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# *Validation of Information Technology Outsourcing Success Model using Structural Equation Modelling*

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**A B S T R A C T**

Since the last few decades, information technology outsourcing has been observed as an instrument for technology transfer and rapid economic development, with the potential to change the fate of the nation. However, many emerging countries, including Nepal, continue to struggle to establish a foothold in the international market; they are perplexed about their path toward outsourcing, and they still have ineffective laws and policies in place. A snowball sampling method was used to collect quantitative data inside Kathmandu valley among outsourcing companies, freelancers, consultants, and policymakers. Data were properly tested for reliability using Cronbach's Alpha, analysed using exploratory followed by confirmatory factor analysis, and results were confirmed using convergent and discriminant validity. Second-level validation was performed by partial least squares. The researcher has validated a multidimensional structural model with interdependencies between 8 unobserved and 33 observed variables using path analysis and proposed an information technology outsourcing success model for emerging markets from the vendor's perspective. Similarly, a latent variable 'setup quality' was identified as a new construct omitted by previous researchers in the study of IS success. The model shall be interpreted as "the system dimensions - setup quality, system quality and service quality influence the characteristics – communication quality, user satisfaction, and usage of the products or services. The positive impact of mediating factors leads to individual and organizational benefits, resulting in the overall success of information technology outsourcing."

*Keywords:* Critical Success Factors, Information Technology Outsourcing Success Model, Strategic Success Factors, Structural Equation Modelling

## Ⅰ. Introduction

In the ever-changing global economy, outsourcing has emerged as one of the topics of investigation for a variety of sectors (Asli et al., 2014). Information technology outsourcing is an inescapable component of modern businesses. The outsourcing business is growing on average at 4.4% every year since 2010 (Gartner, 2020). Outsourcing allows businesses to focus on their core competencies while delegating

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non-critical functions to external entities with proven expertise. In other words, outsourcing is the use of third-party organizations to carry out logistic services (Erturgut, 2012). In the age of capitalization, outsourcing is one of the best drivers of economic development. Information Technology Outsourcing (ITO) helps industrial activities and modernization thus uplifting the economy of both the receivers and the providers. Hence, knowledge of the success model is of utmost importance for the execution and continuation of outsourcing projects. Companies outsource for a variety of reasons, including improving organizational efficiency, increasing revenue, managing risk, and lowering costs.

IT Outsourcing utilizes information systems to connect people, process, and technology and hence, information system success is synonymous to outsourcing success. Various researchers, including those listed here, used IT outsourcing activities to evaluate information systems success.

When we evaluate the various success models on information technology, basically 6 models come into the picture: a. Leavitt's Diamond Model b. McKinsey 7-S framework c. Nadler-Tushman Congruence Model d. DeLone and McLean's IS Success Model e. Technology Acceptance Model f. IS Impact Model. In 1965, American Professor Harold Leavitt developed an organizational change model popularly known as Leavitt's Diamond Model with five components – structure, culture, tasks, people and technology. This model is considered an entry point for information systems success. McKinsey 7-S framework consists of structure, strategy, skills, staff, style, systems and shared values framed by Tom Peters and Robert H. Waterman in the late 1980s to measure the organizational success who were consultants to McKinsey. Fred D. Davis devised Technology Acceptance Model in 1986 in his PhD Dissertation which states that customers prefer to buy a product or service of competitive advantage. DeLone and McLean (1992) recognized more than one hundred variables to determine IS success after reviewing 180 empirical and philosophical studies. After ten years of development, they released an upgraded IS-Success model in 2003, recognizing the contributions of numerous researchers who describe the relationship among six success dimensions: system, service and information, system use/ usage intentions, customer satisfaction, and net benefits. All these models were developed from a customer perspective on the developed market; hence, this study was performed to identify a model based on the needs of emerging market on vendors perspective.

While assessing the status of outsourcing, Nepal exported services amounting to 139 million (Trading Economics BoP, 2021) while the export of ICT services from India amounted to 99 billion US dollars and China to 38 billion US dollars (excluding manufacturing) in 2020, with a significant contribution to their GDP. Kearney (2021) showed that India is the most preferred location for outsourcing services, followed by China, Malaysia, Indonesia, Brazil, Vietnam, United States, United Kingdom, Philippines, and Thailand. Similarly, Thailand, Mexico, Estonia, Colombia, Poland, Egypt, Germany, and Bulgaria are some of the other successful countries. However, countries like Nepal are still at an emerging stage and struggling to make their presence felt on the international market. If the foundation for IT outsourcing is strong, these developing economies shall experience a huge economic upswing and one of the goals of the study is to motivate the stakeholders.

The study addresses the answer to the research question "What would be the appropriate ITO Success Model for IT outsourcing vendors?" and intends to propose an information technology out-

sourcing success model applicable for an emerging market, especially Nepal, as a global vendor from the perspective of a service provider.

## Ⅱ. Research Methodology

This is an exploratory study based on quantitative data. The research was carried out in three districts of Kathmandu valley viz., Kathmandu, Lalitpur and Bhaktapur, the capital city of Nepal. The sample size was 385 and the respondents were IT service providers, government employees, freelancers, and industry experts. A structured questionnaire was used as an instrument, with a Likert scale ranging from 5 (Strongly Agree), 4 (Agree), 3 (Neutral), 2 (Disagree), and 1 (Strongly Disagree). The questionnaire was distributed to 10 subject experts for content validity.

Urbach and Muller (2012) identified numerous variables for Information Systems Success on a systematic literature review based on the research works carried out by DeLone and McLean (1992; 2003), Bailey and Pearson (1983), Gable et al. (2008), Iivari (2005), Rainer and Watson (1995), McKinney et al. (2002), Doll and Torkzadeh (1988), Chang and King (2005), Pitt et al. (1995) and Almutairi and Subramanian (2005). All observed and unobserved variables (<Table 1>) were selected from the literature review based on the works of the above authors,

<Table 1> The Variables with their Descriptions used in the Present Study

| Latent Variable | Description |
|---|---|
| System Quality | The success variable 'system quality' is concerned with system performance, reliability, user interface, consistency, data accuracy, data currency, response time, efficiency, flexibility, integration capabilities, features, update capability etc., of hardware or software system. A total of 17 success factors was used in the research. |
| Communication Quality | Communication quality relates to timeliness of communication, the accuracy of information, relevance, reliability, and scope of information being communicated between the customer and the vendor or vice versa. A total of 12 success factors were selected for the research. |
| Service Quality | This success dimension represents the quality of service received by a customer from the vendor, e.g., helpdesk support, product training, response time, resolution period, interpersonal skills etc. A total of 9 success factors was selected from the literature review. |
| Setup Quality | Setup Quality is the way how outsourcing business is organized, planned, and arranged. Synonymous to strategic success factors that measure the internal factors related to organizational strength, external factors related to business competition and policy factors related to laws and policies in place. A total of 31 variables were selected as per the input from the industry experts and the literature review. |
| System Use | System Use represents the actual use of hardware or software being developed for the customer, the extent of its usage and intention of reuse. A total of 4 success factors were used in the research instrument. |
| User Satisfaction | One of the most important perceived factors - user satisfaction measures the level of fulfilment of the need of the customer after the consumption of a product or service. Total 7 factors were used in the research. |
| Individual Benefit | Individual benefit discusses the benefits of outsourcing to a user or staff, both on vendor and customer segment. Total 5 factors were used in the questionnaire. |
| Organizational Benefit | Organizational benefit measures the effectiveness of IT Outsourcing on the overall performance of the company. A total of 15 variables was selected for the study. |

and, from the input of industry experts. It was further validated with face and content validity. Initially, about 10% questionnaire was tested for reliability using Cronbach's Alpha. The questionnaire was designed both in English and Local Nepali language.

### 2.1. Data Collection

Office of the Company Registrar in Nepal registers the IT companies and indexes as per the international industrial code. Though there are industrial codes for various software development and hardware companies, no such code is assigned for IT outsourcing companies, as a result, defining the true population of IT outsourcing firms is difficult. According to Investment Board Nepal (2017), out of 6,000 BPO operations in Nepal, there are 256 officially registered companies.

Respondents were chosen based on their direct or indirect involvement in IT outsourcing. For instance, outsourcing firms and freelancers who offer outsourcing services to their clients; consultants who provide support to outsourcing firms; and policy-makers who are involved in developing the outsourcing policy. The approach of snowball sampling, or more specifically, exponential non-discriminative snowball sampling, was used, where the first responder suggested a few respondents, and each subsequent respondent recommended other respondents. This pattern persisted until the study had enough participants. Respondents were also identified using personal contacts and search engines. Prior approval or consent was taken before conducting survey, and the information of the respondent was kept confidential on ethical grounds.

The questionnaire was distributed personally, by email and by using an enumerator. 403 responses were collected out of 590 and 385 respondents were selected after removing missing and unusual records. The number satisfies the sample size for unknown population using the formula n = (z2 * p * q) / e2) where z = 1.96 at 95% confidence level, p = standard deviation = 0.5 (maximum variability of the population at 50%), q = 1-p, e = margin of error (0.05).

### 2.2. Data Validation

Reliability coefficient Cronbach's α was employed to test the reliability of data. The questionnaire consisted of 101 observed variables distributed to eight latent variables: system quality, service quality, setup quality (internal factor, external factor and policy factors), communication quality, user satisfaction, system use, individual benefit, and organizational benefit. Cumulative Cronbach α was found to be 0.965. A reliability test of individual factors was also conducted, Alpha value based on covariance ranged from 0.688 to 0.916 and the same based on correlation ranged from 0.715 to 0.917 (<Table 2>) and hence considered reliable for further analysis.

The Kaiser-Meyer-Olkin measure of sampling adequacy was tested for each latent variable and the values were observed between 0.65 and 0.83. For all variables, Bartlett's test of sphericity was highly significant (p = 000). The result of these tests justifies that the data is suitable for factor analysis.

## Ⅲ. Analysis

Factor analysis, a technique commonly used for data reduction and summarization, was employed to examine the results. Factor analysis reduces highly correlated variables to a manageable level for interpretation when there is a large number of variables. The study has utilized both exploratory and con-

<Table 2> Test of Reliability, Adequacy and Sphericity

| Latent Variable | Reliability Statistics | | | KMO Measure of Sampling Adequacy | Bartlett's Test of Sphericity | | |
|---|---|---|---|---|---|---|---|
| | Cronbach's Alpha | Alpha Based on Standardized Items | N | | Approx. Chi-Square | df | Sig |
| System Quality | .837 | .858 | 17 | .650 | 3708.342 | 136 | .000 |
| Communication Quality | .901 | .914 | 12 | .822 | 3238.889 | 78 | .000 |
| Service Quality | .865 | .880 | 9 | .784 | 2099.577 | 36 | .000 |
| Setup Quality | | | | | | | |
| Internal | .688 | .715 | 9 | .678 | 786.109 | 36 | .000 |
| External | .832 | .836 | 7 | .804 | 1041.989 | 21 | .000 |
| Policy | .894 | .896 | 15 | .784 | 3104.846 | 105 | .000 |
| System Use | .803 | .803 | 4 | .664 | 664.607 | 6 | .000 |
| User Satisfaction | .832 | .836 | 7 | .737 | 1039.590 | 21 | .000 |
| Individual Benefit | .855 | .855 | 5 | .830 | 820.648 | 10 | .000 |
| Organizational Benefit | .916 | .917 | 15 | .777 | 3851.038 | 105 | .000 |

firmatory factor analysis to identify, design and validate the success model.

## 3.1. Single Factor Structural Equation Modelling

Structural Equation Modelling (SEM) is based on a positivist epistemological belief and is the model that combines two approaches: psychometrics (linear regression models) and factor analysis (EFA, CFA). SEM is useful when main constructs cannot be directly observed. SEM measures data for statistical analysis using observed variables as input and the result includes the proof of the relationships between latent (unobserved) variables. According to recent trends, SEM has been employed as an empirical method for theory testing in a substantial number of IT studies (Roldan and Sanchez-Franco, 2012).

Confirmatory factor analysis (CFA) was conducted in IBM AMOS (version 26). The single-factor model was plotted separately for each of the latent variables except setup quality (due to different nature of the study), and variables with factor loading less than 0.7 were eliminated except when the variables were tightly correlated with latent variable and removal of such variable would break the model. For estimation, covariance supplied as input was 'unbiased', and covariances to be analysed was 'maximum likelihood' with an iteration limit of 50 (<Table 3> - <Table 9>).

Four variables Data Accuracy [SYSTEM3] (0.643), System Flexibility [SYSTEM7] (0.831), System Consistency [SYSTEM11] (0.720) and System Completeness [SYSTEM12] (0.944) were identified as success factors for the latent variable 'System Quality'. Though The regression weight of Data Accuracy (SYSTEM3) was less than 0.7, the variable was selected as a success factor because probability level could not be computed as the degree of freedom would be 0 in absence of this variable.

Four variables - Availability of Information [COMM3] (0.964), Completeness of Information [COMM4] (0.808), Conciseness of Information

<Table 3> List of Observed Variables under 'System Quality' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Easy to Access [SYSTEM1] | .544 | System Reliability [SYSTEM10] | .528 |
| Easy to Use [SYSTEM2] | .368 | System Consistency [SYSTEM11] | .755 |
| Data Accuracy in the System [SYSTEM3] | .665 | System Completeness [SYSTEM12] | .798 |
| Data Currency in the product [SYSTEM4] | .536 | System Response time [SYSTEM13] | .578 |
| Easy to Learn the System [SYSTEM5] | .526 | System Turnaround time [SYSTEM14] | .544 |
| System Efficiency [SYSTEM6] | .405 | System Sophistication [SYSTEM15] | .354 |
| System Flexibility [SYSTEM7] | .823 | Data Duplication and Repetition [SYSTEM16] | .029 |
| System Integration [SYSTEM8] | .362 | System Features [SYSTEM17] | .296 |
| System Interactivity [SYSTEM9] | .406 | | |

<Table 4> List of Observed Variables under 'Communication Quality' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Accuracy of Information [COMM1] | .540 | Reliability of Information [COMM8] | .621 |
| Adequacy of Information [COMM2] | .593 | Scope of Information [COMM9] | .680 |
| Availability of Information [COMM3] | .830 | Timeliness of Communication [COMM10] | .812 |
| Completeness of Information [COMM4] | .710 | Understandability of Information [COMM11] | .726 |
| Conciseness of Information [COMM5] | .771 | Uniqueness of Information [COMM12] | .446 |
| Consistency of Information [COMM6] | .579 | Usability of Information [COMM13] | .626 |
| Relevance of Information [COMM7] | .659 | | |

<Table 5> List of Observed Variables under 'Service Quality' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Empathy [SERVICE1] | .338 | Service Timeliness [SERVICE6] | .671 |
| Responsiveness [SERVICE2] | .842 | Service Reliability [SERVICE7] | .718 |
| Service Flexibility [SERVICE3] | .790 | Customer Orientation [SERVICE8] | .552 |
| Interpersonal Quality [SERVICE4] | .792 | Tangibles [SERVICE9] | .715 |
| Intrinsic Quality [SERVICE5] | .642 | | |

<Table 6> List of Observed Variables under System Use and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Actual Use [USE1] | .383 | Intention to (re)use [USE3] | .734 |
| Frequency of Use [USE2] | 1.014 | Usage patterns [USE4] | .698 |

<Table 7> List of Observed Variables under 'User Satisfaction' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Adequate Satisfaction [SATISF1] | .569 | Information/communication satisfaction [SATISF5] | .639 |
| Effectiveness of Product and Service [SATISF2] | .671 | System Satisfaction [SATISF6] | .616 |
| Satisfaction due to Efficiency [SATISF3] | .715 | Overall Satisfaction [SATISF7] | .678 |
| Enjoyment [SATISF4] | .651 | | |

<Table 8> List of Observed Variables under 'Individual Benefit' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Training and Development [IB1] | .758 | Decision Effectiveness [IB4] | .805 |
| Job simplification [IB2] | .785 | Task innovation [IB5] | .641 |
| Performance Increment [IB3] | .694 | | |

<Table 9> List of Observed Variables under 'Organizational Benefit' and their Factor Loadings

| Observed Variables | Factor Loading | Observed Variables | Factor Loading |
|---|---|---|---|
| Business Process Enhancement [OB1] | .637 | Improved Decision Making [OB9] | .736 |
| Competitive Advantage [OB2] | .689 | Increased Capacity [OB10] | .503 |
| Cost Reduction [OB3] | .575 | Overall Productivity Increase [OB11] | .651 |
| Enhancement of Communication and Collaboration [OB4] | .659 | Overall Success [OB12] | .716 |
| Better Coordination [OB5] | .603 | Quality Improvement [OB12] | .659 |
| Enhancement on Internal Operations [OB6] | .645 | Customer Satisfaction [OB31] | .480 |
| Enhancement of Reputation [OB7] | .776 | Management Control [OB14] | .665 |
| Improved Output [OB8] | .789 | | |

[COMM5] (0.700) and Timeliness of Communication [COMM10] (0.679) were identified as success factors for the latent variable 'communication quality'. Without Timeliness of Communication [COMM10], the model would fail due to 0 DF.

Four variables Responsiveness [SERVICE2] (0.893), Service Flexibility [SERVICE3] (0.800), Interpersonal Quality [SERVICE4] (0.729) and Service Reliability [SERVICE7] (0.675) were identified for the latent variable 'service quality'. Without the variable Service Reliability [SERVICE7], the model would break.

Three variables - Frequency of Use [USE2] (0.854), Intention to (Re)Use [USE3] (0.850) and Usage Patterns [USE4] (0.850) were identified as success factors for the latent variable 'system use'.

Four variables - Effectiveness of Product and Service [SATISF2] (0.664), Satisfaction due to Efficiency [SATISF3] (0.896), Information/communication satisfaction [SATISF5] (0.615) and Overall Satisfaction [SATISF7] (0.674) were identified as success factors for the latent variable 'User Satisfaction'.

<Table 10> Model Fit Measures

| Latent Variables | CMIN | DF | CMIN/DF | CFI | SRMR | RMSEA | PClose |
|---|---|---|---|---|---|---|---|
| System Quality | 1.310 | 2.000 | 0.655 | 1.000 | 0.012 | 0.000 | 0.759 |
| Communication Quality | 2.083 | 1.000 | 2.083 | 0.999 | 0.010 | 0.053 | 0.329 |
| Service Quality | 3.842 | 2.000 | 1.921 | 0.997 | 0.018 | 0.049 | 0.402 |
| System Use | 2.342 | 1.000 | 2.342 | 0.998 | 0.016 | 0.059 | 0.297 |
| Satisfaction | 2.105 | 1.000 | 2.105 | 0.998 | 0.018 | 0.054 | 0.326 |
| Individual Benefit | 0.047 | 1.000 | 0.047 | 1.000 | 0.002 | 0.000 | 0.893 |
| Organizational Benefit | 4.376 | 3.000 | 1.459 | 0.998 | 0.019 | 0.035 | 0.564 |

Though three variables have regression weights less than 0.7, the model would break the removal of any of these.

Four variables - Training and Development [IB1] (0.782), Job simplification [IB2] (0.806), Performance Increment [IB3] (0.751) and Decision Effectiveness [IB4] (0.756) were identified as success factors for the latent variable 'individual benefit '. The correlation value between the error term of Training and Development [IB1] and Performance Increment [IB3] was 0.29.

Four variables - Enhancement of Reputation [OB7] (0.749), Improved Output [OB8] (0.891), Improved Decision Making [OB9] (0.782) and Overall Success [OB12] (0.659) were identified as success factors for the latent variable 'Organizational Benefit'. The correlation coefficient between the error term of Improved Decision Making [OB9] and Overall Success [OB12] was -0.18.

<Table 11> Validity and Reliability Measures

| Latent Variables | CR | AVE | MaxR(H) |
|---|---|---|---|
| System Quality | 0.869 | 0.628 | 0.925 |
| Communication Quality | 0.871 | 0.633 | 0.943 |
| Service Quality | 0.859 | 0.606 | 0.885 |
| System Use | 0.888 | 0.725 | 0.888 |
| Satisfaction | 0.808 | 0.519 | 0.863 |
| Individual Benefit | 0.857 | 0.599 | 0.858 |
| Organizational Benefit | 0.856 | 0.600 | 0.882 |

All the models for the above latent variables passed the model fit measures as per <Table 10>. Out of 7 variables, the model referring to system quality and Individual Benefit reached the best fit with a CFI value of 1.00.

As per Gaskin and Lim (2016), model is considered excellent when the values of CMIN/DF are between 1 and 3, Comparative Fit Index (CFI) > 0.95, Standardized Root Mean Residual (SRMR) < 0.08, Root Mean Square Error of Approximation (RMSEA) < 0.06, PClose > 0.05, CR (Composite Reliability) > 0.7, AVE (Average Variance Extracted) > 0.5 and MaxR(H) (Maximal Reliability) > 0.7. Results in <Table 11> further demonstrate that the model is reliable and valid. However, discriminant validity could not be tested in a single factor model.

### 3.2. Analysis of latent construct 'setup quality'

The questionnaire included three categories for the latent variable 'setup quality' – internal factors, external factors, and policy factors. 'Setup quality' access the readiness of both the government and service providers for outsourcing business and measures the environment variables that are considered important to promote IT outsourcing. Internal factors

are related to the organizational strength of the service provider like human resource structure, production cost, intellectual property, compliance etc.; external factors are related to a competitive environment like market demand, price sensitivity, global image of the country, demographic trends etc.; and policy factors are related to laws and policies in place like foreign direct investment, taxes and tariffs, brain drain, country-specific specialization, banking priority, academic status etc. Hence, 'setup quality' is syn-

<Table 12> Rotated Component Matrix

| | Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Own Intellectual Property | | | .824 | | | | | | |
| Increase Efficiency | | | | | | .806 | | | |
| Minimize Production Costs | | | | | | | .759 | | |
| HR Structure of the company | | | .634 | | | | | | |
| Build a Strong Sales Team | | | | | | | | .836 | |
| IT Infrastructure | | | | | | | | .631 | |
| Product Expertise | | | | | | | | | |
| Capacity to Grow | | | .798 | | | | | | |
| Meet the Compliance | | | .582 | | | .548 | | | |
| Competitive Marketplace | | .737 | | | | | | | |
| Global Image of the Country | | .605 | | | | | | | |
| Possibility of Market Penetration | | .701 | | | | | | | |
| Demographic Information and Trends | | .520 | .557 | | | | | | |
| Market Demand | | .822 | | | | | | | |
| Price Sensitivity | | | | | | | .797 | | |
| Competition's Staying Power | | .549 | | | | | | | |
| Government Policies and Preferences | .809 | | | | | | | | |
| Adjustment of Taxes and Tariffs | .828 | | | | | | | | |
| More IT Colleges | .576 | | | | | | | | |
| FDI on IT Outsourcing | .589 | | | | | | | | |
| Training Centers as per Global Demand | .570 | | | | | | | | |
| Formulate Government Agency to Promote IT Outsourcing | .523 | | | | | | | | |
| Interaction Program between IT Outsourcing Companies | | | | .689 | | | | | |
| Knowledge Sharing Activities between the Countries | | | | .814 | | | | | |
| Cooperation and Collaboration with Foreign Companies | | | | | | | | | |
| Banking Priority to Outsourcing Sector | .667 | | | | | | | | |
| Country Specific Specialization | | | | .576 | | | | | |
| Recognition of Outsourcing Companies | | | | .594 | | | | | |
| Pool of IT Experts | .588 | | | | | | | | |
| Develop an Outsourcing Zone | | | | | .791 | | | | |
| Minimize Brain Drain | | | | | | | | | .784 |
| Extraction Method: Principal Component Analysis.<br>Rotation Method: Varimax with Kaiser Normalization. | | | | | | | | | |
| a. Rotation converged in 14 iterations. | | | | | | | | | |

onymous with 'strategic business factors'. Most of the variables for this latent variable were derived from the inputs by industry experts using stepwise selection method and hence, the researcher decided to start data analysis using exploratory factor analysis to validate whether the selected latent variables were appropriate.

Out of 31 variables, principal component analysis extracted 29 variables in 9 groups using varimax rotation with Kaiser normalization (<Table 12>).

Variables with smaller factor loadings less than 0.3, negative and cross loadings were removed. Final extraction was performed using maximum likelihood and varimax rotation to comply with CFA which reduced the groups into two, redefined them as internal and external factors. External and policy factors were merged by CFA into a single latent variable 'external factor'. <Table 13> shows internal factors with 5 variables and external factors with 15 variables.

The variables selected from EFA (using SPSS) were

<Table 13> Rotated Factor Matrix

| | Factor | |
|---|---|---|
| | 1 | 2 |
| Own Intellectual Property | | .730 |
| HR Structure of the Company | | .600 |
| Product Expertise | | .449 |
| Capacity to Grow | | .774 |
| Meet the Compliance | | .562 |
| Competitive Marketplace | .639 | |
| Possibility of Market Penetration | .460 | |
| Government Policies and Preferences | .691 | |
| Adjustment of Taxes and Tariffs | .604 | |
| More IT Colleges | .617 | |
| FDI on IT Outsourcing | .745 | |
| Training Centers as per Global Demand | .622 | |
| Formulate Government Agency to Promote IT Outsourcing | .725 | |
| Interaction Program between IT Outsourcing Companies | .636 | |
| Knowledge Sharing Activities between the Countries | .394 | |
| Cooperation and Collaboration with Foreign Companies | .575 | |
| Banking Priority to Outsourcing Sector | .815 | |
| Country Specific Specialization | .724 | |
| Recognition of Outsourcing Companies | .441 | |
| Pool of IT Experts | .487 | |
| Extraction Method: Maximum Likelihood.<br>Rotation Method: Varimax with Kaiser Normalization. | | |
| a. Rotation converged in 3 iterations. | | |

<Table 14> Success Factors for the Latent Variable 'Setup Quality' and their Factor Loadings

| Variable | Internal Factors | Variable | External Factors |
|---|---|---|---|
| Intellectual Property [INTF1] | .748 | FDI on IT Outsourcing [POLF4] | .610 |
| HR Structure [INTF4] | .578 | Banking Priority [POLF10] | .980 |
| Capacity to Grow [INTF8] | .770 | Country-Specific Specialization [POLF11] | .738 |

plotted into CFA using AMOS version 26 to further refine the factors. Variables with low factor loadings were removed until the best model fit indices were found. Maximum likelihood covariance analysis was used, with unbiased covariances as input.

The result in <Table 14> shows that a total of six variables have been identified as strategic success factors. Though 'HR Structure' and 'FDI on IT Outsourcing' variables have factor loadings < 0.7, their removal would fail the model due to correlations with other observed variables.

While evaluating the values of model fit indices, the result is satisfactory: CMIN/DF (2.978), CFI (0.985), SRMR (0.047), RMSEA (0.072) and PClose (0.148). Similarly, the value of Normed Fit Index (NFI) is .977, Relative Fix Index (RFI) is .943, Incremental Fit Index (IFI) is .985, Tucker Lewis Index (TLI) is .962, the model with above 6 variables is regarded as acceptable.

Further, evaluating the validity parameters, values

<Table 15> Validity Indicators

| | CR | AVE | MSV | MaxR(H) | External Factors | Internal Factors |
|---|---|---|---|---|---|---|
| External Factors | 0.829 | 0.627 | 0.097 | 0.962 | 0.792 | |
| Internal Factors | 0.745 | 0.497 | 0.097 | 0.765 | 0.312*** | 0.705 |

*** p < 0.001

<Table 16> Standardized Regression Weight and significance

| | | | Estimate | P |
|---|---|---|---|---|
| System Use | ← | Service Quality | -.825 | *** |
| User Satisfaction | ← | System Quality | .143 | .147 |
| Organizational Benefit | ← | Setup Quality | .215 | *** |
| Communication Quality | ← | Setup Quality | .198 | *** |
| User Satisfaction | ← | Service Quality | .871 | *** |
| Communication Quality | ← | Service Quality | .577 | *** |
| System Use | ← | Setup Quality | .574 | *** |
| User Satisfaction | ← | Setup Quality | -.321 | *** |
| System Use | ← | System Quality | .305 | *** |
| Communication Quality | ← | System Quality | -.019 | .637 |
| Organizational Benefit | ← | Individual Benefit | .006 | .966 |
| Individual Benefit | ← | Organizational Benefit | .629 | *** |
| Communication Quality | ← | Organizational Benefit | .215 | *** |
| Individual Benefit | ← | User Satisfaction | .275 | *** |
| User Satisfaction | ← | Individual Benefit | -.003 | .986 |
| System Use | ← | Communication Quality | .139 | .328 |
| Communication Quality | ← | System Use | -.136 | *** |
| Organizational Benefit | ← | System Use | .749 | *** |
| System Use | ← | User Satisfaction | 1.849 | *** |
| User Satisfaction | ← | System Use | -.514 | .135 |
| System Use | ← | Organizational Benefit | -1.265 | *** |

Note: *** p = < 0.05

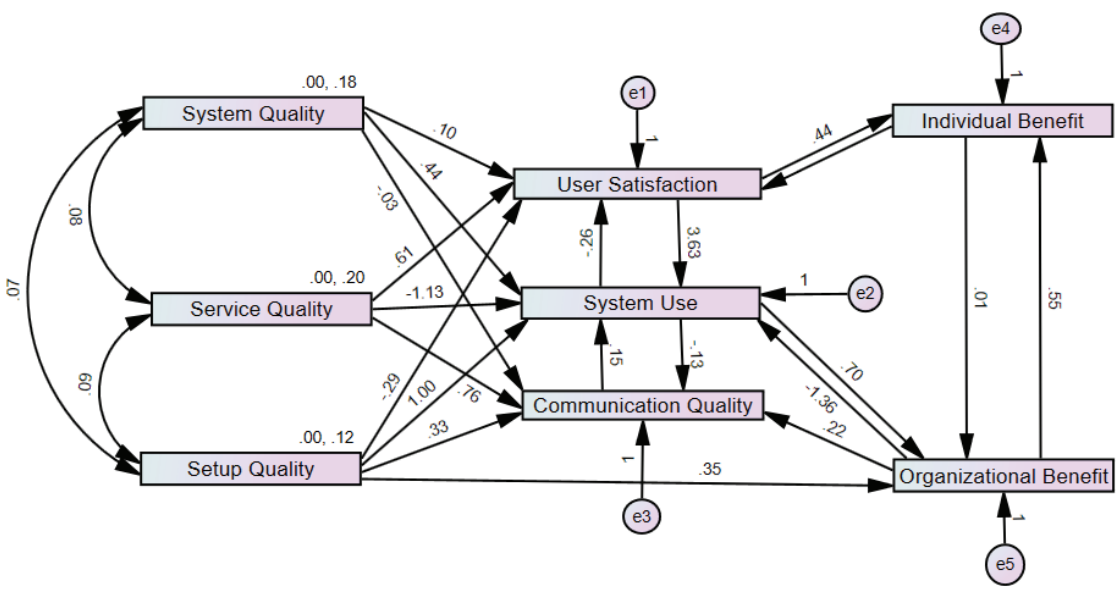
of CR, AVE, MSV and MarR(H) indicates that the model passes the convergent and discriminant validity. All values of CR are more than 0.7, AVE of the external factors is 0.627 however, the AVE of the internal factor is 0.497 which is very near to the threshold of 0.5. MSV is less than AVE and MaxR(H) is greater than 0.7 for both the latent variables (<Table 15>).

### 3.3. Causal Modelling

The factor loading from all latent variables and used for path analysis (causal modelling). Latent Variable 'setup quality' was computed from the mean values of internal and external setup factors. Observed, exogenous variables were service quality, system quality and setup quality. Observed, endogenous variables were system use, user satisfaction, organizational benefit, communication quality and individual benefit. However, communication quality was studied as an independent variable by previous researchers. The model was designed and tested in IBM AMOS 26 (<Figure 1>).

Standardized regression weight between each latent variable and their significances are presented in <Table 16>.

The model fit was achieved with a chi-square value (6.186), degrees of freedom (4) and probability level (p = .186). The observed value of model fit indices denotes that all the values are within the recommended threshold and each measure can be interpreted as an excellent result (Gaskin and Lim, 2016) as shown in <Table 17>. Similarly, the value of other fit indices like NFI is 0.996, RFI is 0.972 and TLI is 0.990. Assessment of normality shows that the value of skewness and the kurtosis are within the accepted range of + -1.96 and hence all the latent variables are normally distributed (<Table 18>).




<Figure 1> Proposed Success Model of Information Technology Outsourcing

<Table 17> Model Fit Indices

| Measure | Estimate | Threshold | Interpretation |
|---|---|---|---|
| CMIN | 6.186 | -- | -- |
| DF | 4.000 | -- | -- |
| CMIN/DF | 1.547 | Between 1 and 3 | Excellent |
| CFI | 0.999 | > 0.95 | Excellent |
| SRMR | 0.010 | < 0.08 | Excellent |
| RMSEA | 0.038 | < 0.06 | Excellent |
| PClose | 0.568 | > 0.05 | Excellent |

<Table 18> Normality Distribution

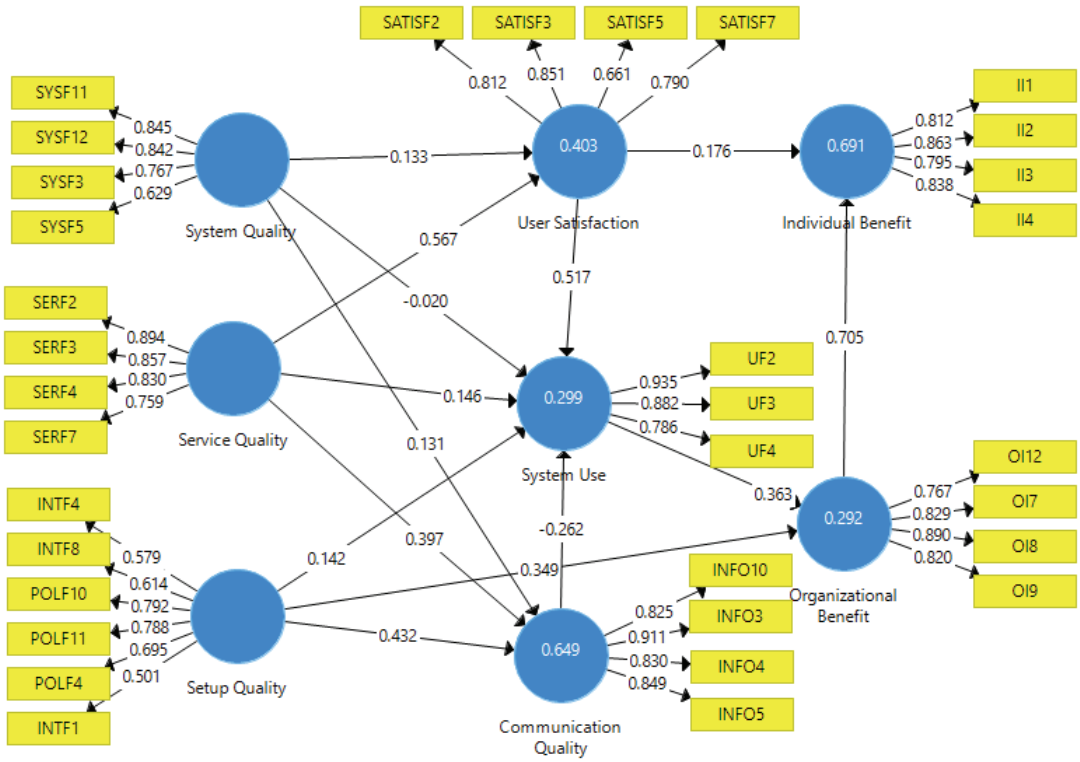
| Variable | min | max | skew | c.r. | kurtosis | c.r. | Skew/cr | Kurtosis/cr |
|---|---|---|---|---|---|---|---|---|
| Setup Quality | -0.957 | 0.499 | -0.387 | -3.1 | -0.298 | -1.195 | 0.124839 | 0.249372 |
| Service Quality | -1.213 | 0.364 | -0.946 | -7.579 | -0.285 | -1.141 | 0.124819 | 0.249781 |
| System Quality | -1.838 | 0.295 | -1.94 | -15.542 | 4.745 | 19.006 | 0.124823 | 0.249658 |
| Individual Benefit | -0.988 | 0.579 | -0.377 | -3.017 | -1.079 | -4.321 | 0.124959 | 0.249711 |
| Communication Quality | -1.468 | 0.5 | -0.87 | -6.97 | -0.215 | -0.863 | 0.124821 | 0.249131 |
| Organizational Benefit | -1.126 | 0.699 | -0.21 | -1.686 | -1.031 | -4.129 | 0.124555 | 0.249697 |
| User Satisfaction | -0.92 | 0.344 | -0.829 | -6.639 | 0.087 | 0.35 | 0.124868 | 0.248571 |
| System Use | -1.045 | 0.938 | 0.332 | 2.661 | -1.077 | -4.315 | 0.124765 | 0.249594 |
| Multivariate | | | | | 2.538 | 1.968 | | 1.289634 |

## 3.4 Model Validation

To validate the model tested in AMOS, SmartPLS 3.3.3 was used which utilizes partial least squares structural equation modelling which is a second-generation multivariate analytic method that combines the analysis of measurement and structural models (Civelek, 2018). All the variables used in AMOS were used in SmartPLS without any deviation. The result from the SmartPLS was used to evaluate the values of R Square, construct validity, discriminant validity and collinearity statistics. These features are graphi-

<Table 19> Validity and Reliability Measures of Success Model

| Latent Variable | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Communication Quality | 0.877 | 0.884 | 0.915 | 0.730 |
| Individual Benefit | 0.846 | 0.847 | 0.897 | 0.685 |
| Organizational Benefit | 0.845 | 0.846 | 0.897 | 0.685 |
| Service Quality | 0.856 | 0.868 | 0.903 | 0.700 |
| Setup Quality | 0.755 | 0.779 | 0.827 | 0.449 |
| System Quality | 0.776 | 0.802 | 0.856 | 0.602 |
| System Use | 0.840 | 0.874 | 0.903 | 0.757 |
| User Satisfaction | 0.787 | 0.806 | 0.862 | 0.611 |




<Figure 2> Validation Model in SmartPLS

cally unavailable in AMOS.

The resulting model has the construct reliability and validity statistics as given in <Table 19>. The values of Cronbach's Alpha, rho_A, CR and AVE are greater than 0.7 for all latent variables. Composite reliability is a measure of internal consistency on standardized factor loadings. Rho_A is also a composite reliability indicator but computed on unstandardized loadings. Additionally, convergent validity is assessed by Average Variance Extracted (AVE). Variables do not correlate well with each other inside their parent factor if there are convergent validity concerns.

Discriminant validity is used to assess the multicollinearity issues between latent variables. Discriminant validity refers to how exactly the construct differs from each other and the extent to which it has been validated. Fornell-Larcker criterion and Heterotrait-monotrait (HTMT) ratio of correlation are two different types of methods used to assess discriminant validity. The square root of the average variance retrieved in a correlation of latent variables is compared using the Fornell-Lacker criterion. As per smartpls.com, the Fornell-Lacker value above 0.7 are considered excellent (<Table 20>).

Henseler et al. (2015) suggested that HTMT can achieve higher specificity and sensitivity rates of 97-99% compared to Fornell-Lacker of 20.82%. Near 1 HTMT readings suggest a lack of discriminant validity. Smartpls.com has stated that discriminant validity is established between two reflective constructs if the HTMT value is below 0.90. As shown

<Table 20> Result of Fornell-Lacker Criterion

| | Communication Quality | Individual Benefit | Organizational Benefit | Service Quality | Setup | System Quality | System Use | User Satisfaction |
|---|---|---|---|---|---|---|---|---|
| Communication Quality | 0.855 | | | | | | | |
| Individual Benefit | 0.356 | 0.827 | | | | | | |
| Organizational Benefit | 0.436 | 0.821 | 0.828 | | | | | |
| Service Quality | 0.681 | 0.375 | 0.375 | 0.836 | | | | |
| Setup Quality | 0.714 | 0.243 | 0.403 | 0.528 | 0.670 | | | |
| System Quality | 0.537 | 0.271 | 0.371 | 0.425 | 0.549 | 0.776 | | |
| System Use | 0.155 | 0.371 | 0.416 | 0.357 | 0.149 | 0.173 | 0.870 | |
| User Satisfaction | 0.437 | 0.641 | 0.659 | 0.623 | 0.247 | 0.374 | 0.522 | 0.782 |

<Table 21> HTMT (Heterotrait-Monotrait) Ratio of Correlation

| | Communication Quality | Individual Benefit | Organizational Benefit | Service Quality | Setup | System Quality | System Use | User Satisfaction |
|---|---|---|---|---|---|---|---|---|
| Communication Quality | | | | | | | | |
| Individual Benefit | 0.416 | | | | | | | |
| Organizational Benefit | 0.513 | 0.971 | | | | | | |
| Service Quality | 0.782 | 0.426 | 0.442 | | | | | |
| Setup Quality | 0.850 | 0.310 | 0.494 | 0.656 | | | | |
| System Quality | 0.639 | 0.360 | 0.460 | 0.519 | 0.730 | | | |
| System Use | 0.219 | 0.455 | 0.492 | 0.386 | 0.205 | 0.223 | | |
| User Satisfaction | 0.526 | 0.768 | 0.794 | 0.741 | 0.394 | 0.491 | 0.612 | |

<Table 22> R Square Statistics

| | R Square | R Square Adjusted |
|---|---|---|
| Communication Quality | 0.649 | 0.647 |
| Individual Benefit | 0.691 | 0.690 |
| Organizational Benefit | 0.292 | 0.288 |
| System Use | 0.299 | 0.290 |
| User Satisfaction | 0.403 | 0.400 |

in <Table 21>, the HTMT values are as low as 0.223, except in between Individual Benefit and Organization Benefit (0.971).

R-square is a statistical measure used to determine the distance between the data and the fitted regression line. The R-square value reflects how much of the dependent variable's total variance can be explained by the independent variable. The R Square of dependent variable communication quality is 0.649, individual benefit is 0.691, organizational benefit is 0.292, user satisfaction is 0.403 and system use is 0.299. In the analysis, independent variables are system quality, service quality and setup quality. Falk and Miller (1992) suggested that the R-Square values should be $\geqq$ 0.10 while undertaking research studies in the field of information technology.

While observing the result for collinearity statistics (VIF), all the variables were found below 5.0 (<Table 23>).

<Table 23> Collinearity Statistics

| Variable | VIF | Variable | VIF | Variable | VIF |
|---|---|---|---|---|---|
| II1 | 1.875 | OI9 | 1.381 | SERF3 | 1.610 |
| II2 | 2.214 | POLF10 | 1.701 | SERF4 | 1.648 |
| II3 | 1.755 | POLF11 | 1.572 | SERF7 | 2.012 |
| II4 | 1.955 | POLF4 | 1.922 | SYSF11 | 1.327 |
| INFO10 | 1.959 | SATISF2 | 2.764 | SYSF12 | 1.680 |
| INFO3 | 3.490 | SATISF3 | 2.114 | SYSF3 | 2.711 |
| INFO5 | 2.579 | SATISF7 | 2.719 | UF2 | 2.226 |
| OI8 | 2.060 | SERF2 | 2.189 | UF3 | 1.865 |

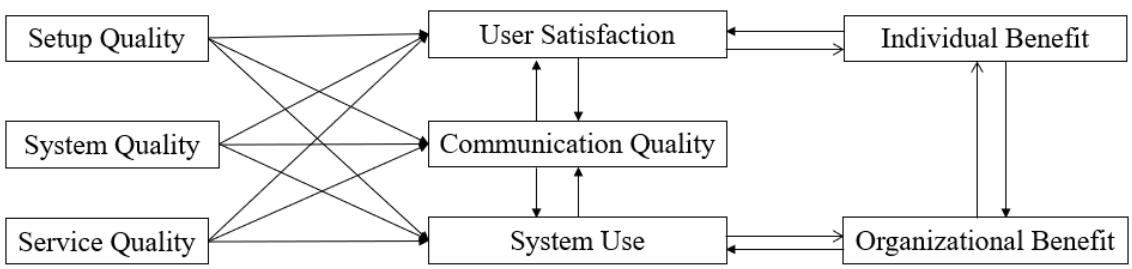
## Ⅳ. Result

The output of the path analysis is a multidimensional structural model with interdependencies between the major success categories. Earlier studies were based on the customer perspective; however, this study is based on vendors' perspectives. The eight interrelated dimensions including 33 success factors are: System Quality (data accuracy, system flexibility, consistency and system completeness); service quality (service responsiveness, service flexibility, interpersonal quality and service reliability); setup quality (foreign direct investment, banking priority to ITO industry, country-specific specialization, intellectual property, human resource structure and service provider's capacity to grow); communication quality (availability of information, completeness of information, conciseness of information and timeliness of communication); system use (frequency of use, intention to (re)use and usage patterns); user satisfaction (satisfaction due to efficiency, effectiveness of product and service, information/communication satisfaction and overall satisfaction); individual benefit (job simplification; training and development; decision effectiveness; performance increment) and organizational benefit (improved output, improved decision making, enhancement of reputation and overall success). The arrows demonstrate associations between the success dimensions. <Figure 3> represents the simplified version of the success model devised from the study.

The information technology outsourcing success model can be interpreted as "The system dimensions - setup quality, system quality and service quality influence the characteristics – communication quality, user satisfaction, and usage of the products or services. The positive impact of mediating factors leads to individual and organizational benefits, resulting to the overall success of information technology outsourcing."

## Ⅴ. Discussion

The current study has identified 33 success metrics under 8 categories. DeLone and McLean (2003) iden-




<Figure 3> Success Model of Information Technology Outsourcing

tified 24 success metrics under 6 categories for Ecommerce in their updated IS Success Model - systems quality (adaptability, availability, reliability, response time and usability); information quality (completeness, ease of understanding, personalization, relevance and security); service quality (assurance, empathy and responsiveness); use (nature of use, navigation patterns, number of site visits and number of transactions executed); user satisfaction (repeat purchases, repeat visits and user surveys) and net benefits (cost savings, expanded markets, incremental additional sales, reduced search costs and time savings). This study additionally validated setup quality as a novel latent variable. This study further divided organizational benefit and individual benefit as a separate variable, instead of using net benefits as a whole; as done by DeLone and McLean (2003). Similarly, Gable et al. (2008) suggested 37 variables under 4 categories in their IS-impact measurement model studied across 27 Australian Government Agencies that implemented SAP Financials in the late 90s – System quality (Data accuracy, Data currency, Database contents, Ease of use, Ease of learning, Access, User requirements, System features, System accuracy, Flexibility, Reliability, Efficiency, Sophistication, Integration and Customization); Information quality (Importance, Availability, Usability, Understandability, Relevance, Format, Content Accuracy, Conciseness, Timeliness and Uniqueness); Individual Impact (Learning, Awareness, Decision effectiveness, Individual productivity) and Organizational Impact (Organizational costs, Staff requirements, Cost reduction, Overall productivity, Improved outcomes/outputs, Increased capacity, e-government and Business Process Change). In comparison to IS impact model, this study additionally validated four new latent variables - Setup Quality, Service Quality, User Satisfaction and System Use. Petter et al. (2013) mentioned that comprehensive and integrative research on the variables that influence IS success has been lacking and hence, they examined over 600 articles and identified 15 success factors as an independent variables: enjoyment, trust, user expectations, extrinsic motivation, IT infrastructure, task compatibility, task difficulty, attitudes toward technology, organizational role, user involvement, relationship with developers, domain expert knowledge, management support, management processes, and organizational competence. Few of these variables like enjoyment, IT infrastructure were also tested in this study.

## Ⅵ. Conclusions

Information Technology outsourcing, one of the drivers for rapid economic development through the transfer of technology, could not be embraced by Nepal and many other uprising countries around the world. There is a lack of tested, standardized, and empirically validated measurement models for assessing the success of information technology outsourcing. Hence, the researcher has proposed a new model from the vendor's perspective, keeping service providers at the core of the study. The study is based on the theoretical framework of DeLone and McLean IS Success Model (2003). Out of 101 observed variables categorized in 8 unobserved variables, 33 observed variables were identified as critical success factors using exploratory and confirmatory factor analysis; and those variables were imputed back to the database for path analysis.

A multidimensional measurement model consisting of three independent variables and five dependent variables were validated which shall be considered an appropriate base for further empirical and theoret-

ical research on information systems success. The taxonomy of the ITO model suggests the interdependence and causal relationship between the constructs. System quality, service quality and setup quality singularly and jointly affect three variables system use, user satisfaction and communication quality. The amount of system use can affect the degree of user satisfaction and quality of communication, positively or negatively. The degree of user satisfaction affects the perception of individual benefit while the amount of system usage affects the level of organizational benefit. Additionally, organizational benefit eventually has a positive or negative influence on individual benefit and vice versa.

The study has also validated 'setup quality' as a construct for the first time which represents the quality of policy, planning and organization of outsourcing business. In an emerging market like Nepal, there are regulatory issues like lack of framework for outsourcing, visa difficulties for skilled foreigners, weak IP enforcement capacity, difficulty in seed funding, high-interest rates, lack of proper regulations to attract foreign direct investment, lack of international payment infrastructure and ineffective policies/priorities to cultivate country-specific products. 'Setup Quality' shall be considered as a baseline framework for the outsourcing business. Additionally, implementation of the ITO model shall play a vital role on success dimensions like system quality, service quality, communication quality for customer satisfaction and continuous usage of products and services ensuring individual and organizational benefit. This model shall be used as a universal success model not just in the field of information technology outsourcing, but also in all other fields of science, engineering, management, agriculture, healthcare, and transportation, among others.

There are some limitations to the study that require further research. The first limitation is that the study was conducted in Nepal, so the results cannot be generalized to all nations, except for emerging ones. Similarly, the research was performed on holistic approach, covering all aspects of outsourcing. There are ample opportunities for future refinement and testing on specific areas like cloud computing, application development, artificial intelligence etc. This study was focused the perspectives of the vendors and there is a need of the validation of the model on the customers point of view. Similarly, there are limitations of the SEM method itself like variable omission, posteriori method on model fit judgement, confirmation bios etc.

The study helps researchers with new variables in their future studies. It is advised the researchers use more observed variables for 'system use' as the smaller number may lead to an ambiguous result. Similarly, it is advised to study 'individual benefit' and 'organizational benefit' as two separate unobserved variables because human behaviour is a complex phenomenon and much different from an organization as a whole.

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