

# Development and Validation of Scales to Measure the Strategic Potential of IT-Enabled Resources: A Resource-Based Approach

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## Abstract

*This paper describes the development of reliable and valid scales for assessing the strategic potential of IT-enabled resources. Following to the resource-based view of the firm (RBV), the strategic potential of organizational resources may be assessed by four resource attributes – value, rarity, inimitability, and non-substitutability. The RBV contends that these four attributes provide a link between organizational resources and performance, at the level of the firm. While resource attributes are a central and critical element of resource-based logic, they have not been systematically operationalized. This paper presents a set of measures with satisfactory psychometric properties that can be adapted by researchers and managers to assess the strategic potential of multiple types of IT-enabled resources. The measures are tested using survey data from 150 customer service managers who recently implemented an information technology. The attribute measures were able to explain 54% of the variance in firm performance.*

## 1. Introduction

For some time, the resource-based view of the firm (RBV) has been an influential theory in strategic management and related fields. The IS community has adopted this theory as a lens with which to study the business value of IT [for broad reviews of the RBV in IS research see 1, 2, 3]. The RBV is popular for a number of reasons, including that: (1) it is based on a small number of intuitively appealing concepts and rules, (2) it resonates well with researchers who recognize that markets are seldom efficient or perfectly competitive, (3) it can be used to study phenomena at multiple levels of analysis (i.e. department, organization, industry), and (4) it has been largely supported by empirical analysis.

Despite a large literature employing RBV logic, there is a great deal of inconsistency regarding the empirical representation of resource attributes, commonly considered to be *value*, *rarity*, *inimitability*, and *non-substitutability* [4, 5, 6, 7]. Priem and Butler [8] argued that this deficiency was a major

shortcoming of the theory. They further pointed out that without a valid, measurable and falsifiable path from resources to organizational benefits, the usefulness of the theory was severely limited. Resource attributes are important since the value of the RBV rests on its ability to differentiate between resources that have the potential to become strategic and those that do not. Further, because strategies are based on collections of resources, some of which may go up while others go down, it may not be possible to identify a particular resource's strategic potential by observing aggregate measures [9, 10]. Hence, it is useful to develop mechanisms for studying the strategic impact of individual resource attributes.

To the best of our knowledge, *there are no commonly-accepted reliable and valid multi-item scales to measure value, rarity, inimitability, and non-substitutability within the context of the RBV.* Most studies using the RBV either ignore resource attributes altogether, or provide cursory logical arguments for or against certain attributes [11]. In the absence of proper measures, researchers are constrained in their ability to theorize about the strategic potential of organizational resources. They are, for example, unable to compare and contrast the relative strategic contribution of each attribute, or know whether a resource needs to have 'all' the identified attributes, or if one or two will suffice (and if so, which ones).

These deficiencies have restricted IS research on the business value of IT by forcing researchers to employ in their models organizational resources that are assumed to be strategic, rather than empirically measure their strategic potential [e.g., 9]. Motivated by these shortcomings of the RBV, this paper describes a process of resource-attribute scale development and validation with a view to enhancing the consistency, comparability, validity, and reproducibility of IS research employing the RBV.

## 2. The Strategic Potential of Organizational Resources

According to the RBV, resource attributes form a resource's strategic potential. *Value* refers to a resource's ability to "[e]xploit opportunities, and/or

neutralize threats in a firm's environment" [4: pg. 105]. *Rarity* is a measure of a resource's relative availability to "[a] firm's current and potential competition" [4: pg. 105]. *Inimitability* is a reflection of the costs and difficulties associated with attempts to duplicate a resource. These difficulties are the result of the "[u]nique historical conditions" associated with obtaining the resource, the "[c]ausally ambiguous" link between the resource and competitive advantage, and the "[s]ocially complex" nature of the resource [4: pg. 107]. *Non-substitutability* is an attribute that evaluates the lack of "[s]trategically equivalent substitutes for this resource" [4: pg. 106].

*Value* and *rarity* are necessary and sufficient conditions for the attainment of competitive advantage, whereas *inimitability* and *non-substitutability* are required for the sustainability of that advantage [7]. Consequently, a valuable, rare, inimitable, and non-substitutable organizational resource has the potential to become strategic and, in turn, enable a firm to accrue performance benefits over an extended period of time.

### 3. IT-Enabled Customer Service Departments

Many information technologies are mass produced, available from multiple providers, and easily duplicated. Further, any intellectual property rights, such as patents or copyrights, that may be attributed to them can be circumvented with relative ease. Therefore, it is not surprising that, in and of themselves, information technologies are generally not considered to be strategic [12, 13].

IS researchers have observed that information technologies are often implemented at the resource level and are combined with organizational resources, such as departments, teams, or groups. The motivation for such implementations is to enhance these organizational resources' capabilities [14, 15, 16]. In the context of this study, we term the outcomes of such implementations as *IT-enabled resources*.

This study argues that although information technologies are not strategic *per se*, they may still play a strategic role in business environments since they participate in the formation of potentially strategic IT-enabled resources. Thus, to the extent that the IT-enabled resource is more valuable and rare, and less imitable and substitutable compared with the non-IT enabled organizational resource, it follows that the information technology has increased the resource's strategic potential.

The organizational resource studied in this paper is the *customer service department (CSD)*. The customer service process – handled by the CSD – is an important resource to most organizations [12]. Treating the CSD

as an organizational resource is consistent with [3]. Equally important is the fact that customer service employees use a variety of IT assets such as intranets, personal computers, incident management solutions, collaboration technologies, and CRM systems, with varying results [12].

Consequently, the focal IT-enabled resource is an IT-enabled CSD – i.e., the result of implementing an information technology that members of the CSD use.

The literature provides numerous anecdotal examples of the transforming power of IT in the context of customer service. For example Jelassi and Figon [17] described a case where a firm implemented several information technologies to allow customers better access to delivery, invoice, inventory, pricing, and payment information, thus employing superior IT-enabled customer service to differentiate itself from its rivals. In another case, Hughes and Morton [18] describe an IT implementation project that enabled customer service employees to accommodate customer requests for changes in pickup or delivery times and locations. Building on the intrinsic characteristics of IT, the high reliability of the service increased the satisfaction of both customers and employees.

Further examples of the transforming power of IT, as it pertains to customer service, are provided by El Sawy and Bowles [19] and Clemons and Row [20]. Both cases demonstrate how IT can be used to enhance customer service and improve customer satisfaction. By enabling faster, cost-effective, accurate, and consistent problem resolutions, the IT implemented in the first case enhanced the satisfaction of the customer service employees and enabled a higher quality of service delivery. By making it possible for customer service specialists to focus on high-value consulting services, instead of labor-intensive, low-value tasks, the IT implemented in the second case increased the differentiating impact of the CSD.

To better see how a particular resource attribute is affected by an IT solution, note that the customer service department described in the second case had the potential to become a rare resource, but because it was busy with low-cost, labor-intensive tasks it could not reach its full potential [21].

In all four cases, the authors concluded that following the IT-based customer service transformation, the organizations enjoyed a competitive advantage over their rivals or were able to strategically differentiate themselves.

Despite these examples, little is known about the mechanisms through which IT-enabled customer service helps firms to achieve financial and non-financial outcomes [13, 22]. Accordingly, this study is motivated by the observed lack of empirical evidence linking IT-enabled customer service and organizational performance.

Based on the foregoing discussion, we propose to study the main attributes of organizational resources, as they are conceptualized by the RBV, in the context of IT-enabled customer service.

#### 4. Instrument Development Methodology

This paper employed perceptual measures to assess resource attributes. While it may be possible to objectively measure firm performance, it is infeasible to objectively assess the presence or quantify the strength of resource attributes. Objective measures rarely exist at the resource level [23]. It would be hard to imagine, for example, an objective measure for the rarity of a resource, or for the presence or absence of substitutes. The strategic potential of a resource can most accurately be assessed by the managers who control and use that resource [24]. Thus, shortcomings of perceptual measures apply in this research.

The scales described in this article were developed using a multi-phase process of validation and refinement, as recommended by Straub [25]. These phases included an extensive search of the literature, discussions with academic and non-academic experts, two rounds of card sorting, pre-testing with members of the sampling frame, a pilot test, and a confirmatory test using a complete dataset.

##### 4.1 Phase 1: Literature Review

The first step in the scale development process was to survey the extant literature for validated scales that could be used in the analysis. While we could find no research that developed or employed valid and reliable multi-dimensional scales for resource attributes, a large amount of work defined and used attributes in an ad hoc or anecdotal manner. We drew on this research to develop the foundation of our scale measures. Some items were reverse-coded to reduce common method bias [26].

##### 4.2 Phase 2: Researcher Panel

A panel of researchers familiar with information systems and the resource-based view evaluated the list of items. Based on the comments they provided, items were added, deleted, and modified to improve content and face validity [27]. Several scholars from the Marketing area who specialize in consumer research were contacted and asked to comment on the relevance of the items to customer service professionals. It was deemed critical to receive feedback from these experts since the intended informants were individuals with close links to customer service. The experts offered some useful comments and minor modifications to the items were made accordingly.

##### 4.3 Phase 3: Card Sorting

The revised item list was subjected to a two-stage card-sorting exercise [28]. The *first stage* consisted of three rounds. In each round, a group of Ph.D. students from different business administration specializations was asked to sort cards into piles based on similarities and differences among the items. The students were also asked to label each pile and voice any concerns they might have regarding cross-loadings, ambiguities, and wordiness. Items that were too difficult to understand, too specific, or that fitted more than one construct were dropped after each round.

In the *second stage*, the remaining items were subjected to two more rounds of card sorting. In each round, four different professors, separate from the research team, grouped the items and placed them near appropriate labels. The labels reflected the theoretical constructs as well as the findings from the first stage of the exercise. Following this stage, several additional items were removed and others were rephrased. Light's Kappa was used to calculate inter-rater agreement among judges in the final round. The test statistic was 0.713, which was greater than the recommended minimum score of 0.65 [29].

##### 4.4 Phase 4: Pre-Test with Members of the Sampling Frame

The survey instrument was then sent to five senior customer service managers. These informants commended the survey on its usefulness and relevance to the customer service environment. They provided some feedback on individual items and as a result additional minor changes were made to the items.

**Table 1. Questionnaire Items<sup>a</sup>**

	Item	Mean (SD)
Value	<b>Value1:</b> The [IT-enabled CSD] is useful to your organization.	5.38 (1.28)
	<b>Value2:</b> The [IT-enabled CSD] is important to your organization.	4.91 (1.51)
	<b>Value3:</b> The [IT-enabled CSD] receives extensive resources from the organization.	4.54 (1.56)
	<b>Value4:</b> The [IT-enabled CSD] is valuable to your organization.	5.01 (1.50)
Rarity	<b>Rarity1:</b> Few of your organization's competitors have the [IT-enabled CSD].	4.00 (1.51)
	<b>Rarity2:</b> The [IT-enabled CSD] is unique in comparison your competitors.	4.25 (1.62)
	<b>Rarity3:</b> It is common to find similar [IT-enabled CSDs] among your competitors [reverse coded].	3.71 (1.43)
	<b>Rarity4:</b> It is unlikely for a competitor to have a similar [IT-enabled CSD].	3.88 (1.50)

Inimitability	<b>Inimitability1:</b> Your competitors do not understand the [IT-enabled CSD].	4.25 (1.42)
	<b>Inimitability2:</b> Your competition can imitate the [IT-enabled CSD]. (reverse coded)	3.86 (1.57)
	<b>Inimitability3:</b> Few of your competitors can match the [IT-enabled CSD].	4.02 (1.48)
	<b>Inimitability4:</b> The [IT-enabled CSD] cannot be easily replicated by your competition.	3.79 (1.46)
Non-Substitutability	<b>Non-Substitutability1:</b> Your organization could achieve the same level of [output of the IT-enabled CSD] it enjoys today through fully outsourcing the [IT-enabled CSD]. (reverse coded)	5.69 (1.61)
	<b>Non-Substitutability2:</b> Your organization could replace the [IT-enabled CSD] with a self-service automated solution without a drop in [output of the IT-enabled CSD]. (reverse coded)	6.01 (1.41)
Organizational Performance	<b>Performance1:</b> The [IT-enabled CSD] has a positive effect on your organization's performance.	5.41 (1.19)
	<b>Performance2:</b> The [IT-enabled CSD] provides your organization with a competitive advantage.	5.26 (1.31)
	<b>Performance3:</b> The [IT-enabled CSD] helps your organization to increase revenues.	4.93 (1.33)
	<b>Performance4:</b> The [IT-enabled CSD] helps your organization to reduce costs.	5.09 (1.39)
	<b>Performance5:</b> The [IT-enabled CSD] helps your organization to exploit business opportunities.	4.62 (1.53)
	<b>Performance6:</b> The [IT-enabled CSD] enables your organization to respond more quickly to change.	5.09 (1.41)

a. Seven-point Likert-type scale anchored by 1 = Strongly Disagree and 7 = Strongly Agree

#### 4.5 Phase 5: Pilot Test

A cover letter that included an informed consent form and selection criteria to ensure the eligibility of the respondents, was attached to the list of questions. The cover letter also included the logos of the researchers' University and of the International Customer Service Association (ICSA), the sponsoring organization. 134 randomly drawn ICSA members were mailed a package containing the item questions and an addressed, stamped return envelope. After an initial round and a follow-up mailing, 23 questionnaires were returned completed. We analyzed the completed responses and made small modifications to the scale items based on our analysis. Table 1 presents the final list of items used in the scales along with item means

and standard deviations. The final instrument consisted of 4 items to measure the value attribute, 4 items to measure rarity, 4 items to measure inimitability, and 2 items to measure non-substitutability<sup>1</sup>. A further 6 items were developed to measure firm performance. Overall, the results indicated that the survey instrument was a useful tool for collecting data that could be used for validating the measurement items. Data collected during the pilot study were not used in subsequent stages.

#### 5. Data and Sample

The data collection methodology followed guidelines set forth by [37] and [38]. Data were collected over three rounds. The first two rounds – four weeks apart – included mailing an envelope with a questionnaire, an addressed stamped return envelope, a small gift, and a cover letter [39]. The cover letter detailed the rights of the respondents, the measures taken to assure their anonymity and the data storage and disposal processes. Each intended respondent was also entered into a draw to win a prize valued at \$500, and was offered a summary of the results. In the third round, executed four weeks after the second round, the remaining non-respondents were contacted by e-mail and presented with a Web-based version of the questionnaire.

For this research, we adopted a key informant approach [33]. Key informants are often used to collect information on organizational and departmental factors, especially in the context of the RBV [e.g., 9, 34]. In this study, customer service managers and other executives who oversee the customer service function were considered adequate key informants. One concern with the key informant approach is the possible presence of a method bias, an issue associated with a single individual reporting measures on behalf of his or her organization or department. Following Powell and Dent-Micallef [35], we addressed this concern by comparing the average score for the Organizational Performance scale with an objective measure of firm performance – Return on Capital. Specifically, the Pearson correlation coefficient was 0.45 ( $p < 0.01$ ) suggesting that key informants in our study did not systematically err in their responses.

Overall, customer service professionals in 635 organizations were contacted. Of these, 126 questionnaires were undelivered, and 168 completed questionnaires were returned, generating a response

<sup>1</sup> Respondents had some difficulty making a distinction between resource rarity and inimitability throughout the scale development process. This difficulty may represent an operational limitation of the resource-based view. Future research should attempt to expand the non-substitutability scale beyond 2 items.

rate of 33%. Eighteen questionnaires were removed due to missing values resulting in a usable dataset of 150 records.

### 5.1 Firm and Respondents Demographics

A number of demographic and control questions were included in the instrument. These questions concerned both the focal firm, such as the number of employees, core business, industry, sales; as well as the respondent, such as title, responsibilities, and tenure. The median organization size was 450 employees, and the median sales figure was \$400 million. 87.6% of the respondents were in a managerial position, with an additional 8.8% in a supervisory role. Informants had been with their organizations, on average, for more than 12 years and more than 6 years in their current positions. Two control variables were created. The natural log of the number of employees was used as a proxy for firm size, and a categorical variable was created to control for industry sector.

### 5.2 Assessment of Non-Response Bias

Two tests were conducted to account for the possibility of non-response bias. We compared early respondents (“first wave”) with late respondents (“second wave”) on several respondent and firm demographic measures. A one-way ANOVA test found no significant differences between the two respondent groups [36]. In addition, we compared the demographic characteristics of respondents with non-respondents (this information was provided by the sponsoring organization) and found no significant differences between the two groups.

## 6. Empirical Results

### 6.1 Measurement Model

Assessment of the psychometric properties of the scales was conducted first via an exploratory factor analysis (EFA) using SPSS. The EFA demonstrated that each of the items had higher loadings on its respective scale than on other scales. One item (inimitability2) did not meet the minimum criteria for an exploratory analysis and was dropped at this stage. The results of the EFA are presented in Table 2.

The second stage of the instrument validation process was carried out by observing the statistics associated with the measurement model, following a confirmatory factor analysis. For purposes of triangulation, two structural equation modeling approaches were adopted to assess the measurement model, one component-based (Partial Least Squares represented by Visual PLS), and one covariance-based (AMOS 6). Both approaches provided support for the adequacy of the model. The covariance analysis

provided the following goodness-of-fit measures, CFI = 0.944, NNFI = 0.924, and RMSEA = 0.056, that suggest a good fit between the data and the model. The component analysis provided evidence of satisfactory psychometric properties as shown in Table 3.

**Table 2. Exploratory Factor Analysis**

	Component			
	1	2	3	4
Value1	<b>0.83</b>	0.10	-0.06	0.17
Value2	<b>0.93</b>	0.01	0.00	-0.01
Value3	<b>0.61</b>	0.00	0.29	-0.16
Value4	<b>0.91</b>	0.02	0.08	-0.02
Rarity1	0.03	<b>0.83</b>	0.07	-0.13
Rarity2	0.36	<b>0.65</b>	0.31	-0.13
Rarity3	-0.12	<b>0.73</b>	0.16	0.10
Rarity4	0.08	<b>0.70</b>	0.31	-0.08
Inimitability1	-0.02	0.41	<b>0.50</b>	0.15
Inimitability3	0.17	0.38	<b>0.77</b>	0.03
Inimitability4	0.05	0.15	<b>0.86</b>	-0.12
NonSubstitutability1	0.00	-0.03	0.01	<b>0.86</b>
NonSubstitutability2	0.00	-0.07	-0.03	<b>0.86</b>

**Table 3. Measurement Model**

Scale Items	Value (0.90)*	Rarity (0.82)	Inimitability (0.80)	Non-Substitutability (0.89)	Performance (0.93)
V1	<b>0.83</b>	0.24	0.21	0.24	0.58
V2	<b>0.91</b>	0.13	0.12	0.12	0.52
V3	<b>0.66</b>	0.23	0.15	-0.07	0.43
V4	<b>0.91</b>	0.20	0.17	0.11	0.60
R1	0.07	<b>0.82</b>	0.59	-0.14	0.05
R2	0.30	<b>0.96</b>	0.63	-0.11	0.20
R3	0.08	<b>0.81</b>	0.61	-0.09	0.03
R4	0.15	<b>0.84</b>	0.57	-0.15	0.07
I1	0.07	0.46	<b>0.79</b>	0.06	0.21
I3	0.25	0.63	<b>0.94</b>	-0.02	0.25
I4	0.15	0.66	<b>0.84</b>	-0.13	0.14
NS1	0.08	-0.12	-0.04	<b>0.84</b>	0.18
NS2	0.14	-0.12	-0.02	<b>0.94</b>	0.34
P1	0.59	0.05	0.15	0.34	<b>0.85</b>
P2	0.60	0.15	0.22	0.35	<b>0.88</b>
P3	0.50	0.04	0.11	0.19	<b>0.76</b>
P4	0.53	0.07	0.17	0.23	<b>0.82</b>
P5	0.30	0.25	0.28	0.05	<b>0.60</b>
P6	0.43	0.17	0.23	0.22	<b>0.71</b>

\* The numbers in the brackets are the scales' composite reliabilities.

### 6.2 Construct Reliability

Composite reliability scores (Table 3) were used as an indication of the construct’s reliability [30]. All scales met the 0.70 cut-off, as suggested by Straub [18]. In addition, the average variance extracted (the squared values of the diagonal elements in Table 4) was larger than 0.50 for each of the constructs, indicating adequate scale reliability [26].

### 6.3 Convergent Validity

Convergent validity considers the degree to which constructs that should be related, are in fact related. Hence, high levels of convergent validity indicate that the items reflect the same latent variable. Composite reliability scores (Table 3) were used as an indication of convergent validity [30]. All scales met the 0.70 cut-off, as suggested by Fornell and Larcker [31]. Convergent validity can be further assessed by observing the square root of the average variance extracted (diagonal elements in Table 4). All the scales met the minimum level of 0.70 suggested by Fornell and Larcker [31].

**Table 4. Construct Correlations**

Construct (# Items)	Resource’s Value	Resource’s Rarity	Resource’s Inimitability	Resource’s Non-Substitutability
Value (4)	<b>0.84</b>			
Rarity (4)	0.29	<b>0.74</b>		
Inimitability (3)	0.26	0.64	<b>0.76</b>	
Non-Substitutability (2)	0.16	-0.08	-0.3	<b>0.87</b>

### 6.4 Discriminant Validity

Discriminant validity indicates that the items measure only the construct for which they were created and not other constructs [32]. Evidence of discriminant validity is obtained when the square root of the average variance shared among a construct’s measures (diagonal elements in Table 4) is larger than the correlations between the construct and other constructs (off-diagonal elements in Table 4). All scales met this criterion [31].

Another way to assess discriminant validity is by observing the difference between the loadings and the cross-loadings. An acceptable difference is 0.10 [40]. None of the differences in our study is lower than this cutoff (Table 3).

Based on these tests, it can be concluded that the scales exhibit satisfactory reliability and validity. The

next step in the instrument development process was to examine the nomological validity of the scales.

### 6.5 Structural Model

A bootstrapping procedure was used to assess the significance of the path coefficients. This procedure is standard when simultaneously assessing the significance of multiple path coefficients within a structural model [41]. The results of the component analysis are presented in Figure 1. As theorized by the RBV, the *value*, *inimitability*, and *non-substitutability* attributes were found to have positive (0.582, 0.249, 0.188, respectively) and significant impacts on *organizational performance*. Covariance analysis yielded consistent path coefficients (0.69, 0.36, and 0.19, respectively). A third test, using ordinary least squares (OLS) regression provided an additional set of estimates (0.542, 0.183, and 0.133, respectively) that further supported the usefulness of the model.

### 6.6 Predictive Power

The predictive power of the model can be assessed by observing the percentage of variance in the dependent variable attributed to the explanatory variables (i.e.,  $R^2$ ). The results of the component analysis indicated that 54% of the variance in the *organizational performance* scale was explained by the resource’s attributes. The covariance-based squared multiple correlation measure (67%) and the OLS-based  $R^2$  (51%) also supported the predictive power of the model.

## 7. Discussion and Conclusions

This study has demonstrated that information technologies can play a strategic role in a business environment when they are combined with organizational resources such as departments, teams, or groups with the intention of producing IT-enabled resources. This finding provides evidence that can help to establish the elusive business value of IT.

To the best of our knowledge, this study is the first successful attempt to systematically operationalize the RBV by developing and validating multi-item scales to measure the four attributes of organizational resources<sup>2</sup>.

<sup>2</sup> A recently published paper measured scales for resource attributes in the context of international joint ventures [42]. However, our ability to assess the instrument’s validity and reliability is limited by the extensive use of single-item scales.

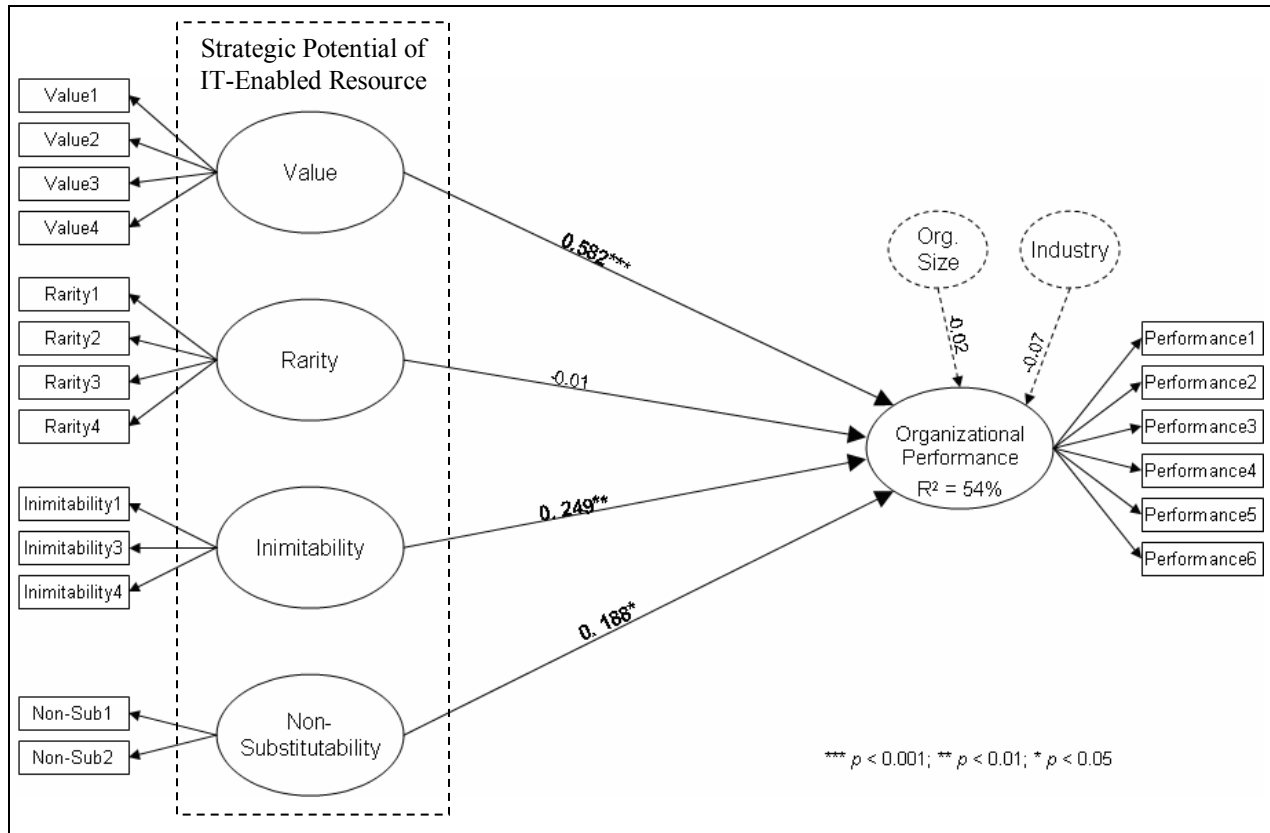


Figure 1. Empirical Model

This study attempts to provide a consistent empirical representation of the RBV by measuring the effect of these attributes – *value*, *rarity*, *inimitability*, and *non-substitutability* – on organizational performance. The results provide empirical support for the RBV and psychometric validation of the proposed measurement scales.

Three attributes of organizational resources – *value*, *inimitability*, and *non-substitutability* – were found to have a significant and positive effect on organizational performance, as confirmed by three different statistical analysis methods. Of these three attributes, value was the most substantial (and significant), contributing just over half of the model’s explanatory power. These results suggest that in the face of financial or organizational constraints, managers should choose a resource with the highest value, over other attributes. The second most important resource attribute was inimitability, followed by non-substitutability.

Interestingly, the *rarity* attribute was not significantly linked to organizational performance. *Rarity* reflects the current unavailability of a resource to competitors. However, rarity is only strategically important if it can be maintained over time, i.e. as long as it can be sustained. Sustained rarity is logically equivalent to inimitability, as noted by [7]. Thus, these

two concepts, rarity and inimitability, may have been confounded in the minds of informants, as evidenced by the relatively high correlation between the constructs (0.64, see Table 4). Informants indicated that it is more important for a resource to remain inimitable over time, than to be rare in the present.

The close relationship between rarity and inimitability is perhaps a shortcoming of the RBV when it comes to empirical assessment and measurement. This confound should be explored in future research. Alternatively, since this study focused on commonly-available information technologies, it is possible that the respondents in the sample attributed more importance to IT implementations that were likely to remain unique even after the competition had learned about them and attempted to duplicate them. The results may have been different had the information technologies examined in the paper been protected by strong isolating mechanisms such as intellectual property rights [43].

The results of the analysis can be used to answer the question raised at the beginning of this article – does a resource need to have some or all of the identified attributes? It would appear that three out of the four attributes – value, inimitability, and non-substitutability – are required, while rarity plays a secondary role.

## 7.1 Contribution to Research

This article makes several contributions to the literature. First, it develops and validates scales for measuring the key attributes of organizational resources, thus establishing an empirical link between resources and organizational performance. These scales are designed to be context independent. Thus, they could be applied to other types of IT-enabled resources. Second, with the scales presented in this study, researchers can study different organizational resources, and rather than assume their strategic potential, they may be able to assess it explicitly [8]. Third, the study points out an important limitation of the RBV for purposes of empirical assessment – the potential confounding of rarity and inimitability attributes.

## 7.2 Contribution to Practice

This study also makes several contributions to practice. Managers are presented with a parsimonious and useful tool for assessing the strategic potential of their organization's resources (in particular, IT-enabled resources). This tool can be used to decide upon the role a given resource should take in the execution of a value creating strategy. As well, by drawing on the scales presented in this article, managers can make better informed decisions when contemplating strategic decisions, such as the attractiveness of new ventures or outsourcing.

This study can be used to motivate a deeper focus on the specific attributes of organizational resources when considering IT implementation. Decision-makers are encouraged to evaluate the impact of IT solutions on resource attributes as a mechanism for assessing the business value of IT, and ultimately providing their organizations with a competitive advantage. Finally, the findings of this study suggest that practitioners need to look at the outcome of combinations of information technologies with organizational resources when considering IT investments [10]. It appears that by analyzing the strategic potential of information technologies by themselves, rather than IT-enabled resources, practitioners may underestimate the business value of IT.

## 7.3 Future Research

The focal organizational resource studied here was the customer service department. Although the instrument was developed with the intention of being applicable to any organizational resource, its generalization beyond this single context is untested. Future studies should attempt to replicate the results with different organizational resources.

As is common in empirical RBV research, this study employed data that was collected at a single point in time, and thus longer term trends can only be inferred and not directly measured [9, 44]. Using longitudinal methods, future research could more accurately ascertain the sustainability of organizational performance benefits. Finally, additional research should also attempt to develop and validate new scales for rarity to assess whether its inability to explain variance in firm performance is a result of theoretical limitations, or is an artifact of this study.

## 8. References

- [1] Melville, N., Kraemer, K. and Gurbaxani, V. "Review: Information technology and organizational performance: An integrative model of IT business value", *MIS Quarterly* 28(2), 2004, pp. 283-322.
- [2] Piccoli, G. and Ives, B. "Review: IT-dependent strategic initiatives and sustained competitive advantage: A review and synthesis of the literature", *MIS Quarterly* 29(4), 2005, pp. 747-776.
- [3] Wade, M.J. and Hulland, J. "The Resource-based view and information systems research: Review, extension, and suggestions for future research", *MIS Quarterly* 28(1) 2004, pp. 107-142.
- [4] Barney, J.B. "Firm resources and sustained competitive advantage", *Journal of Management* 17(1), 1991, pp. 99-120.
- [5] Dierickx, I. and Cool, K. "Asset stock accumulation and sustainability of competitive advantage", *Management Science* 35(12), 1989, pp. 1504-1513.
- [6] Penrose, E.T. *The Theory of the Growth of the Firm*, Oxford University Press: Oxford, 1959.
- [7] Peteraf, M.A. "The corner stones of competitive advantage: A resource-based view", *Strategic Management Journal* 14, 1993, pp. 179-191.
- [8] Priem, R.L. and Butler, J.E. "Is the resource-based 'view' a useful perspective for strategic management research?", *Academy of Management Review* (26)1, 2001, pp. 22-40.
- [9] Ray, G., Barney, J.B., and Muhanna, W.A. "Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view", *Strategic Management Journal* 25(1), 2004, pp. 23-37.
- [10] Liu, Y., T. Ravichandran, T., Han, S. and Hasan, I. "Complementarities between IT and Firm Diversification and Performance Implications", Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06) Track 8, 2006, p. 167c



- [11] Srivastava, R.K., Fahey, L., and Christensen, H.K. "The resource-based view and marketing: The role of market-based assets in gaining competitive advantage", *Journal of Management* 27(6), 2001, pp. 777-802.
- [12] Mata, J.F., Fuerst, W.L., and Barney, J.B. "Information technology and sustained competitive advantage: A resource-based analysis", *MIS Quarterly* 19(4), 1995, pp. 487-505.
- [13] Ray, G., Muhanna, W.A., Barney, J.B. "Information technology and the customer service process: A resource-based analysis", *MIS Quarterly* 29(4), 2005, pp. 625-652.
- [14] Markus, M. L., and Robey, D. "The organizational validity of management information systems", *Human Relations* 36(3), 1983, pp. 203-226.
- [15] Orlikowski, W.J., and Hofman, J.D. "An Improvisational Model for Change Management: The Case of Groupware Technologies", *Sloan Management Review* 38(2), 1997, pp. 11-21.
- [16] Orlikowski, W.J. "Using technology and constituting structures: A practice lens for studying technology in organizations", *Organization Science* 11(4), 2000, pp. 404-428.
- [17] Jelassi, T. and Figon, O. "Competing through EDI at Brun Passot: Achievements in France", *MIS Quarterly* 18(4), 1994, pp. 337-352
- [18] Hughes, A. and Morton, M.S.S. "The transforming power of complementary assets", *Sloan Management Review* 47(4), 2006, pp. 50-58.
- [19] El Sawy, O.A. and Bowles, G. "Redesigning the Customer Support Process for the Electronic Economy: Insights from Storage Dimensions", *MIS Quarterly* 21(4), 1997, pp. 457-483.
- [20] Clemons, E.K. and Row, M. "McKesson Drug Company: a case study of Economost—a strategic information system", *Journal of Management Information Systems* 5(1), 1988, pp. 36-50.
- [21] Clemons, E. and Row, M. 1991. "Sustaining IT advantage: Theory of structural differences", *MIS Quarterly* 15(3), 1991, pp. 274-292.
- [22] Krishnan, M.S., Ramaswamy, V, Meyer, M.C. and Damien, P. "Customer satisfaction for financial services: The role of products, services, and information technology", *Management Science* 45(9), 1999, pp. 1194-1209.
- [23] Barney, J.B., Wright, M., and Ketchen, D.G. Jr. "The resource-based view of the firm: Ten years after 1991", *Journal of Management* 27(6), 2001, pp. 625-641.
- [24] Lado, A.A., and Zhang, M.J. "Expert Systems, Knowledge Development and Utilization, and Sustained Competitive Advantage: A Resource-Based Model", *Journal of Management* 24(4), 1998, pp. 489-509.
- [25] Straub, D. W. "Validating instruments in IS research", *MIS Quarterly* 13(2), 1989, pp. 147-169.
- [26] Podsakoff, P.M., MacKenzie, S.B., Lee, J., and Podsakoff, N.P. "Common method biases in behavioral research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology* 88(5), 2003, pp. 879-903.
- [27] Hinkin, T.R. "A review of scale development practices in the study of organizations", *Journal of Management* 21(5), 1995, pp. 967-988.
- [28] Moore, G.C., and Benbasat, I. "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research* 2(3), 1991, pp. 173-191.
- [29] Jarvenpaa, S. "The effect of task demands and graphical format on information processing strategies", *Management Science* 35(3), 1989, pp. 285-303.
- [30] Churchill, G.A. "A paradigm for developing better measures for marketing constructs", *Journal of Marketing Research* 16(1), 1979, pp. 64-73.
- [31] Dillman, D.A. 1999. *Mail and Internet Surveys: The Tailored Design Method*, 2<sup>nd</sup> Ed., John Wiley Company: New York, NY.
- [32] Kanuk, J.L and Berenson, C. "Mail surveys and response rates: A literature review", *Journal of Marketing Research* 12(4), 1975, pp. 440-453.
- [33] Bagozzi, R.P., Yi, Y., and Phillips, L.W. "Assessing construct validity in organizational research", *Administrative Science Quarterly* 36(3), 1991, pp. 421-448.
- [34] Tanriverdi, H. and Venkatraman, N. "Knowledge relatedness and the performance of multibusiness firms", *Strategic Management Journal* 26, 2005, pp. 97-119.
- [35] Powell, T.C. and Dent-Micallef, A. "Information technology as competitive advantage: the role of human, business, and technology resources", *Strategic Management Journal* 18(5), 1997, pp. 375-405.
- [36] Armstrong, J.S. and Overton, T.S. "Estimating nonresponse bias in email surveys", *Journal of Marketing Research* 14(3), 1977, pp. 396-402.
- [37] DeVellis, R.F. 1991. *Scale Development: Theory and applications. Applied Social Research Methods Series Vol. 26*. Sage: Newbury Park, CA.
- [38] Fornell, C. and Larcker D.F. "Structural equation models with unobservable variables and measurement error: Algebra and statistics", *Journal of Marketing Research* 18(3), 1981, pp. 382-388.

[39] Salisbury, D., Chin, W. W., Gopal, A. and Newsted, P. R. "Research report: Better theory through measurement – developing a scale to capture consensus on appropriation", *Information Systems Research* 13(1), 2002, pp. 91-105.

[40] Wixom, B.H., and P.A. Todd. "A Theoretical Integration of User Satisfaction and Technology Acceptance", *Information Systems Research* 16(1), 2005, pp. 85-102.

[41] Chin, W. W. "Issues and opinion on structural equation modeling", *MIS Quarterly* 22(1), 1998, pp. vii-xvi.

[42] Ainuddin, R. A., Beamish, P. W., Hulland, J. S., and Rouse, M. J. "Resource attributes and firm performance in international joint ventures", *Journal of World Business* 42, 2007, pp. 47-60.

[43] Lin, L. "Impact of Users' Expertise on the Competition between Proprietary and Open Source Software", Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06) Track 8, 2006, p. 166a.

[44] Tanriverdi, H. 2006. "Information technology relatedness, knowledge management capability and the performance of multi-business firms", *MIS Quarterly* 29(2), 2006, pp. 311-334