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NATURE OF WORK EFFECTS ON MOTIVATION OF INFORMATION TECHNOLOGY PROFESSIONALS

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Abstract

The ever-changing environment of information technology (IT) makes special demands on those in the profession and those demands include remaining competent through some manner of professional development. The factors that contribute to information technology professionals' (ITPs) motivation to participate in professional development are not well understood. Previous research has suggested that an ITP must be motivated before they will participate in professional development. The purpose of this research is to investigate the effects between the nature of work factors, task identity, skill variety, decision autonomy and task complexity, and motivation to participate in professional development.

Keywords: Motivation, nature of work, IT professionals, expectancy theory

Introduction

Success in today's dynamic environment requires information technology professionals (ITPs) to remain technologically current, adapt to new domains, and acquire new as well as updated competencies. Consequently, ITPs need to actively participate in continuous updating of professional knowledge and skills because their existing skill base (intellectual capital) becomes obsolete every few years (Menkus, 1992). Professional commitment and active participation in professional development should enhance professional competence or at least deter the onset of skill erosion and obsolescence (Dubin, 1990).

Motivation has been suggested as the most important factor determining whether ITPs participate in updating activities (Woodard, 1991). Therefore, it is reasonable to expect motivated individuals to participate in professional development and maintain professional competency; however, this assumes work environments provide appropriate facilitating and motivational conditions (Hackman, and Oldham, 1980). This study examines the impact of selected nature of work characteristics on the motivation of ITPs to participate in professional development.

Research Model

As part of a larger study and research stream, the current study examines the nature of work characteristics, decision autonomy, task complexity, task identity, and skill variety. Figure 1 illustrates the research model used in this study. Based upon expectancy theory, the model predicts that characteristics of nature of work will impact an IT professional's motivation to participate in professional development. This is an important consideration because, in order for IT professionals to maintain professional competency in today's dynamic IT environment they must participate in significant professional development. However, since most professional development is voluntary, IT professionals must first be motivated to participate before participation will occur.

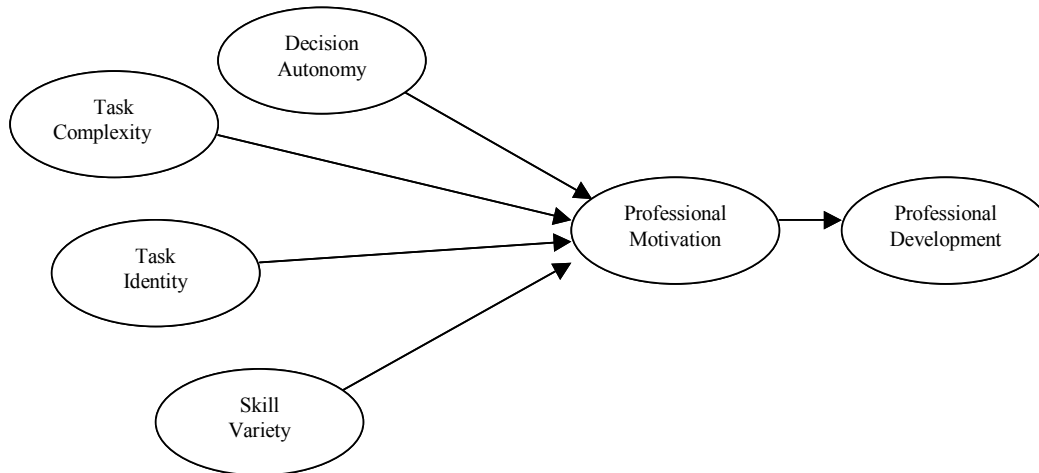


Figure 1. Research Model

Nature of Work

Nature of work (NOW) refers to job assignment requirements, decision latitude and related skill utilization. Complex, challenging, high variety assignments including decision autonomy stimulate motivated psychological states while allowing the worker to experience, practice and refine multiple abilities.

Characterized by job assignments and task requirements, NOW reflects how intellectually and psychologically challenging professionals perceive their work assignments to be. Routine, narrowly focused work assignments do not exercise the full repertoire of existing professional skills and do not encourage the development of new skills, whereas challenging work assignments exercise existing skills, stretch the limits of existing proficiencies and encourage continuing professional development (Kozlowski, and Farr, 1988).

Salient job characteristics associated with challenging work assignments include job complexity and skill variety, autonomous decision making, work group interdependencies, task identity and significance, and feedback regarding difficult but achievable goals (Parker et al., Nov 2001; Locke, and Latham, 1990; Gerhart, 1988; Couger, and Zawacki, 1980; Hackman, and Oldham, 1980). According to Hackman and Oldham (1980), a job's motivating potential represents the degree to which work itself potentially stimulates workers critical psychological states and motivated behaviors. To the extent job characteristics, such as task variety and identity, enhance psychological meaningfulness of work and expectancies, the worker will be motivated to exert greater effort toward successful performance (Evans, Kiggundu, and House, 1979). Aryee (1991) found motivation to positively influence updating activities. And, Marchese (1998) saw that heightened motivation was a product of the expanded role in an organization.

Specific nature of work characteristics examined in this study include skill variety, task identity, decision autonomy, and task complexity. Skill variety suggests work assignments are neither routine nor primarily administrative, thus allowing the ITP to practice a variety of professional skills. Decision autonomy indicates the ITP uses professional discretion in deciding how to conduct assigned work tasks. Degree of decision autonomy also measures participation in determining task assignments and priorities. Task identity originates from comprehensive work assignments; it entails task significance and identifiability through vertical loading of work tasks. Task complexity involves all phases of a project, concept development and the complexity of task assignments. Task complexity involves skill complexity and novelty, thus increases the intellectual demands associated with work assignments and indicates that learning is required before the project can be successfully completed.

Professional Motivation

The aspect of motivation studied here is professional motivation (PM), defined as the extent to which professionals are motivated to participate in professional development. The expectancy theory of motivation (Vroom, 1964) provides a foundation for considering the implications of various NOW characteristics influence on individual behaviors. PM represents an expectancy

theory perspective predicting that cognitive processes (mental calculus) within the person mediate the relationship between the perceived situational context, the person, anticipated outcomes and enacted individual behaviors. Assuming rational behavior, ITPs who believe in their capacity to remain competent and perceiving important outcomes as contingent upon professional competency will be more highly motivated to participate in professional development.

This study adopts the perspective that although participation in professional development is primarily a decision of the individual, nature of work provides a context that either encourages or discourages participation in professional development. Mere exposure to updating opportunities, such as class attendance, is insufficient. Motivated participation is required before learning occurs (Wood, and Bandura, 1989), and learning is fundamental to maintaining professional competency.

Hypotheses

Based upon the previous literature discussion the following hypotheses are presented and tested in this study:

- H1: Degree of perceived skill variety is positively related to professional motivation.
- H2: Degree of perceived task complexity is positively related to professional motivation.
- H3: Degree of perceived task identity is positively related to professional motivation.
- H4: Degree of perceived decision autonomy is positively related to professional motivation.

Research Method

Field research, employing quantitative analysis of questionnaire data was the primary method of research. The respondents were drawn from twelve organizations representing divergent industries in order to facilitate generalizability. Data from a convenience sample of 174 ITPs were obtained. The respondents range in age from 23 to 63 with a median age of 37 and over 85% were at least age 30. Most had attended some formal education within the past five years and 72% had at minimum a bachelor's level college degree. Females represented 38% of the sample and 70% of the respondents had worked as an ITP for more than five years.

The measurement instrument was pre-tested to verify content validity, ensure readability, and to eliminate threatening and ambiguous measurement items. A pilot test was also conducted to further validate the research instrument and administration techniques. Reliability coefficients were examined and considered satisfactory (generally exceeding .60) given the small sample size.

Measurement

An existing instrument was adapted for each variable in order to maintain consistency with prior research. Some modifications were made to the instruments to better fit an ITP work context, to reduce some ambiguity and reduce the number of items representing each construct due to time constraints in the administration of the instrument.

Previous research (Farr *et al.* 1980) suggested subscales that included skill variety, professional autonomy, comprehensive project assignments, and assignments to challenging versus administrative or repetitive work projects to measure NOW. Yet another research stream (Hackman and Oldham, 1980; and Sims, *et al.*, 1976) suggested skill variety (VAR), task complexity (CPX), task identity (IDN), and autonomy (AUT) as being important motivating facets of work itself. Skill variety, task identity and autonomy were measured on a six-point Likert scale adapted from Farr *et al.* (1980); Hackman and Oldham (1980); Sims, *et al.* (1976); and Kozlowski and Hults (1987). Skill variety (VAR) was operationalized using 7 items on the survey instrument, but one was eliminated during pilot testing. The proposed scale for skill variety lacked internal consistency ($\alpha = .55$). Task identity (IDN) was operationalized by 3 items on the survey instrument. The proposed scale for task identity demonstrated acceptable internal consistency ($\alpha = .70$). Autonomy (AUT) was operationalized by 6 items on the survey instrument. Scale reliability for autonomy was acceptable ($\alpha = .85$). Task complexity (CPX) was measured by five items on a six-point Likert scale adapted from an instrument combining core facets of the traditional job characteristics inventory (JCI; Sims, Szilagyi, and Keller, 1976) and job diagnostic survey (JDS; Hackman and Oldham, 1980). The scale reliability for task complexity was marginal ($\alpha = .68$). Summating the respective items from the measurement scales and averaging by the number of respective items generated each of the independent variables, VAR, CPX, IDN and AUT, hypothesized in this study to impact PM.

The instrument to measure PM used combined methods for measuring motivation, Stall and Harrell’s (1981) decision modeling approach and adapting Vroom’s (1964) and Kopelman’s (1977) traditional methods of measuring motivational force. Since expectancy theory emphasizes cognitive aspects of motivation, judgment-modeling techniques provide a useful method for measuring relevant expectancy variables (Zedeck, 1977). Therefore, this study operationalizes expectancy theory variables by adapting decision-modeling rationale and methods developed by Stahl and Harrell (1981). In a similar manner, Rasch and Tosi (1992) used this approach to operationally measure motivated effort in a study of performance variation among ITPs.

The decision theory approach is consistent with the expectancy theory notion of motivation, therefore by using a decision-modeling instrument, respondents provided estimates of probable outcomes (rewards) and associated outcome valence. Respondents also estimated performance expectations when making an extensive effort, up to nine hours per week, to update professional abilities. The instrument was designed to lead the respondent through a mental calculus resulting in estimation of intended effort level. Thus, the method guides respondents through the type of cognitive decision processes conceptualized in expectancy theory (Stahl, and Harrell, 1981).

For this study, the outcome and reward items used in instrumentality assessment were constructed to reflect the outcomes identified as most important to technology professionals (Dubin, 1990). These outcome items are consistent with important intrinsic and extrinsic motivators identified for ITPs (Igbaria, and Greenhaus, 1991; Couger, 1988; Fitz-enz, 1978).

Adapting traditional methods of measuring motivational force (Vroom, 1964) and Kopelman's (1977) return on effort refinements, this instrument provides valence, instrumentality, and expectancy scores that were used to compute an estimate of motivational force. Motivational force was calculated using the following formulae: $F_m = [e * \sum_i (o_i * v_i)] / 100$, where "F_m" is the motivational force associated with a particular group of outcomes; "e" is the ITPs' expected ability level given an extensive updating effort of nine hours per week; " \sum_i " is the sum of ($o_i * v_i$) for "i" potential outcomes, "o" is the outcome instrumentality (likelihood) and "v" is the valence or value that the ITPs with the given outcome; and divided by a constant (100) so as to maintain a range of scales compared to the other indicators.

Results

Statistical techniques including T-tests and multiple regression analysis were used to test the hypotheses. Before applying any of the statistical analyses, model assumptions were tested for normality and variance constancy. No significant abnormalities were found from these tests. The descriptive statistics for the independent variables are illustrated in Table 1. Pearson Correlation Coefficients for the independent variables are illustrated in Table 2.

Table 1. Descriptive Statistics of Variables.

Variable	N	Mean	Std Dev	Minimum	Maximum
VAR	170	3.73	0.72	1.83	5.33
AUT	170	4.45	0.85	1.33	6.00
CPX	170	4.06	0.80	1.40	6.00
IDN	170	4.45	0.99	1.33	6.00

Table 2. Pearson Correlation Coefficients

	VAR	AUT	CPX	IDN
VAR	1.000			
AUT	0.451	1.000		
CPX	0.583	0.491	1.000	
IDN	0.433	0.477	0.492	1.000

The main effects model below, which proposed each variable was independent to the other, was found statistically significant at $\alpha = .01$, with a global F-value of 7.58, and p-value of $<.0001$. The R^2 was .154 and Adjusted R^2 was .134, indicating that this model explains 13.4% of the variance in PM.

$$PM = \beta_0 + \beta_1VAR + \beta_2AUT + \beta_3CPX + \beta_4IDN + \text{Error}$$

A complete higher order interaction model was analyzed and the model below was found statistically significant at $\alpha = .01$, with a global F-value of 4.16, and p-value of $<.0001$. The R^2 was .207 and Adjusted R^2 was .157, indicating that this model explains 15.7% of the variance in PM.

$$PM = \beta_0 + \beta_1VAR + \beta_2AUT + \beta_3CPX + \beta_4IDN + \beta_5VAR * AUT + \beta_6VAR * CPX + \beta_7VAR * IDN + \beta_8AUT * CPX + \beta_9AUT * IDN + \beta_{10}CPX * IDN + \text{Error}$$

Both models were compared with the intent to find the model optimizing explanatory power and parsimony. Not only is generalizability at issue with the higher order interaction model that has 10 degrees of freedom compared to 4 degrees of freedom for the main effects model, but also, one must consider the future predictability of such a model. The Adjusted R^2 for the complete higher order interaction model was not significantly higher than the main effects model to warrant using the more complex model. Also, no interaction term T-test was significant at alpha level .05. Therefore, the main effects model was adopted for this study.

The individual T-tests of the independent variables and the results of the main effect tests with respect to the hypotheses are summarized in Table 3.

Table 3. Summary of T-Tests

Source	F-Value	p-value	Hypotheses
VAR	3.28	0.0717	Supported ***
AUT	7.04	0.0087	Supported *
CPX	3.28	0.0721	Supported ***
IDN	4.39	0.0377	Supported **
* at alpha level = .01			
** at alpha level = .05			
*** at alpha level = .10			

Discussion

As organizations become increasingly dependent upon innovative application of enabling technologies, they also become more dependent upon professional proficiencies of ITPs who envision, develop, and implement these technologies. These results suggest that organization interventions within the work environment may impact influence on motivation of ITPs.

This study provides empirical verification concerning the relationships between the nature of work characteristics with respect to the information technology professionals and their motivational efforts. Organizations should look at the work characteristics of ITPs, ensuring work assignments are not primarily administrative or routine; change rules so that IT professionals have more discretion on how to conduct work tasks; keep work mentally challenging and increase responsibility and skill variety. If organizations are not able to focus on all four of these nature of work characteristics, a recommendation would be to focus on the characteristics, starting with the most significant, autonomy (AUT), task identity (IDN), skill variety (VAR), then task complexity (CPX).

Applying an expectancy theory framework, results of this study support the relevance of motivation, and offer an initial evaluation of the influence of the nature of work factors and the significance of professional motivation in ITPs. Researchers and organizations interested in understanding ITPs participation or nonparticipation in professional development must seek to understand the influence of the nature of work factors on motivation. We know that Information System professionals are concerned about their career development prospect and that their perception of management policies affects their motivation (Mak and Sockel, 2001). Therefore, making improvements in the nature of work characteristics may lead to increased motivational efforts toward professional development.

Limitations

All respondents were from the same geographic region, central Florida, and all respondents were involved in systems development; this may limit the generalizability of the study. Participants in the study were from organizations that volunteered to participate and the respondents, themselves, were volunteers, thus self-selection poses a threat to validity; and the results are subject to common source and common method bias.

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