

2.1 Subjects

Participants in the study include seventeen management staff and an equal number of support staff, identified through occupational duties (N=34). Participants were screened for age and occupational experience within a computerised maintenance management environment.

2.2 Materials

Materials used within the study include a questionnaire designed by the researchers. The questionnaire examined training, human relations and occupational performance as a function of information technology, utilising both a Likert type scale in addition to dichotomous response and short answer type questions.

2.3 Procedure

Participants were instructed to complete the questionnaire individually, followed by a structured interview, administered by one of the two researchers.

2.4 Results

Data was analysed utilising the unpaired t-test procedure, with independent statistical analyses being conducted to control the type one error rate at 0.05. The initial area to be investigated was the differences between management and support staff's perceptions of training in relation to information technology. It was observed that a significant difference existed between management and support staff's level of satisfaction and training for existing information technology ($t=2.811, p, 0.05$), with a higher mean score observed for the management as opposed to the support staff, where a higher score is indicative of a greater level of satisfaction (see fig 1). Additionally, a significant difference was also observed between these two groups for satisfaction with training for new information technology implementations as they occur ($t=2.837, p<0.05$), with a similar direction of results to those reported for the previous analysis (see fig 2). It was also observed that averaged across management and support staff, 88.2% of subjects utilised new information technology introduced in the work place, as opposed to 11.2% who did not. However, once again averaged across subject groups, 64.7% felt they were not keeping up with new information technology developments, whilst 35.3% believed they were.

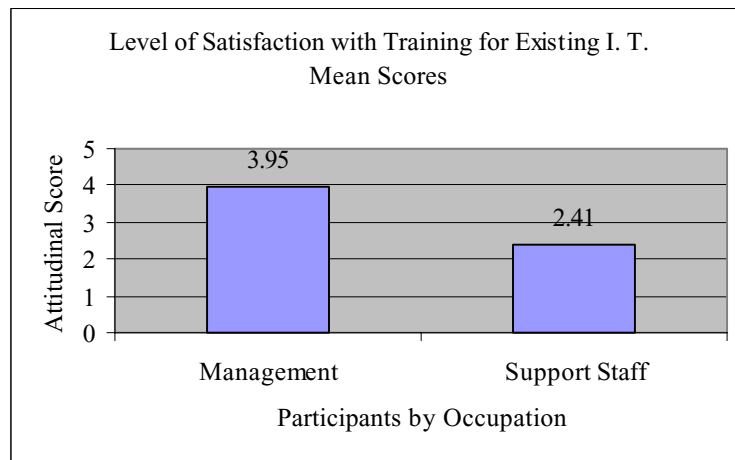


Fig. 1: Satisfaction with training for existing I.T

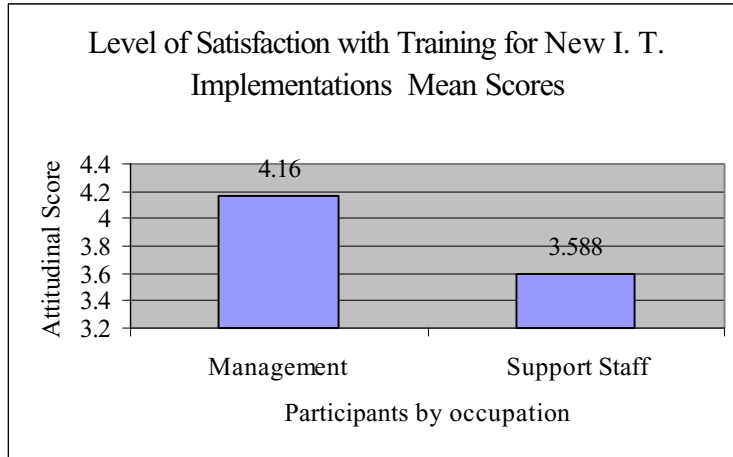


Fig. 2: Satisfaction with training for new I.T

The second area of investigation concerned that of human relations as a function of information technology, once again contrasting management versus support staff's phenomenological perceptions. The initial questions to be analysed concerned morale, with a significant difference being observed for the two groups perceptions of information technology's effects on office morale ($t=2.25$, $p<0.05$). Mean scores for managers were significantly greater than those observed for support staff, with higher scores evidencing greater satisfaction (see fig 3). A similar direction of results was observed for perceived control in occupational performance derived from information technology, with managers believing they had more control than support staff (see fig 4). This difference was also statistically significant ($t=2.604$, $p<0.05$). Finally, a highly significant statistical difference was observed between the two groups fear of redundancy as a result of information technology ($t=4.243$, $p<0.05$), with managers mean scores higher than support staff's, where high scores indicate a low level of fear of redundancy (see fig 5).

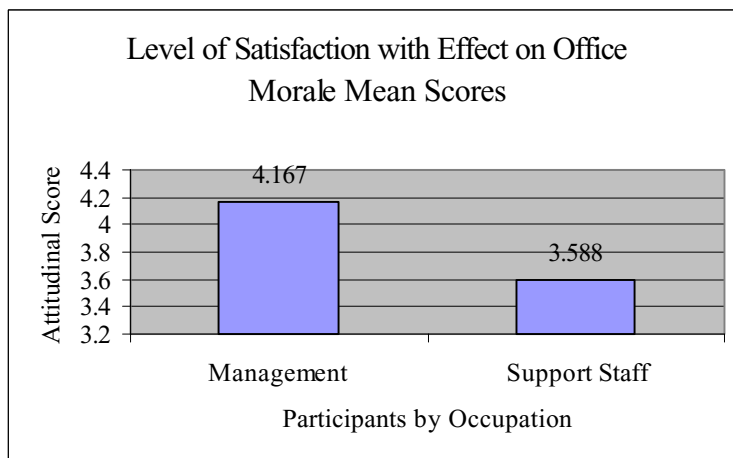


Fig. 3 Satisfaction with office morale

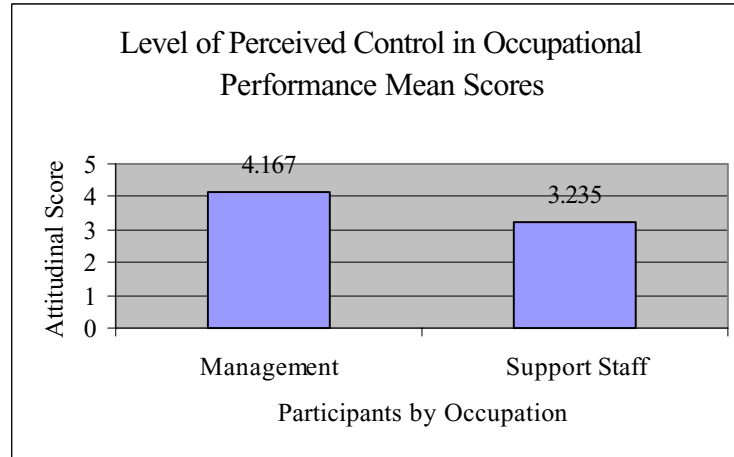


Fig. 4: Level of perceived control

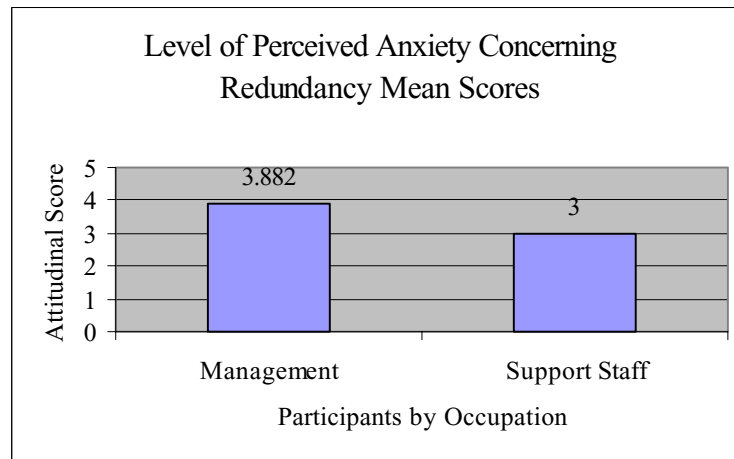


Fig. 5: Level of perceived anxiety concerning redundancy

The final analyses conducted utilising the t-test procedure involved differences in both groups perceptions of quality and quantity of service provided as a function of information technology. A statistically significant difference was observed between the two groups perceptions of quality of service provided as a result of information technology ($t=2.135$, $p<0.05$), with support staff demonstrating a lower mean score than management, where a low score is indicative of a perception of poorer quality of service being provided (see fig 6). In an analysis of quantitative output as a result of information technology, no significant difference was observed between management and support staff mean scores ($t=1.525$, $p>0.05$) (see fig 7).

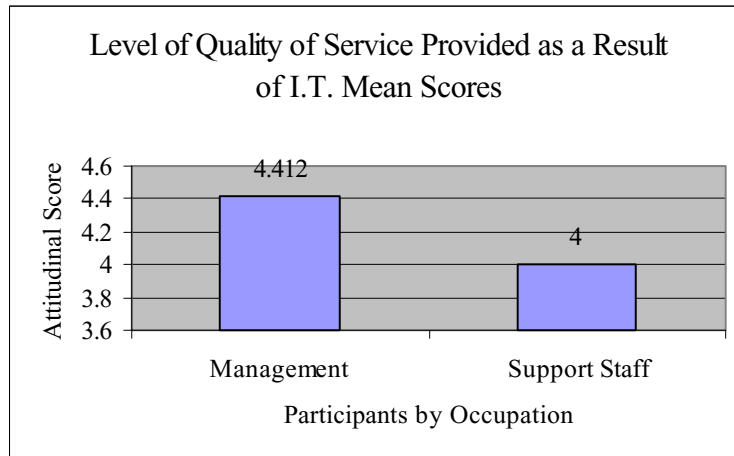


Fig. 6: Level of perceived quality of service

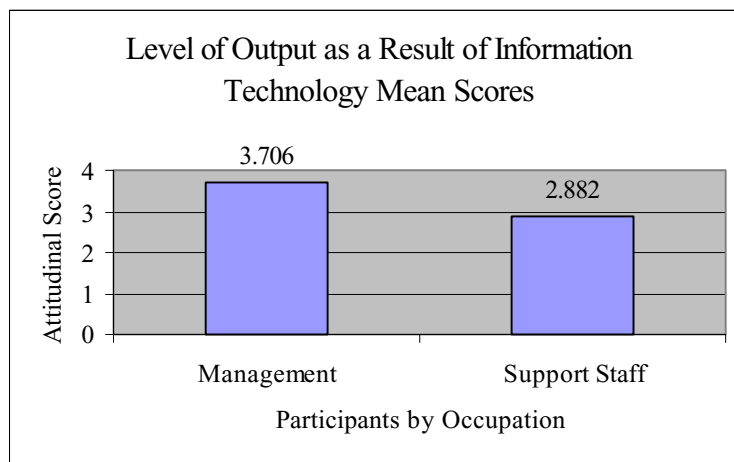


Fig. 7: Level of perceived output

Finally, in a dichotomous choice question evaluating information technology overall, averaged across both management and support staff, 82.3% reported they would use information technology over the old methods utilised, whilst 70.5% reported that they favoured the use of and introduction of further information technology within their workplace in the future. Exploratory investigation also took place with regard to the overall evaluation of information technology with regard to age of subjects, in addition to the years of experience of subjects being examined. It was observed that 60% of the older group of subjects favoured the use of information technology as opposed to 71.2% of younger subjects, while 50% of older subjects were in favour of the use of information technology in the future within the workplace as compared to 85.7% of younger subjects, where old refers to 40 years of age or greater.

With regard to years of professional experience, 63.2% of experienced subjects reported they were in favour of utilising information technology, as opposed to 73.3%

of less experienced subjects, where experienced refers to 10 years of experience or greater. While 57.9% of experienced subjects claimed they were in favour of the use of information technology and the further introduction of new information technology developments as opposed to 66% of their less experienced co-workers. All of the above analyses were averaged across management and support staff, with an investigation of their interaction envisaged in future research.

3 Discussion

Within the present empirical investigation a plethora of interesting results were observed, largely conforming with the theoretical hypotheses derived from previous research. However, the existent differences observed between ancillary staff and management's phenomenological perceptions of efficiency of training and information technology, the effect of information technology on human relations within the workplace and the perceived quality of output warrant further investigation as this could be an area of importance in terms of increasing the overall efficiency of information technology, through garnering support and satisfaction with information technology, from support staff in addition to management. A great deal of further research and investigation in the field is necessary within this area.

The initial area investigated involved the perceptions of both managerial and support staff toward training levels and information technology within a computerised maintenance management environment. It was observed that while mean scores were reasonably high for both groups on a Likert type scale, indicating to some extent satisfaction with training, a significant difference was observed between the two groups. The management group reported a higher level of satisfaction than did the support staff group. This could be an area of some concern, as the morale of the support staff may be affected, potentially resulting in lower levels of both quantitative and qualitative output. It is considered that this is an area that needs extensive further research in an endeavour to ascertain initially whether training levels truly are satisfactory, and secondly whether staff perceptions of training inadequacy are related to output levels. As outlined earlier a diversity of theoreticians have identified the importance of training in terms of maximising the qualitative and quantitative efficiency of information technology, in addition to postulating existent training is to some extent inadequate in terms of both current information technology in addition to training on new innovations in the area which are introduced within various workplaces. However little research has been conducted within the area in the building construction industry, and particularly within computerised maintenance management areas.

The second area to be investigated within the study involved the effects of information technology on support versus managerial staff's phenomenological perceptions of human relations within the workplace. Similar to the last area of investigation, a significant difference was observed between these two groups perceptions of the effect of information technology within this area. This disparity of opinion is interesting in that it may also have some significant effect on the level of production of support staff within the workplace, which could potentially be rectified

by making the workplace more 'human friendly'. Previous researchers have observed that low morale in the office is correlated with a diversity of problems ranging from poorer productivity to instances of mental illness (Chishti et al, 1994).

Finally the results would indicate that managers feel that information technology results in superior qualitative output, in contrast to support staff's beliefs. This result corresponds with those observed in previous analyses in which management displayed a more favourable phenomenological perspective than support staff toward information technology overall within the workplace. However the lack of any significant difference in attitudes towards quantitative output is interesting in that it would suggest that while support staff do not necessarily like all of the effects of information technology, they still acknowledge that it enables them to produce a greater output than if they were utilising traditional methods. This result could be particularly useful in terms of illustrating that further education and training may be useful in order to gain complete acceptance of information technology by support staff, following which both qualitative and quantitative output could be monitored.

The examination of age and years of experience in relation to information technology also provided interesting directions of results, but it is acknowledged within this study that further and more extensive examination of these areas is necessary, employing a more rigorous quantitative method than dichotomous answer type questions. Future research would be required to explore, more fully, the areas identified within the present study. It must also be recognised that further research in a plethora of diverse areas could also be undertaken. Including the investigation of such facets as looking at customer satisfaction in the building construction industry and its interaction with information technology, and as previously mentioned the degree of interaction between phenomenological perceptions and actual productivity as a function of information technology.

In conclusion, it must be recognised that while both support staff and management perceptions of information technology were reasonably high in terms of training, human relations and overall qualitative and quantitative output, a significant difference was evident between these two groups, in terms of satisfaction with information technology on the whole. While the high degree of satisfaction concurs with a multiplicity of previous researchers findings, the differences between the groups warrants further investigation to ascertain a more comprehensive understanding of the exact state of affairs within the building construction maintenance management sphere.

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