# The Effects of Fit and Social Construction on Individual Performance

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**Abstract**

*This study examines the effects of information and communication technologies on individual performance. The literature has paid a considerable amount of attention to social influence as a determinant of individual behavior. We combine task-technology fit with concepts from adaptive structuration theory to specify social influence. In our model, we suggest that individuals should receive support from proper social construction to have additional performance improvement. Empirical data from 317 individuals across 43 teams in 10 companies is used to assess the theoretical model. Our theoretical model received support from the data.*

**Keywords:**

task-technology fit, adaptive structuration theory, faithfulness of appropriation, consensus on appropriation, hierarchical linear modeling

## Introduction

Investigating the impacts of information and communication technologies (ICTs) on individual-level technology adoption and its use is of fundamental interest to information systems researchers. Among many determinants of individual behavior, social influence has received a considerable amount of attention. This attention is based on the observation that individual behavior "occurs in a very social world which is far from neutral in its effects" [8, 117]. Furthermore, individuals are recognized as social actors "whose interactions are simultaneously enabled and constrained by the socio-technical affiliations and environments of the firm, its members, and its industry" [15, 218].

While assuming an active and influential social context, the IS literature employs various approaches to specify the social processes. One theoretical approach applies the framework of structuration theory [9] to explain the mutual influence of information technologies and social processes. In her duality of technology model, Orlikowski [17] depicts human agents as intertwined with institutional properties and technology. In their adaptive structuration theory (AST), DeSanctis and Poole [6] explain that human actions are socially constructed as people interact with technology.

In this study, we take Goodhue and Thompson's task-technology fit (TTF) model [10] as the base framework and extend it by incorporating concepts from AST to specify the social processes. Such an extension is important because social processes can produce patterns of cognition and behaviors that arise from forces well beyond the straightforward contingency between situational factors and interacting technology. This extension is partly encouraged by advancements in AST, which provide scales to measure core constructs of the theory [4, 20]. More importantly, we identify the importance of social structures surrounding ICTs and their impacts on individual technology adoption and use. Specifically, we examine the impacts of social construction (i.e., faithfulness of appropriation and consensus on appropriation) on fit, system usage, and individual performance. We suggest that the extended model will explain variance in individual system usage and performance beyond that explained by the TTF variables.

Empirical data from 317 individuals across 43 teams in 10 companies was used to assess the theoretical model. A hierarchical data structure (i.e., individuals within teams) was warranted in order to test the impacts of social construction at the group level (i.e., level 2) on individual behaviors (i.e., level 1). Hierarchical linear modeling was used to test a cross-level effect of a level-2 predictor on a level-1 criterion.

## Background

### Task-Technology Fit Model

We draw on a TTF model called the technology-to-performance chain [10], which explains the impacts of information technologies at the individual level, as the base framework. It is a combination of usage and fit-focused research that overcomes the limitations of both. Fit is defined as the correspondence between task requirements, individual characteristics, and the functionality of technology. It measures an individual's beliefs about the extent to which systems meet the requirements of a user's tasks and assists an individual in performing his or her tasks. In terms of usage, the basic tenets of this model are that "for an information technology to have a positive impact on individual performance, the technology *must be utilized*, and the technology *must be a good fit with the tasks it support*" (p. 213; italics original). This model recognizes that usage or fit alone cannot adequately explain performance impacts from technology. Usage alone models do not explain that when system usage is not voluntary, individual performance may hinge on fit rather than usage. In addition, system usage may not enhance individual performance unless technology has a good fit to the task. Similarly, fit alone models do not consider that systems should be used to lead to performance impacts.

**Adaptive Structuration Theory**

Within the realm of recognizing technology in a larger social system, what specific social system influences individuals' behavior in their use of technology? According to their adaptive structuration theory, DeSanctis and Poole [6] identify sources of influence that can explain the mutual interaction of technology and social processes within social groupings. The crux of AST is social structures, which are defined as "rules and resources provided by technologies and institutions as the basis of human activity … and serve as templates for planning and accomplishing tasks" (p. 125). Social structures are provided by technology and also emerge in human action as people interact with the technology. The *structure* provided by an information technology is identified by both its spirit and its specific features. The spirit of the technology is the intended, generally recognized purpose of the structure. The specific features are the operations that the system implies and the timing and sequence of these operations.

The social structures emerge from human actions as a technology's rules and resources come into play as people interact with the technology (a process called structuration, or appropriation within a specific context). Appropriation is a social interaction process in which people actively select how technology structures are used through different appropriation processes. DeSanctis and Poole suggest that the nature of technology appropriations will vary depending on the structures of technology, other sources of structure (e.g., task), and a group's internal system.

In this study, we apply AST to incorporate social structures and processes into the TTF model. We are interested in this approach due to advancements in the AST theory that provides scales to measure faithfulness of appropriation (FOA) [4] and consensus on appropriation (COA) [20]. Prior to this advancement only group attitudes in AST had been examined to explain the performance impacts of GSS [11, 21, 22]. More importantly, we believe that the social structures and processes emphasized by DeSanctis and Poole are equally important in non-GSS contexts.

## Research Model and Hypotheses

Figure 1 depicts our theoretical model that combines task-technology fit with elements from AST.

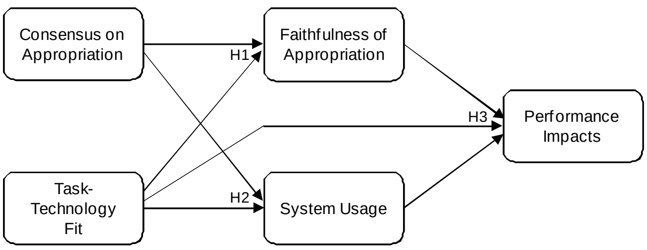


Figure 1 – Research Model

From among AST's many facets, we focus on the appropriation of structures and a group's internal system. Appropriation of structures are characterized by *faithfulness of appropriation* (FOA), which is defined as "the extent to which structures provided to a group are used in a manner consistent with the spirit of the technology" [4]. Degrees of appropriation may be characterized on a range from faithful to unfaithful. A faithful (unfaithful) appropriation occurs when the technology is used in a manner consistent (inconsistent) with its spirit. Assessment of faithfulness can be best accomplished by focusing on the subjective, internal spirit of the technology, rather than the objective, external one, because it is actually the subjective spirit that matters in the mind of the individual [4].

Next, a group's internal system refers to members' nature and their relationships inside the group [13] (cited in DeSanctis et al. [6]). *Consensus on appropriation* (COA), which is defined as "the extent of the agreement among group members on how the technology should be used" [20], may influence a group's appropriation on available structures. If individual users do not reach an agreement, they cannot effectively appropriate the technology. Lack of agreement will effect uncertainty, ambiguity, and conflict among individuals and promote the unexpected, inconsistent, or improvisational use of the technology. This agreement may exist a priori or develop as users adopt and use the technology [20]. The consensus may be less dependent on the technology's qualities, but rather may be a function of interaction between the technology and a group of users.

We believe that FOA is affected by fit [5]. Technology designs do not drive people toward a certain mode of appropriation. Rather, it is people who actively select how technology structures are used [6]. If people have a good fit with the technology, they will be motivated to exploit the technology according to its spirit. We also expect that COA will influence appropriation of structures (i.e., FOA). COA reduces uncertainty about which structures of the ICT intervention are appropriate to a given task [6]. COA is also associated with less ambiguity and conflict over technology usage patterns. A lack of consensus may make it difficult for individuals to coordinate effectively through proper use of technology [20]. Thus, greater COA should lead to faithful appropriation of the technology [18]. This leads to:

*H1: Individuals' faithfulness of appropriation will vary depending on task-technology fit and consensus on appropriation.*

Extending the TTF model, we expect that COA will bring more explanatory power in predicting individuals' technology usage. First, the consensus may work as a social pressure among a group's individuals that fosters more use of the system to fulfill the group's tasks [8]. Second, individuals are exposed to vicarious learning opportunities from observing others' experience [2]. When the usage leads to positive results, other members of the group are likely to mimic that behavior if there is high consensus among the group. Last, if individuals experience less uncertainty and ambiguity over appropriations, they are likely to develop their own patterns of system usage to perform their tasks. Thus:

*H2: Consensus on appropriation at the group level will have additional explanatory power in predicting individual technology usage beyond that explained by task-technology fit.*

Extending the TTF model, we argue that individuals' FOA will bring positive effects in predicting perceived performance impacts. Fit is expected to lead to improved performance. Structures provided by ICT may either fit or not fit the task requirements of individuals. If the technology's selected structures fit the tasks, individual performance will be enhanced if individuals perform their tasks by using the appropriate structures and features. If the selected structures of the technology do not fit the tasks, the technology basically cannot meet all the requirements of individuals. In addition, faithful appropriation of the technology will generate optimal performance impacts because individuals will have an easier time to complete tasks along the features embedded in the technology. Thus:

*H3: Individuals' faithfulness of appropriation will have additional explanatory power in predicting perceived performance impacts beyond that from task-technology fit and usage.*

## Method

### Sample

Data were collected from 10 large organizations in South Korea across a variety of industries including construction, iron and steel, chemical, and software integration, as well as Korean government agencies. A major effort was made to randomly select teams in each participating organization. Each organization was asked to distribute the survey to all selected individuals within each team. At each organization, the study contact collected the completed surveys and returned them to the researcher.

The survey was sent to 346 individuals and 327 surveys were collected. Of these, 10 surveys were dropped because they completed by individuals who were not associated with a team. The overall study response rate was 95% with 317 usable surveys.

### Instrument Development

This study uses the survey method. We developed the questionnaire using standard recommended procedures. Based on an extensive review of previous research, we developed a preliminary version of the questionnaire. Items were developed based on existing instruments and were adapted to the research context. The preliminary version was refined via two pilot tests using part-time working students at the graduate and advanced undergraduate level at a major university in the southeastern United States. Refined items were also reviewed by colleagues. The results of the pilot tests were used to corroborate the clarity of instructions, appropriateness of terminology and item-wording, and response formats and scales.

### Measures

We operationalized the key variables in our conceptual framework using multi-item reflective scales. Appendix A contains a description of the specific items for each scale. All items were measured based on a seven-point Likert scale ranging from (1) "Strongly Disagree" to (7) "Strongly Agree." Team size was specified as controls. Appendix B provides some background on the characteristics of team-level constructs included in this study.

**Performance**. Performance was measured using two subjective items that asked about perceived performance impacts of the information system. This approach is appropriate in this study because objective measures of individual performance were not available across organizations and the measures also would not be comparable across teams and organizations with different tasks and organizational characteristics.

**System Usage**. System usage can be best measured by calculating actual use through examining system logs or recording the connection time. However, this approach was not uniformly applicable across different organizations in this field study. Thus, we adopted a perceived measure of usage by asking individuals about their frequency and extent of system use. We refined two items developed by Hartwick and Barki [12].

**Task-Technology Fit**. After synthesizing various dimensions suggested by Goodhue and his colleague, we included the following 10 dimensions in this study: currency, right data, right level of detail, accuracy, compatibility, meaning, locatability, presentation, authorization, and training. Four dimensions (right data, accuracy, presentation, and training) were dropped during the measurement purification process.

**AST.** FOA and COA were selected as the key dimensions of social construction from AST. We refined measures developed by Chin et al. [4] for FOA and by Salisbury et al. [20] for COA. FOA is conceptualized as individual-level constructs, whereas COA is identified as a shared team-level construct. FOA scales are focused on the subjective spirit encountered by the individual rather than an objective reality, and can be best measured at the individual level [4]. This allows us to meet the requirement of the employed analytical tool hierarchical liner modeling (HLM) demanding researchers to specify the criterion at the lowest level [3]. Appendix B provides a brief background on the characteristics of team-level constructs.

## Results

The research model was tested using regression and hierarchical liner modeling. HLM 6.0 was used for multilevel analysis. Regression was selected in preference to structural equation modeling because HLM is a multilevel regression technique.

### Measurement Model

Collected measures were validated using SPSS 13 and LISREL 8. The measures were validated using confirmatory factor analysis. First, the results suggested that the measurement model provided a good fit for the data.

The fit indices exceeded the levels suggested by Hu and Bentler [14] ($\chi^2$ = 585.42, $df$ = 386, root mean square error of approximation [RMSEA] = 0.04, comparative fit index [CFI] = 0.98, and standardized root mean square residual [SRMR] = 0.044). Second, we calculated the reliability of the measures. Composite reliability and average variance extracted for each construct were calculated according to the procedure outlined in the literature. Composite reliability and average variance extracted for each construct all exceeded a minimum of 0.70 and 0.5, respectively. The parameter estimates and their associated t-values were all significant. Cronbach's alpha for each of the measures was above the suggested value of 0.70.

Finally, we investigated discriminant validity via two tests. We compared average variance extracted for each construct with the shared variance between all possible pairs of constructs. Average variance extracted for each construct was higher than the squared correlation between the construct fairs. We also established discriminant validity by assessing pairs of constructs in a series of two-factor confirmatory models. We freely estimated the correlation between the constructs, and then constrained the correlation to unity. We conducted $\chi^2$ different tests for the constrained and unconstrained models. For each investigated model, the $\chi^2$ values for the unconstrained models were significantly lower than the $\chi^2$ values for the constrained models. Overall, the self-report measurement instruments exhibited sufficiently strong psychometric properties to support valid testing of the proposed research model.

**Hierarchical Linear Models**

We employed HLM to test the cross-level models (H1 and H2), and employed OLS regression to test the individual-level model (H3) (see Table 1). The testing of H1 and H2 was conducted using the following cross-level equations. The equations are expressed in mixed models consisting of fixed effects (the γs) and random effects ($u$ and $r$). Table 2-4 present model estimation results.

Table 1. Summary of Hypothesis Tests

| Hypothesis | Sample size | Variables | Level of analysis | Statistical technique |
|---|---|---|---|---|
| 1 | 43 groups<br>317 people | DV: FOA<br>$IV_1$: TTF<br>$IV_2$: COA | Cross-level | HLM |
| 2 | 43 groups<br>317 people | DV: Usage<br>$IV_1$: TTF<br>$IV_2$: COA | Cross-level | HLM |
| 3 | 317 people | DV: Performance<br>IV: Usage, TTF<br>Moderator: FOA | Individual | Regression |

Note: $IV_1$ = Level 1 variable; $IV_2$ = Level 2 variable. TTF variables: Currency, Right Level, Compatibility, Meaning, Locatability, and Authority.

*Mixed model for H1:*

$$FOA_{ij} = \gamma_{00} + \gamma_{01}*COA_j + \gamma_{10}*Currency_{ij} + \gamma_{20}*RightLevel_{ij} + \gamma_{30}*Compatibility_{ij} + \gamma_{40}*Meaning_{ij} + \gamma_{50}*Locatability_{ij} + \gamma_{60}*Authority_{ij} + u_{0j} + u_{1j}*Currency_{ij} + u_{2j}*RightLevel_{ij} + u_{3j}*Compatibility_{ij} + u_{4j}*Meaning_{ij} + u_{5j}*Locatability_{ij} + u_{6j}*Authority_{ij} + r_{ij}$$

*Mixed model for H2:*

$$Usage_{ij} = \gamma_{00} + \gamma_{01}*COA_j + \gamma_{10}*Currency_{ij} + \gamma_{20}*RightLevel_{ij} + \gamma_{30}*Compatibility_{ij} + \gamma_{40}*Meaning_{ij} + \gamma_{50}*Locatability_{ij} + \gamma_{60}*Authority_{ij} + u_{0j} + u_{1j}*Currency_{ij} + u_{2j}*RightLevel_{ij} + u_{3j}*Compatibility_{ij} + u_{4j}*Meaning_{ij} + u_{5j}*Locatability_{ij} + u_{6j}*Authority_{ij} + r_{ij}$$

Table 2. Results for H1 using Hierarchical Linear Modeling

| | FOA | |
|---|---|---|
| Intercept ($\gamma_{00}$) | 3.34 | (2.47) |
| COA ($\gamma_{01}$) | 0.26** | (0.13) |
| TTF | | |
| Currency ($\gamma_{10}$) | 0.04 | (0.09) |
| Right Level ($\gamma_{20}$) | 0.36** | (0.13) |
| Compatibility ($\gamma_{30}$) | 0.66** | (0.08) |
| Meaning ($\gamma_{40}$) | -0.03 | (0.12) |
| Locatability ($\gamma_{50}$) | 0.03 | (0.10) |
| Authority ($\gamma_{60}$) | 0.31** | (0.08) |
| Deviance | 1642.359 | |

Note: Standardized coefficients (standard errors) are shown. One-tailed tests.
+ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$.

Table 3. Results for H2 using Hierarchical Linear Modeling

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| Intercept ($\gamma_{00}$) | 9.49** | (0.60) | 3.86** | (1.40) | 3.01** | (1.34) |
| COA ($\gamma_{01}$) | | | 0.30** | (0.06) | 0.31** | (0.06) |
| Team Size ($\gamma_{02}$) | | | | | 0.09** | (0.03) |
| TTF | | | | | | |
| Currency ($\gamma_{10}$) | 0.15** | (0.07) | 0.12* | (0.07) | 0.11* | (0.07) |
| Right Level ($\gamma_{20}$) | 0.15** | (0.06) | 0.14** | (0.06) | 0.14** | (0.06) |
| Compatibility ($\gamma_{30}$) | 0.02 | (0.03) | 0.04 | (0.03) | 0.04 | (0.03) |
| Meaning ($\gamma_{40}$) | 0.01 | (0.06) | 0.00 | (0.06) | 0.01 | (0.06) |
| Locatability ($\gamma_{50}$) | -0.06 | (0.04) | -0.05 | (0.04) | -0.05 | (0.04) |
| Authority ($\gamma_{60}$) | 0.01 | (0.04) | 0.01 | (0.03) | 0.00 | (0.03) |
| Deviance | 1212.952 | | 1204.160 | | 1206.903 | |
| Deviance difference | | | 8.792** | | 6.049* | |
| Parameters | 22 | | 23 | | 24 | |

Note: Standardized coefficients (standard errors) are shown. One-tailed tests.
+ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$.

H1 suggested that individuals' FOA would vary depending on fit and COA. We tested the hypothesis by examining a hierarchical linear model that has FOA as the criterion. Strong support would demand that at least some variables of fit and COA be a significant predictor. The results suggest that right level, compatibility, and authority have positive effects on FOA (see Table 2). At the group level, COA has a positive effect on FOA. The proportion of variance explained by this level-1 model is 0.395, respectively. Overall, the effects provide support for H1.

H2 predicted that COA at the group level would have additional explanatory power to predict individuals' use of technology beyond that explained by fit alone. This can be examined by comparing the two models with or without COA. Model comparison in hierarchical linear modeling can be conducted by examining the difference of the deviances from each model, which is distributed as a chi-square statistic with degrees of freedom equal to the difference in the number of parameters estimated in each model [19]. The results in Table 3 shows that the deviance is significant (1212.952 - 1204.160 = 8.792, $df$ = 1, $p$ < 0.01). This suggests that Model 2 with COA provides a better fit to the data than does Model 1. The proportion of variance explained by Model 2 beyond Model 1 at level 2 is

0.344. Model 3, which controls for team size, also exhibits a better fit to the data than Model 1. Thus, the effects provide support for H2.

H3 suggested that individuals' FOA will have additional explanatory power in predicting perceived performance impacts beyond that from fit and usage. The result shows a non-significant effect of FOA, not supporting H3.

Table 4. Results for H3 using Regression

| | Model 4 | |
|---|---|---|
| Usage | 0.39** | (0.05) |
| FOA | 0.02 | (0.03) |
| | | |
| TTF | | |
| 1. Currency | 0.19** | (0.05) |
| 2. Right Level | -0.03 | (0.06) |
| 3. Compatibility | -0.03 | (0.04) |
| 4. Meaning | 0.15** | (0.05) |
| 5. Locatability | 0.12 | (0.05) |
| 6. Authority | -0.07 | (0.03) |
| | | |
| Main effects | | |
| FOA | 0.02 | (0.03) |
| | | |
| *Adjusted $R^2$* | 0.323 | |

Note: Standardized coefficients (standard errors) are shown. One-tailed tests.
+ $p < 0.10$. * $p < 0.05$. ** $p < 0.01$.

## Discussion

We proposed an initial attempt to fill an important gap in the TTF literature by expanding our view of social influence on system usage and performance and by exploring some of its effects using systematic quantitative data.

### Implications

One of this study's important contributions is an integrated explanation of the impacts of social construction on individual behaviors in the ICT context. Drawing on the advancements in AST, we systematically applied key constructs of AST on an integrated framework of TTF and AST. On one hand, we confirm the importance of social construction by empirically examining the effects of FOA and COA on system usage and performance. On the other hand, our empirical results challenge the effect of FOA on performance.

From testing H1, we found that the appropriation of structures (i.e., FOA) is determined by TTF as well as a group's internal system (i.e., COA). The results show that the TTF (e.g., right level, compatibility, and authority) has positive effects on the appropriation of structures. This implies that appropriation is affected by the set of salient beliefs about fit. DeSanctis and Poole [6] did not take the effects of individuals' beliefs on appropriation into account. However, in the non-GSS context, it is important to note that individuals are also affected by their own beliefs for their decisions about appropriation. Overall, the results extend the thinking of AST into the realm of individual level beliefs in the non-GSS context.

The results also show the positive effect of the group's internal system on appropriations. This implies that achieving consensus at the group level is important for proper appropriation at the individual level. The influence of COA on appropriations is likely to occur through internalization and compliance [16]. Internalization regards "individuals' private acceptance of group messages and the incorporation of group meanings and attitudes into their own constructions of reality" while compliance regards "individual behavior that conforms to perceived group pressures" [7, 924]. COA is conducive to internalization and compliance, which will produce convergence of interpretations, attitudes, meanings, and behaviors between an individual and a group. Since COA entails proper appropriation of structures, individuals will subscribe to this agreement on appropriation via internalization and compliance.

The results of H2 showed that COA at the group level has additional explanatory power in predicting individuals' use of technology beyond that explained by fit. This finding augments previous work that focused only on fit to explain the usage behavior of individuals. Our result supports the importance of COA on fostering extended use of the technology. The literature shows that the effects of social influence can vary with the volitional versus non-volitional nature of technology use and with the stage of a system adoption [1]. Our results do not explain whether the effects of COA will vary with these contingencies, warranting further research.

The results of H3 showed that FOA does not provide additional explanatory power in predicting individual performance beyond that from fit and usage. It is notable that FOA does not generate any effect on performance. Our model uses two constructs to measure utilization of systems: FOA and system usage. FOA reflects the evaluation of the appropriateness of usage, and can be considered a type of *quality* of usage. System usage measures frequency and extent of usage, that is, *quantity* of usage. The results in Table 4 show the strong positive effects of system usage on individual performance. Such results confirm one critical assumption found in technology adoption research that suggests that performance benefits derived from technologies are maximized by fostering the extended use of technology. Our results strongly endorse this assumption to encourage people to use more technology.

## Conclusion

In this study, we attempted to develop a richer theoretical model that incorporates individuals as social actors. We took social construction phenomena to provide more explanatory power on the TTF model. We found that appropriations (FOA) vary depending on fit and COA. COA brought additional explanatory power in predicting individuals' use of technology beyond that explained by fit. Appropriations played a marginal role in enhancing individual performance further beyond fit and system usage. Overall, our model augments the TTF with the social construction for behaviors that arise from forces well beyond tasks, technology, and individuals.

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