TASK, VALUE, AND DEMAND ALIGNMENT FOR OPEN SOURCE USE IN ORGANIZATIONS

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Abstract

Irrespective of increased adoption, continued use of open source software (oss) in organizations remains a persistent challenge. Lack of alignment between the task, value of oss, and demands to meet task requirements often deter the use of oss. In this study, we posit that fit between task and oss (task-oss fit), fit between individual's values and an organization's values relevant to their beliefs about free/libre value of oss (value-based fit), and fit between demand of work and oss skills of the individual (demand-abilities fit), influence the performance derived from oss use. We hypothesize that value-based fit and demand-abilities fit have an interaction effect on task-oss fit to influence productivity performance. We test our hypothesized effects using a survey of 149 it professionals using oss in their respective organizations. Results partially support the hypothesized effects. We discuss managerial implications and contributions of the findings.

Keywords: open source software, task-technology fit, task-OSS fit, demand-abilities fit, value-based fit, productivity

INTRODUCTION

Open source software (OSS) is characterized by its 'open' source code. Unlike commercial software, OSS provides freedom to the user to modify the source code and adapt it to the requirement of the use context (Fitzgerald, 2006). Since OSS provides customization of the source code, it saves cost associated with software license fees or service fees. As a result, OSS use in firms is increasing, with projections that 99% of top 2000 global firms will deploy OSS programs to run critical operations by the year 2016 (Gartner Report, 2011).

Although OSS can be customized to meet the demands of organizational tasks, employees' lack of technological skills and expertise to 'tailor' OSS programs emerges as a barrier to the continued use of OSS in organizations (Ayala, Cruzes, Hauge, and Conradi, 2011). While it is prudent that firms need to focus on the development of skills to customize OSS, however employees who are continuously engrossed in exploring the technological aspects of OSS may not be productive in completing their job duties. In other words, the intricacies involved in the technological development and 'as-per-need' customization of OSS may deter employees from performing actual organizational job duties (Nagy, Yassin, and

Bhattacherjee, 2010). Thus, although organizations favor OSS, they may not have sustained its use with time, due to the alignment of OSS to the individual tasks, and subsequent effects on individual and firm productivity.

In this study, we pose the research question: how the alignment of features of OSS with the task to be performed, the match between the demands of the tasks and the individual's OSS skills needed to perform the tasks, and the value associated with the free/libre value of OSS, interplay to influence productivity of an individual.

Prior studies on OSS use in organizations have indicated that alignment of OSS features (or capabilities) with the requirements of organizational tasks is a major issue for employees in executing their tasks efficiently (Nagy et al., 2010). Accordingly, OSS and productivity linkage is complex, and needs to be explored in details, specifically in the context of task-individual-organization and productivity alignment or fit of OSS (Torres, 2012). In line with this, we explore the interaction and impact of two dimensions of person-organization (P-O) fit, e.g., value-based fit, and demand-abilities fit, with task-technology fit (TTF), on productivity performance. Anchoring to the concept of task-technology fit (Goodhue and Thompson, 1995), task-OSS fit (TOF) is defined as the correspondence between OSS features and the requirements of the task. Based on the existing conceptualization of dimensions of person-organization (P-O) fit (Kristof, 1996); we define value-based fit (VBF) as the congruence between employee's values and the organization's values relevant to their beliefs about the free/libre value of OSS. The free/libre value of OSS refers to the concept of 'open' software (Stewart and Gosain, 2006), which implies that source code should be freely accessible to users. Demand-abilities fit (DAF) is defined as the match between the individual's skills with OSS and the expertise required to meet the demands of the organizational tasks. Productivity performance measures the increase in efficiency in executing tasks due to the use and integration of OSS with the user's work.

We argue that task-OSS fit (TOF) has a direct impact on the productivity performance. In addition, we propose that value-based fit (VBF) and demand-abilities fit (DAF) moderate the relationship between task-OSS fit (TOF) and productivity performance. The conceptual model is tested using a survey of 149 individuals who use OSS in their workplace. Results of the analysis show that when there is congruence between the organization's values and the individual user's values with respect to their beliefs about free/libre value of OSS (value-based fit), OSS user's productivity performance decreases. Further, the match between an individual's OSS skills and the expertise required to meet the demands of the task to be performed (demand-abilities fit) increases OSS user's productivity performance. The results imply that, when the task and demands for the task are inter-aligned with each other towards achieving an objective, the results are effective to enhance an individual user's performance. This study contributes to the evolving literature on the impact of continued use of OSS in organizations.

PRIOR RESEARCH

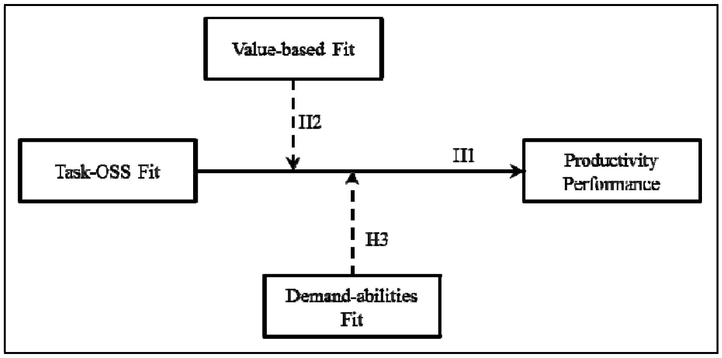
Majority of research on OSS focusses on understanding factors that drive initial adoption decisions (for details see Gwebu and Wang, 2011; Macredie and Mijinyawa, 2011) and motivations of individual developers to participate in OSS projects (Chen, 2010; Fang and Neufeld, 2009; Hahn, Moon, and Zhang, 2008; Roberts, Hann, and Slaughter, 2006; von Krogh and von Hippel, 2006). However, continued use of OSS remains an issue in practice (Gwebu and Wang, 2011) and, to the best of our knowledge, has received limited attention in academic literature relevant to OSS.

Prior research suggests that task-technology fit (TTF) is an antecedent to OSS implementation in organizations (Torres, 2012). The task-technology fit (TTF) and OSS adoption relationship argument is derived from the rationale that, when functionalities inbuilt in the technology enable users to complete tasks, performance is improved (Larsen, Sørebø, and Sørebø, 2009; Lin, 2012). Arguably, because of the accessibility to the source code, individuals can modify OSS in countless ways to suit the needs of their tasks. But, how far users can leverage the options to meet their needs remains a widely debated question; specifically when modifying source code requires high degree of technical expertise to 'suit' and 'fine-tune' the source code to the task needs (Ayala et al., 2011). The sufficiency of task-technology fit (TTF) to impact sustained use of OSS remains an unexplored question in existing literature that this study seeks to address.

THEORETICAL FRAMEWORK

This study uses the theoretical underpinnings of two streams of literature: (1) task-technology fit (TTF), and (2) person-organization (P-O) fit to present a conceptual framework (see Figure 1). We argue that the performance of individual's using OSS in an organization will be influenced through the interactions of two dimensions of person-organization (P-O) fit with task-technology fit (TTF). The two dimensions of person-organization (P-O) fit discussed in this study are value-based and demand-abilities fit (Kristof-Brown, Zimmerman, and Johnson, 2005). Value-based fit (VBF) is defined as the match between employee's values and the organization's values, relevant to their beliefs about the free/libre value of OSS; and demand-abilities fit (DAF) is the match between individual's skills with OSS and the expertise required to meet the demands of the organizational tasks. As such, prior research argues that task-technology fit (TTF) is the extent to which there is alignment between technology and the task (Goodhue and Thompson, 1995). We define task-OSS fit (TOF) as the match between functionality (or features) of OSS and the requirements of the task. The outcome in our model is productivity performance, which indicates the increase in efficiency in executing tasks, due to using or integrating OSS with existing systems.

FIGURE 1: Conceptual Model



The main tenet of the framework suggests that task-OSS fit (TOF) has an impact on performance in the context of an individual using OSS within an organization. In addition, we propose that value-based fit (VBF) and demand-abilities fit (DAF) moderate the relationships between task-OSS fit (TOF) and productivity performance. We argue that when an individual's OSS skills match the organization's demand for OSS use, individual work attitudes increases. As a result, the demand-abilities fit may increase productivity performance. Further, when there is congruence of an individual's "ideologies" or "beliefs" about OSS with that of the organization's, and the individual uses OSS due to the motivation that his/her workplace holds a favorable view about OSS use, his/her focus on the task increases and hence, productivity performance improves. We outline the details of these arguments in the following sub-sections, and draw testable hypotheses.

HYPOTHESES

Prior studies argue that when capabilities and features of technology match with the demands of task, the implemented technology improves performance (Goodhue and Thompson, 1995). The notion behind the view of task-technology fit (TTF) is that the perception of users relevant to better fit of a certain technology with the task over other alternatives, influences their utilization choices (Junglas, Abraham, and Watson, 2008). The task-technology fit (TTF) perspective has been employed to understand the performance of mobile information technology users (Gebauer, Shaw, and Gribbins, 2010) and effectiveness of individuals collaborating on a task virtually (Maruping and Agarwal, 2004), amongst other several applications.

We argue that when the OSS features match with the task (task-OSS fit), an individual's ability to perform the task increases (e.g., productivity performance increases). The contention is that, as in the case of any other technology/software, when the user recognizes that OSS has the necessary functionality to enable him/her to carry out tasks, s/he has a higher perception regarding the utility of OSS, which enables the individual to become more efficient while performing the task. Based on these arguments, we hypothesize:

H1: Task-OSS fit increases an individual's productivity performance.

Fit between the technology and the task may be required, but not sufficient to improve productivity performance (Fuller and Dennis, 2009). It is suggested that when there is value congruence, that is, individual values and organizational values coincide (for example, believing in the core OSS ideology that OSS should be open and free), people are more likely to have positive work attitudes and perform well in their tasks (Cable and Edwards, 2004; Kristof-Brown et al., 2005).

Within the OSS context, Stewart and Gosain (2006) found that members involved in developing OSS performed better when they shared common values (for example, source code should be available free of cost). In another study, Sharma, Daniel, and Chung (2010) applied the concept of person-organization (P-O) fit and proposed that value-based fit might reduce turnover intentions in OSS projects. In other words, albeit the free/libre nature of the OSS, an organizational context and value to support such movement will have a positive impact on productivity, than an organization which supports more proprietary environment.

Demand-abilities fit encompasses the idea that technical skills may be a prerequisite for individuals to use OSS effectively for their tasks (Chen, 2010; Fitzgerald, 2009). Further, prior research suggests that demand-abilities fit has a positive influence on work attitudes (Kristof-Brown et al., 2005). In an organization, when technology use demands that OSS needs to be used for specific purposes, there may be higher degree of activities to orient skills, actions, and technological resources to customize the OSS towards a goal. Specific to the OSS context, Schilling, Laumer, and Weitzel (2012) found that the degree of demand-abilities fit was highly correlated with developer retention in OSS projects.

We argue that demand-abilities fit plays a significant role in improving productivity performance even when the task-OSS fit is high. Following this, as demand-abilities fit varies, its sufficiency or deficiency can influence the relationship between task-OSS fit and productivity performance. When there is high demand-abilities fit, a user can draw on her OSS skills to supplement the task-OSS fit, and improve productivity performance. In contrast, when there is low demand-abilities fit, it can impede the relationship between task-OSS fit and productivity performance. Thus, compared to individuals working in a situation where there exists low demand-abilities, those individuals working in high demand-abilities fit situations will make the relationship between task-OSS fit and productivity performance stronger. Based on these arguments, we hypothesize:

H2: Value-based fit positively moderates the influence of task-OSS fit on productivity performance.

H3: Demand-abilities fit positively moderates the influence of task-OSS fit on productivity performance.

METHODOLOGY

Sample

As a part of a larger effort, a survey was distributed to information technology (IT) professionals who used OSS at their workplace. An email list of 450 IT professionals working in the United States and using OSS at their work was obtained (in addition, a filter question in the survey ensured this portfolio). The type of OSS used varied from development tools, to network monitoring tools, to enterprise applications. An invitation email soliciting participation was sent to the email list. Incentive in the form of $15 Amazon.com gift cards was offered from five participants who completed the survey using a lucky draw. Of the 450 emails that were sent out, 87 were invalid responses, and 32 individuals opted not to participate in the survey. Reminder emails were sent after 2 weeks of sending out the initial invitation email to the remaining 331 individuals. Data collection period lasted for approximately 4 weeks (March to April of 2012). There were 149 individuals that responded to the survey, with an overall response rate of 45.01%.

Table 1 shows the demographics of the sample used in the study. Out of the 149 respondents, 130 were males, 29 respondents were in the age group of 21 to 30 years. Further 69 respondents had completed a 4-year college degree and 41 respondents had a graduate degree. With respect to years of experience, 129 individuals had 5 or more years of experience working in the IT field. Further 52 respondents were programmers and 85 respondents indicated that their organization's age was more than 25 years since inception.

Instrument

Scales to measure the constructs in the model were adopted from prior research. The survey items used to measure all variables are given in Table 2. Task-OSS fit (TOF) was measured using 3 items on a 7-point Likert scale where 1 represents 'extremely disagree' and 7 represents 'extremely agree'. Productivity performance (PP) was measured using 3 items on a 5-point Likert scale where 1 represents 'not at all' and 5 represents 'a great deal'. Value-based fit (VBF) was measured using 3 items and demand-abilities fit (DAF) was measured using 3 items, all on a 5-point Likert scale where 1 represents 'not at all' and 5 represents 'a great deal'.

TABLE 1: Demographics

Label	Question	Results (*with % of respondents in brackets*)
Gender	Please indicate your gender:	Male (87.25%), Female (10.74%)
Age	Please indicate your age in years:	21-30 (19.5%), 31-40 (36.2%), 41-50 (23.5%), 51-65 (16.8%), > 65 (0.7 %)
Education	Please indicate the highest level of education that you have completed?	Some School (0.7%), High School/GED (2.7%), 2-year Diploma (4.7%), Some College (14.8%), 4-year College Degree (46.3%), Master's Degree (23.5%), Doctoral Degree (4.0%)
Work Experience	How many years of work experience do you have in the IT field?	1-3 (7.4%), 3-5 (5.4%), 5-8 (9.4%), 8-12 (19.5%), 12-15 (14.8%), > 15 (37.6%)
Position in the Organization	Please indicate your position/rank in the organization.	Programmer (34.9%), Manager or Equivalent (13.4%), Sr. Manager or Equivalent (8.7%), Director or Equivalent (18.8%), VP or Equivalent (4.0%), President or Equivalent (2.7%), CEO or equivalent (4.0%)
Organization Age	Please indicate the age (since inception) of your organization in years	< 1 (2.0%), 1-5 (5.4%), 5-10 (7.4%), 10-15 (12.8%), 15-20 (6.7%), 20-25 (4.7%), > 25 (57.1%)

TABLE 2: Results of T-test for Non-Response Bias

Construct	Items	Response bias (p-value)
Task-OSS Fit (TOF)	*Adopted from Moore and Benbasat (1991)* 1. Using OSS enables me to accomplish tasks more quickly. 2. Using OSS improves the quality of work I do. 3. Using OSS gives me greater control over my work.	0.712
Productivity Performance (PP)	*Adopted from Torkzadeh and Doll (1999)* 1. *Using OSS saves me time.(item dropped)* 2. Using OSS decreases my productivity. (Reverse coded) 3. Using OSS allows me to accomplish more work than would otherwise be possible.	0.979
Value-based Fit (VBF)	*Adopted from Cable and DeRue (2002)* 1. The things that I value about OSS are very similar to the things that my organization values about OSS. 2. My personal OSS values match my organization's OSS values and culture. 3. My organization's OSS values and culture provide a good fit with the things that I value about OSS	0.171
Demand-abilities Fit (DAF)	*Adopted from Cable and DeRue (2002)* 1. The match is very good between the demands of my job and my OSS skills. 2. My OSS abilities are a good fit with the requirements of my job. 3. My OSS knowledge is a good match with the demands that my job places on me	0.901

Response bias was assessed by comparing the responses of early respondents with late respondents. T-test and subsequent p-value (shown in third column of Table 2) were used to evaluate the difference between these two groups based on relevant constructs, and resulted in no significant response bias.

Table 3 provided the descriptive statistics of the factor variables.

TABLE 3: Descriptive statistics, AVE, Reliability, and Correlations

	Task-OSS Fit	Demand-abilities Fit	Value-based Fit	Productivity Performance
Number of Indicators	3	3	3	2
Mean	4.91	3.38	2.51	2.97
Standard Deviation	1.39	0.785	1.208	1.29
Cronbach's Alpha	0.93	0.76	0.961	0.889
AVE	0.835	0.523	0.900	0.801
Composite Reliability	0.938	0.759	0.964	0.889
Correlations				
TOF	**0.91***			
DAF	0.636	**0.72***		
VBF	0.601	0.465	**0.95***	
PP	0.822	0.500	0.748	**0.90***

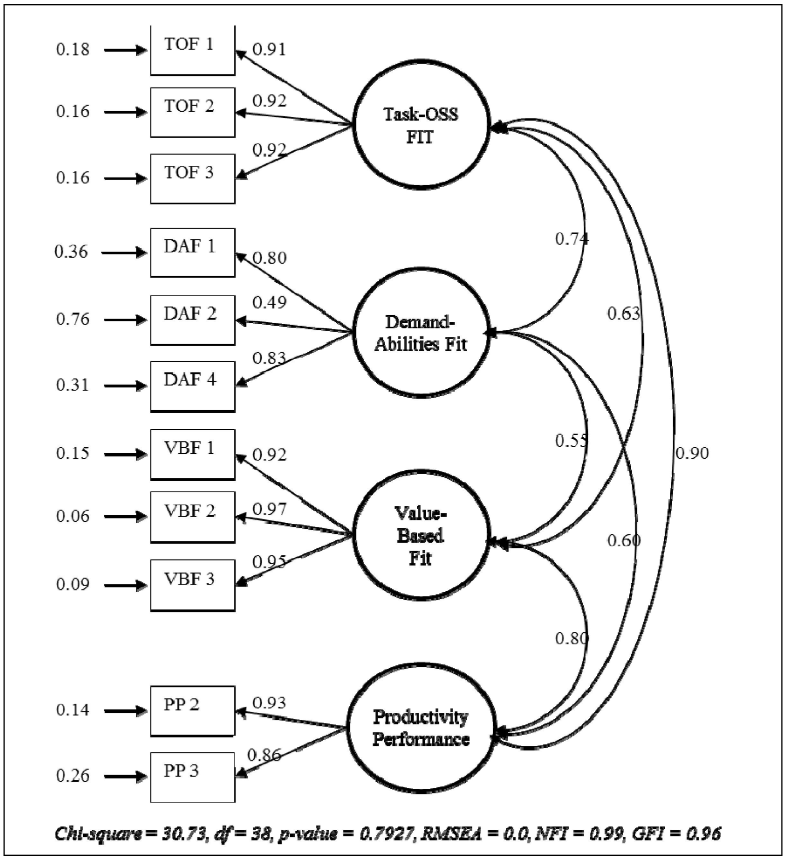
** Diagonal values in bold indicates the square-roots of the AVE for the constructs*

DATA ANALYSIS

Data was analyzed using a two-step process (Anderson and Gerbing, 1988): (1) LISREL was used evaluate the model-data fit of the measurement model and the validity of the constructs used in the measurement model, (2) the hypotheses were tested by evaluating the structural model with SmartPLS version 2.3 (Ringle, Wende, and Will, 2005).

A four-factor correlated measurement model with standardized option was tested with LISREL (See Figure 2) to evaluate efficacy of the variables. The factors included in the measurement model are: Task-OSS fit (TOF), demand-abilities fit (DAF), value-based fit (VBF), and productivity performance (PP). The overall effectiveness of this measurement model was examined using the common model fit measures: chi-square ($\chi 2$), root mean square error of approximation (RMSEA), normed fit index (NFI), non-normed fit index (NNFI), and goodness of fit index (GFI) (Bentler, 1990; Bentler and Bonnet, 1980; Joreskog and Sorbom, 1989; Steiger and Lind, 1980). The initial analysis of the measurement model indicated that one item from productivity performance cross-loaded with value-based fit (VBF). Following this, the measurement model was revised by dropping the item from productivity performance (PP) that showed cross loading. The measurement model then exhibited good model-data fit with chi-square ($\chi 2$) value of 30.73 for 38 degrees of freedom, chi-square ($\chi 2$) per degree of freedom is 0.81, p-value 0.793, root mean square error of approximation (RMSEA) 0.0, normed fit index (NFI) 0.988, non-normed fit index (NNFI) 1.004, and goodness of fit index (GFI) 0.96.

FIGURE 2: The Measurement Model



Reliability assesses the extent to which a measurement scale yields consistent results (Nunnally, 1978). Cronbach's alpha is used to evaluate the reliabilities of a given scale (Nunnally, 1978). A score of 0.70 or above indicates good reliability (Nunnally, 1978). In our model, all constructs had Cronbach's alpha values equal or greater than 0.76 (see Table 4), thus exhibiting adequate reliability.

Convergent validity evaluates how well measurement items load on their latent construct in the model (Bagozzi and Yi, 1988). Convergent validity was evaluated using the three measures: factor loadings, average variance extracted (AVE), and composite reliability (Kwahk and Lee, 2008). Item-factor loadings equal or greater than 0.60 indicate good convergent validity (Bagozzi and Yi, 1988). All the item-factor loadings in our measurement model are greater than 0.60 except for one item (DAF2) (value of 0.49) of the variable demand-abilities fit. AVE with a value of 0.50 or greater indicates good convergent validity (Bagozzi and Yi, 1988). The AVE scores of all the constructs in our measurement model is greater than 0.50 (Table 3). Composite reliability scores of 0.70 or greater for the latent constructs indicate good convergent validity (Kwahk and Lee, 2008). The composite reliability scores of all the constructs used in our measurement model is greater than 0.7 (Table 3). Thus, the item-factor loading scores, the AVE scores, and the composite reliability scores suggest that the constructs used in our measurement model has adequate convergent validity.

Discriminant validity is evaluated by examining whether the measurement items share more variance with their intended construct than any variance that the construct shares with other constructs (Fornell and Larcker, 1981). Thus, a construct is supposed to exhibit adequate discriminant validity if the correlation between this construct and the other constructs is less than the square root of the AVE for this construct. The square roots of AVEs are 0.91, 0.72, 0.95, and 0.90 for task-OSS fit (TOF), demand-abilities fit (DAF), value-based fit (VBF), and productivity performance (PP), respectively. These square roots are greater than the correlation among the latent constructs (Table 3), thus exhibiting adequate discriminant validity.

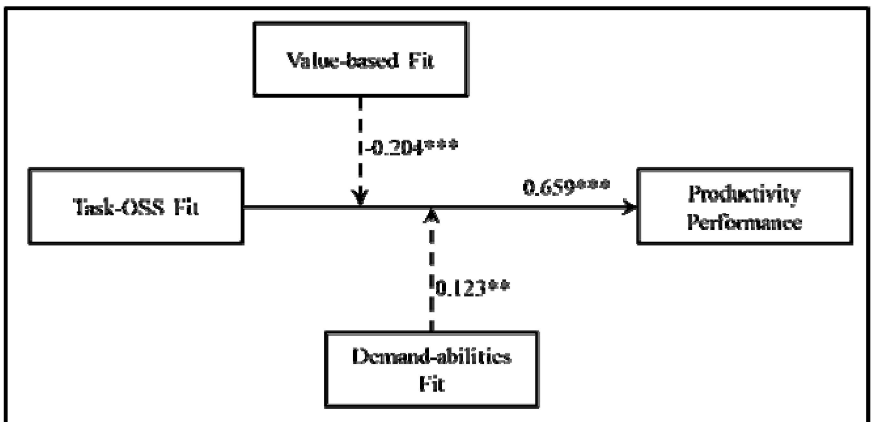
Common method bias (CMB) may be a concern as data was self-reported and collected using the same questionnaire (Podsakoff, MacKenzie, Lee, and Podsakoff, 2003). Two techniques commonly used in IS research to test CMB are the Harmon's single factor test and the marker variable technique (Sharma, Crawford, and Yetton, 2009). We conducted the Harmon's single factor test to examine the presence of CMB (Vorhies and Morgan, 2005). All the eleven variables were loaded on one factor to examine the fit of the model. If CMB is a major concern, then the one-factor model should fit the data well (Korsgaard and Roberson, 1995; Mossholder, Bennett, Kemery, and Wesolowski, 1998). Our analysis showed that the single factor did not fit the data well ($\chi 2$ = 457.58, df = 44, p=0.000, GFI= 0.571; AGFI = 0.356, NFI = 0.781, RMSEA = 0.260). Therefore, CMB is not a major concern in this study.

The marker variable test proposed by Lindell and Whitney (2001) takes advantage of a special variable (the marker variable), that is theoretically unrelated to at least one variable in the proposed model. Because the marker variable is assumed to have no relationship with one or more variables in the model, CMB can be assessed based on the correlation between the marker variable and the theoretically unrelated variable and should be less than 0.30 (Lindell and Whitney, 2001). We performed the marker variable test and the result (correlation = 0.19) revealed CMB was not a major issue.

Hypotheses Testing

Partial Least Squares (PLS) technique using SmartPLS software version 2.3 (Ringle et al., 2005) was used to test the hypotheses. The proposed model consists of one independent variable, and two moderating variables influencing a single dependent variable. The sample size of 149 is more than adequate to conduct the statistical analysis, meeting the required criteria for adequate sample size for PLS (Chin, 1998). Bootstrapping with a sample size of 500 was used to get robust results. The hypotheses were assessed using one-tailed t-test as they were unidirectional in nature.

FIGURE 3: Results of Path Analysis



*Significance Levels *** $p < 0.01$, ** $p < 0.05$; R^2=0.79*

RESULTS

The results of the hypotheses testing are given in Figure 3. The path coefficients and t-values with their significance are presented in Table 4. We find that the influence of task-OSS fit (TOF) on productivity performance (PP) (β = 0.659, $p < 0.01$) is significant, thereby providing support for hypothesis H1.

TABLE 4: Path Coefficients, T-Values, P-Values, and Results

Hypotheses	Path Coefficients	T-values	P-values	Result
H1: TOF → PP	0.659	10.64	0.00***	Supported
H2: TOF X VBF → PP	-0.204	2.34	0.00***	Not Supported, but statistically significant
H3: TOF X DAF → PP	0.123	1.67	0.04**	Supported

**** $p < 0.01$, ** $p < 0.05$, R^2=0.79*

Moderating effect of value-based fit (VBF) on the relationship between task-OSS fit (TOF) and productivity performance (PP) was significant and negative (β= -0.204, $p<0.01$). This is in the opposite direction of the hypothesized relationship in H2. Further, demand-abilities (DAF) fit played a significant moderating role on the relationship between task-OSS fit (TOF) and productivity performance (PP) (β=0.123, $p<0.05$). This result supports hypothesis H3. The R-square value of the model is 0.79, thus, our model explains 79% of the variance in productivity performance (PP).

Self-reported measures of productivity performance were used in this study, which may bias the results (Podsakoff and Organ, 1986). One way to find out if self-reported measures of productivity performance may have introduced spurious results is to test if managers responded differently to items related to productivity performance when compared to the responses from programmers in our sample (Podsakoff and Organ, 1986). The reason to select these two groups - managers and programmers - to conduct the analysis, is that, a manager may hold a view of productivity performance that is not similar to the idea of productivity performance from the perspective of a software programmer. For example, savings associated with licensing fee costs when not using proprietary software could be a good way to measure productivity from the manager's viewpoint, while a programmer may be looking at productivity from the perspective of time required to modify source code.

In order to carry out the test, we divided our dataset into programmers and managers to see if there was a difference in perceptions relevant to productivity performance. One-way analysis of variance was conducted and there was no significant differences found with respect to perceptions of productivity performance between the two groups - managers and programmers - on each of the items taken individually (Table 5). Thus, self-reported measures of productivity performance are not a major concern in the study.

TABLE 5: ANOVA Results for Self-reported Measure Bias

Item	P-value
Using OSS decreases my productivity. (PP2)	0.34
Using OSS allows me to accomplish more work than would otherwise be possible. (PP3)	0.92

DISCUSSION

The objective of this study was to explore how the interplay between different dimensions of task, demand, and OSS values influences productivity performance. Amongst our key findings, we observe that the match between an individual's proficiency with OSS and the skills required to meet the task demands (demand-abilities fit, DAF) increases the influence of task-OSS fit (TOF) on production performance (PP). On the contrary, the correspondence between an individual's values and organizational values pertinent to their beliefs regarding the free/libre value of OSS (value-based fit, VBF) decreases the influence of task-OSS fit (TOF) on productivity performance (PP).

We elaborate our findings further. First, the significant positive relationship between task-OSS fit (TOF) and productivity performance (PP) substantiates that the match between features of the technology (OSS) and demands of the task enable users to work efficiently. As far as OSS use is concerned, the first criterion is that it should meet the characteristics of the task for which it is intended to be used. Once this fit is established, the user can then apply it to perform the task to increase productivity.

The finding that demand-abilities fit (DAF) increases the effect of task-OSS fit (TOF) on production performance (PP) supports the claim that when OSS skills of an individual match the demands of the task to be performed, the resulting productivity will be higher. In other words, if the individual is not skilled enough to use and avail the features of OSS towards the task demands, he may be unable to leverage the use of OSS to meet the productivity goal.

In contrast to our hypothesized relationship, the result that value-based fit (VBF) decreased the influence of task-OSS fit (TOF) on productivity performance (PP) indicates that shared values in the organization has limitations; it may drift individuals away from meeting their productivity goals. Unless oriented towards productivity objectives, the shared OSS values may cause "explore and analysis paralysis". For example, individuals with high degree of value-based fit may be so eager about sharing their OSS beliefs that they may simultaneously participate in multiple organizational tasks that require the use of OSS. As a result, their contribution to a task may not be as significant to other tasks, and/or, the efficiency required to perform the tasks may be compromised. Our findings indicate that often, shared values towards free/libre movement may be highly detrimental to increase productivity - partially explaining why organizations that start with a high value of OSS use may discontinue the use of OSS later, due to results detrimental to work-related productivity.

Limitations

One of the limitations of the study was the use of a relatively small sample size. However, PLS was used to test the relationships proposed in the model that may mitigate such concern. Further, items to measure value-based fit were adopted from Cable and DeRue's (2002) conceptualization of employee-organization value congruence. It may be that this notion of fit may not have been able to accurately 'capture' the idea of fit between an individual's and a firm's OSS shared values regarding their beliefs related to free/libre nature of OSS; and might have been a reason for the lack of support for H2. However, analysis conducted to assess the properties of the scale to measure value-based fit revealed adequate validity (construct, convergent, discriminant). Third, the cross-sectional design may limit our results to infer associational relationship only, than establishing any causal effects. Fourth, in organizations, a users' extent of involvement with OSS may vary. For example, some may be involved with simple installation and management of the OSS programs, others may be responsible for modifying OSS code to meet the organization's task needs, or, certain employees may be re-writing OSS code completely to customize the software to perform tasks. These 'levels' of engagement with OSS could influence employee perceptions regarding the fit constructs included in our study. For example, people who are first-level users, that is, those who simply install and manage OSS programs may be indifferent to the challenges posed when OSS code needs to be 'tweaked' or modified to customize the program to fit the needs of their task. On the other hand, employees that are involved in 'make-over' of the OSS source code to alter the program to suit organizational needs may find the job of modifying the code very challenging, to the extent that it deviates their attention from the job duties they are required to perform in the organization. Thus, results of this study should be inferred with caution, as majority of the individuals included in the sample may have limited involvement with OSS that is they install and/or manage OSS programs they need for their tasks. Future research should examine how various levels of user involvement with OSS influences individual perceptions relevant to the constructs included in the model of this current study.

Contributions

This study makes two theoretical contributions. We extend prior literature which suggests that task-technology fit (TTF) is necessary but not a sufficient condition to improve individual performance (Fuller and Dennis, 2009). We conceptualize that value-based fit and demand-abilities fit, the two dimensions of person-organization (P-O) fit, impact individual performance, thus contributing to the existing literature on fit perspective. This adds a nuanced "fit" based view, which is in line with the alignment literature in information systems research, but has not been applied to explore OSS usage issues in organizations. Second, this study shows that the sharing of common OSS values between the organization and the individual may be a crucial attribute that needs to be explored in future studies. For example, what is the threshold point of value congruence that starts to accrue negative value towards productivity?

Implications

We draw three managerial implications from our findings. First, organizations need to understand why and how to use OSS, and select the right people to manage tasks that require use of OSS. While OSS as a "free and libre" culture is quite attractive, but leaving everything to the whims of employees, rather than a strategic evaluation of OSS use, may not be good. Second, we infer that as far as productivity is concerned, introducing or adopting OSS may be beneficial for most employees. Our findings suggest that it helps to achieve performance. Third, when an organization hires employees for different tasks, it should keep the demand of a task and the person's OSS related knowledge and skills in mind. For example, if a specific system development demands skills, such as redesigning an OSS platform, an individual with 'corresponding' OSS skills may be suited to improve productivity of such tasks. Thus, overall, OSS use should not be seen in isolation of people involved in using OSS, or, without focusing on the demands that need be met in the organization such as meeting deadlines, accomplishing project deliverables.

In conclusion, this study explores the triangulation of task-demand-value based fits in OSS-productivity context. This research adds to the stream of literature on OSS that focusses on understanding the success of OSS for productivity, and draws the attention of managers on areas of fit within an organizational setting.

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