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THE DEVELOPMENT OF ENTERPRISE RESOURCE PLANNING (ERP) SELECTION METHODOLOGY USING DELTA MODEL

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Abstract

Enterprise Resource Planning (ERP) is one of the most popular integrated software suites having been used for world-wide enterprises to support organizational business processes across business functions and departments. Many ERP projects were reported unsuccessful due to improper package selection and unproven methodology of ERP selection. Several studies on critical success factors (CSF) also confirmed the critical role of ERP systems selection for an enterprise. This study discusses the development of ERP selection methodology using a delta model that incorporates important criteria in the ERP selection that complies with the ISO25010 quality standards on software quality. The proposed model was validated by expert surveys and was tested to a sample case of a real enterprise. The results confirmed that the proposed model can fit with need of an enterprise for ERP selection.

***Keywords:** Enterprise Resource Planning (ERP), ERP Selection Methodology, Delta Model, ISO25010*

1. INTRODUCTION

Background

Enterprise Resource Planning (ERP) is one of the most popular integrated software suites having been used for world-wide enterprises to support organizational business processes across business functions and departments. Characteristics or essential attributes of an information system and applications that can be classified as an ERP system (Shehab *et al.* 2004) is its ability to integrate business processes across organizational functions and locations, business best practices already built on system, having a central database and real-time transaction. ERP has many modules and continues to grow (SAP 2006). Some of primary modules are FI (Financial Accounting), CO (Controlling), SD (Sales & Distribution), MM (Materials Management), PP (Production Planning). Other modules are PM (Plant Maintenance), PS (Project System), QM (Quality Management), WM (Warehouse Management), LE (Logistics Execution), FM (Fund Management), HRD (Human Resource Development). Reporting in ERP known as Logistics Information System Information System (LIS), Sales Information System (SIS), Purchase Information System (PIS), Shop Floor Information System (SFIS) and industry-specific solutions (IS) (SAP 2006). While the module of ERP-II includes Business Warehouse (BW) or Business Intelligence (BI), Customer Relationship Management (CRM), Supply Chain Management (SCM), Supplier Relationship Management (SRM), Product Life cycles Management (PLM) and many others (Moller 2005, Motiwalla & Thomson 2009, Chan 2010).

ERP Emphasizes on business transformation that leads the changes in business processes in an effort to maximize company profits. MPI Group (2012) and Gartner (2013) shows that there are still many companies that do not use ERP yet and they are planning to implement ERP. Many companies are less successful in implementing this system (Panorama 2012). Some of ERP image are expensive, high implementation costs (Graham 2009), risky and

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complicated. Panorama (2013) reported that 40% of ERP projects still fail. One cause of failure is improper package selection (Ghosh 2012), not identified a unique and critical processes in selection (Ramco 2005), the failure of selection can affect the implementation failure (Gupta & Kumar 2012). Several studies of the critical success factors (CSF) also showed the importance of the ERP system selection carefully (Sanchez & Bernal 2013), as critical success factor and extreme factor on ERP implementation (Upadhyay *et al.* 2011). However, many companies take this important decision without based on proven selection methodology (BDC 2013), whereas the selected ERP system contributes significantly to the success or failure of ERP implementation (BSM 2010, Yang 2010), positive or negative effect on ROI (BDC 2013) and successful adoption of ERP (Tsai *et al.* 2012, Jayawickrama & Yapa 2013).

Rayner & Woods (2011) from Gartner defines ERP system as part of the organization's strategy and methodology of ERP selection should include alignment of company strategy criteria (Ziaee *et al*. 2006, Bakas *et al*. 2007, Bueno & Salmeron 2008, Unal & Guner 2009, Vorst 2012). This is to avoid what is called by Masini (2003) and Beard & Sunmer (2004) as a "common system paradox". The company lost its competitive advantage because of the best practice adoption and the unique practice was not built in ERP system, a defensive strategy (Beard & Sunmer 2004, Ragowsky & Gefen 2008). The development of the ERP system must reflect the competitive advantage (Beard & Sunmer 2004, Ragowsky *et al.* 2005, Uwizeyemungu & Raymond 2012), use the literature and the latest perspectives in management of strategy (Helm & Hall 2006). Strategic theory of delta model (Hax & Wilde 2003) is the complement of IO theory from Porter and RBV (Barney 1991), the framework of the strategy that is the most responsive and effective (Federix 2008) in line with the rapid development of information and communication technology (Ludviga & Chirjeuskis 2010). Delta model can explain the alignment of ERP systems with the intended strategy of the company whether the Best Product (Low Cost and Diffentiation), Total Customer Solution or System Lock-In.

Previous Research

ERP selection is the first major process for the adoption of ERP system, therefore many previous studies related criteria, methodologies, approaches and tools. Some researchers focus on researching important criteria of selection such as Kumar et al. (2002), Sudzina *et al.* (2008) and Vorst (2012). Most researchers use criteria of ERP function and features, ERP vendors and consultants (Ifinedo 2006), ERP adoption cost (Kumar *et al.* 2002, Shyur 2003, Wei *et al.* 2005). Ziaee *et al.* (2006) and Unal & Guner (2009) adding fit strategy as selection criteria while Lien & Chan (2007) using the criteria of ISO9126 quality of software. So far there has been no research that uses ISO25010, quality of software and quality of use, which has compatibility and security as new characteristics. Vorst (2012) takes into account strategy and change management criteria. Some researchers use criteria with approach-tools and some including methodologies such as Shyur (2003), Wei *et al.* (2005), Verville *et al.* (2007), Bakas *et al.* (2007) and Burton (2011), see Table 1.

Table 1. Previous research on ERP selection criteria, approach-tools and methodology

Researcher	ERP Selection Criteria						Approach-Tools	Metho-dology
	Strategy	Function /Features	Vendor/ Consultant	Change Manaje-men	Cost	ISO		
Kumar *et al.* (2002)		X	X		X		-	
Shyur (2003)		X	X		X		ANP	X
Wei *et al.* (2005)		X	X		X		AHP	X
Ziaee *et al.* (2006)	X	X	X		X		Mod	
Lien & Chan (2007)			X		X	X	FAHP	
Verville *et al.* (2007)		X	X		X		-	X
Ayag & Ozdemir (2007)		X	X		X		FANP	
Bakas *et al.* (2007)	X	X	X		X		-	X
Bueno & Salmeron (2008)	X	X			X		Fuzzy	
Sudzina (2008)	X	X	X		X		-	
Unal & Guner (2009)	X	X	X		X		AHP	
Cebeci (2009)		X	X		X		DSS-BSC	
Karsak & Ozogul (2009)		X	X		X		ANN-ANP	
Onut & Efendigil (2010)		X	X		X		FAHP	
Asgari *et al.* (2011)		X	X		X		TFuzzy	
Burton (2011)	X	X	X		X		-	X
Vorst (2012)	X	X	X	X	X		-	
Kamfiroozi *et al.* (2012)		X	X		X		AHP, Entropi,	
This Research	**X***		**X**	**X**	**X**	**X***	**TFNN TFGA**	**X***

Based on background and previous research, this study was conducted to explore the important selection criteria in the ERP selection, alignment of company

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strategy with delta model strategic theory approach, quality of software and quality of use criteria with refer to the latest ISO25010 international quality standards (ISO/IEC 25010 2011), as well as change management. Developing methodologies with one of stages is delta assessment process to sharpen the unique and critical analysis, and using quantitative tools Triangular Fuzzy - Neural Network (TFNN), Triangular Fuzzy - Genetic Algorithm (TFGA) as alternative tools and delta model approach. The complete comparation with the previous research can be seen at Table 1.

2. METHODOLOGY DEVELOPMENT

Research framework in the development of ERP selection methodology is structured to achieve the research objectives and solve the problems in the ERP selection. Based on the methodology development of several theories that have been developed specifically on ERP selection, literature study and experience, formulating model of integrated ERP selection methodology as the framework development of the methodology on this study. The framework development of ERP selection methodology consists of forming the construction of ERP selection criteria, approaches-tools and the construction of procedures, mechanisms, stages in ERP methodology to integrate all the component in the model.

Important criteria in ERP selection

Selection methodology provides guidance on every stage whether the criteria or characteristics that influence the selection of ERP should be noted, measured and optimized. Alignment of strategy and business processes are the main characteristics in the selection of ERP systems with point view of delta model strategic alignment. Some other criteria are the quality of software and the quality of use that complies with the ISO25010 quality standards on software quality, vendor – consultant, change management and costs.

Approaches and Tools

A Quantitative approach of Triangular Fuzzy - Neural Network (TFNN) is used on the stage of analysis and evaluation. The Triangular Fuzzy - Genetic Algorithm (TFGA) is applied at the selection stage. While the delta model is used in every stage of ERP selection methodology. TFNN is used to overcome the complex hierarchical criteria of ISO25010 quality of software and TFGA is applied to optimise quality of use and costs criteria.

Stages of Methodology

Stages in methodology is developed from basic concept of strategic alignment model (SAM) and ERP selection methodology from Bakas *et al*. (2007) by modernizing the traditional approach, directly into the design process "To Be" in analysis and evaluation stage and adding new stage, delta assessment, as one of the important stages, giving special attention to the uniqueness processes and the competitive advantage of company that can not be adopted directly from the ERP best practices. In the methodology is also developed linkages between important selection criteria, delta model strategic alignment, approaches and tools in every stage of methodology, so it becomes a complete and integrated guidance for the ERP selection. The methodology that has been constructed and developed is named PADS methodology, see Figure 1. PADS methodology comprises the stages of preparation, analysis and evaluation, delta assessment and selection.

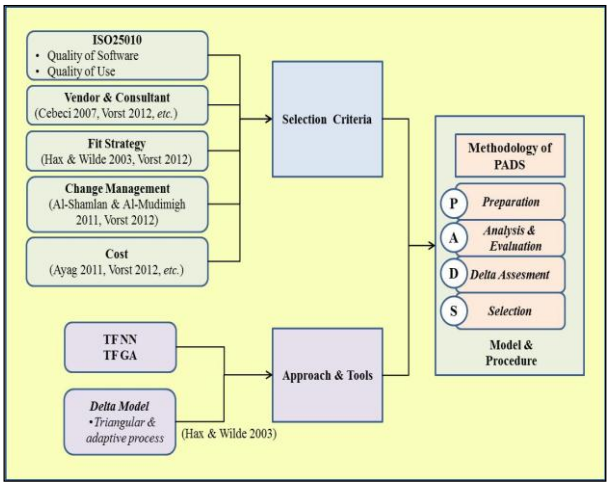

Figure 1. The PADS methodology that has been developed.

3. MODEL VALIDATION AND EVALUATION

Data Collection

This study used a survey methodology and expert interviews to conduct validation test of the PADS methodology model that was developed. Sampling of expert was determined with purposive sampling method. List of SAP ERP experts in Indonesia prepared

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to meet the criteria of competence, experience and integrity. Then all the experts were given a questionnaire, which had been validated and corrected, by email. The results will be used to test the model validation. List of 32 qualified expert respondents was obtained. 29 experts could be contacted and willing to provide email data. The questionnaire and summary of the PADS methodology were sent via email. Respondents were given time to read and learn about the PADS methodology that was sent first. Until the certain time period, 23 experts responded the survey, so the response rate reach 79% of the questionnaires or 72% of the experts list. This number is more than sufficient as a condition for both analysis and testing using PLS path modeling analysis (Wold 1989, Barclay *et al.* 1995) and t student test (Winter 2013).

Model Validation

Validation of the model is defined as evidence that the model in the application domain has the consistency of a satisfactory accuracy in accordance with the intended application of the model (Sargent 2010a). Hypothesis test can be used on a variety of validation techniques for testing. The hypothesis model is H0: Model valid versus H1: Model Invalid (Sargent 2010b). The model is valid in this study if getting score from expert assessment ≥ 70, this value is standard certification test for graduation in the SAP ERP module. Another technique for examining the construction of models that include latent variables and indicators is using Partial Least Squares (PLS) path modeling analysis developed by Wold (1982). This analysis has several advantages such as can be used in a small data sample, not normal spread required and can use formative and reflective relation mode (Ratono *et al.* 2010). The PADS methodology model will be validated using the PLS path modeling analysis. Note and comments from expert also be used as a qualititive validation result. Finally, a simulation of PADS methodology was applied to one consumer goods enterprise in Indonesia to test the model.

4. RESULT AND DISCUSSION

ERP Selection Methodology Model

Characteristics as criteria in the selection of ERP is an important part that must be analyzed in the ERP selection methodology, not only contains the methodology of selection process stages but also how the characteristics of criteria analyzed optimally. Integrated methodology should include criteria for determining critical stage of the process with the approach and analysis tools for the optimization function. Referring to the Bakas *et al.* (2007) idea about the ERP selection process models, in this study, using some of the same term with some modifications and adaptations, such as combining the analysis and evaluation stages into one stage and adding a new stage, delta assessment. PADS methodology comprises the stages of preparation, analysis and evaluation, delta assessment and selection. Providing guidance in every stages technically, selection criteria, approaches and tools used. PADS framework includes four stages, each of which is integrated between strategy, organization and processes, criteria and approaches-tools (Figure 2).

Preparation phase

This stage is to identify the needs of the ERP system in line of vision, mission and strategy of the company's business, both in the short, medium and long term. Top management should be the sponsor of ERP project, because the ERP implementation will involve all level of management and employees across departments and functions. Formation of selection team and implementation of ERP with the people that has high competence in business processes in each department and across functions and involving the change management team from the beginning of project. Team should improve skills of ERP through initial training on various best practices that are owned by their respective ERP. The focus is on the best practice in ERP industry solution. The team also prepared a basic requirement that must be met by ERP, ERP list of vendor-consultant, identify cost - benefit arising from the implementation of ERP and must be aligned with the goals and strategy of the company. The result of this stage is a list form of ERP vendors and consultant with their profiles and a list of basic criteria.

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	Preparation	Analysis & evaluation	Delta assessment	Selection
Strategic Position	• Vision, Mission and overall business strategy koheren • Project sponsor • Focus on future strategy	• Set strategy priority: Best product, total customer solution, system lock-in	• Strategic unique practice built on ERP	• Align strategy with adaptive process (operational effectiveness, customer targeting, bonding inovation)
Organisation and IT processes, skills & infrastructure	• Compose cross-functional experience & skill project team • Get update best practices solution • Use future infrastructure	• Mapping of function, related strategy • Mapping of To Be business proses with best practices (IS) • Data & transaction complexity • Infrastructure	• Delta business process requirement • Delta As Is vs To Be for training & change management (CM)	• Incorporate supplier, complementor & customer in key business process • Allocate time & resource for training
ERP System & Vendor	• Clarify expected ERP benefits • Industry Solution (IS) & relevancy to business	• Checking technology, quality of Software (ISO25010) • Vendor & Consultant methodology & tools	• Delta solution and effort • FRICE list	• Checking quality of use (ISO25010) with Demo or POC • Cost • After service support
Deliverable	• Profile & Potential list of ERP System & Vendor	• Aligned strategies & processes. • RFP to Vendor • Fungtional Req.	• Delta Solution • Delta As Is vs To Be (CM) • FRICE List	• Selected ERP • Contract
Tools	• Fit criteria	• TFNN	• Pareto	• TFGA

Figure 2. The PADS framework.

Analysis and Evaluation Phase

This stage identifies further positioning strategy and its relation to map and analysis of function modules that enable the strategy, as well as the mapping of the company's core business processes with ERP solution at industry best practice. There is relation between strategy and ERP modules in ERP and ERP-II. Based on a review of the strategy Delta Model, if the strategy position to be achieved in the form of a best product: low cost and differentiation. It is necessary enabler of ERP modules such as FI, CO, MM, PP, PS, PM, PC, SD, QM and analytic tools of LIS. Enabler of ERP-II could use additional modules SCM and PLM. Furthermore, for a total customer solution strategy required additional modules like CRM and analytic tools of BW/BI. System lock-in strategy required additional modules from ERP-II CRM, BW/BI and SRM. The infrastructure should support collaboration system between company, customer, supplier and complementor with web - network application. Based on the analysis and evaluation of business processes in ERP, identified the potential magnitude of the volume of transaction and data that will rise as well as the necessary of infrastructure. At this stage, ERP vendor and consultant were assessed on the quality of software (ISO25010) criteria, implementation methodologies and tools of vendor-consultant, alignment of strategy and change management. The results of the analysis will be selected by TFNN approaches-tools. Some ERP vendor-consultant getting the best score go to next stage.

Delta Assessment Phase

After the stage of analysis and evaluation can be known potential business processes that are not included in the ERP industry best practice solutions, but because this is the core business processes, must be built into the ERP, and called the delta solution. ERP Consultant will not be easy to build this delta solution in ERP implementation as well as business process best practices, already built in ERP and it is important to be a major concern of companies and ERP vendors or implementor. Team should build a solution or alternative solution then the implementation team should integrate the solutions into ERP best practices to be unity and seamless in the ERP system. It is need time to design, coding, testing and accepted by key user. Delta documentation is very important and must contain in the list of FRICE (forms, reports, interfaces, conversion and enhancement) to make a priority and

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monitored tightly. Agile modeling can be a practice-based methodology for modeling and documentation of software-based systems to address the delta solution (Balaji & Murugaiyan 2012). This stage also identifies potential delta between current vs "To Be" business processes and anticipate the proper change management and project culture for successful implementation (Bočková & Škoda 2014). At this stage company and vendor-consultant agree the representative sample of business process scenario that will be demonstrated for the next stage. Demo as an important part of how ERP vendor and consultant to prove their solutions concepted.

Selection Phase

At this stage, adaptive process strategies are aligned. Company should conduct socialization to internal user, key customers and suppliers about the ERP implementation. Training to be intensified and knowledge validation is also very important to overcome the user resistent by describing the potential economic benefits of ERP (Bani-Hani *et al.* 2013). ERP vendor-consultant present solutions and perform the demo. How vendor-consultant can solve the problem and give the best solution of the business process scenario. This demo can be assessed for ISO25010 quality of use criteria. Another selection criteria to be considered in the assessment is the cost of ERP implementation and post-implementation support service factor. TFGA approach-tool is used to value vendor-consultant. Top manajemens judge one of the best two of vendor-consultant as the winner and get sign the contract.

Overview and Description Analysis

General data of experts includes the position, experience, certification or training which have been gained, the working area and industry. Distribution of respondents position include director, general manager, manager, independent consultants, business process manager and sap specialist. Distribution of expert experience in the field of ERP is also important to note, can be seen in Figure 3. 78% of respondents experts have over 15 years experience.

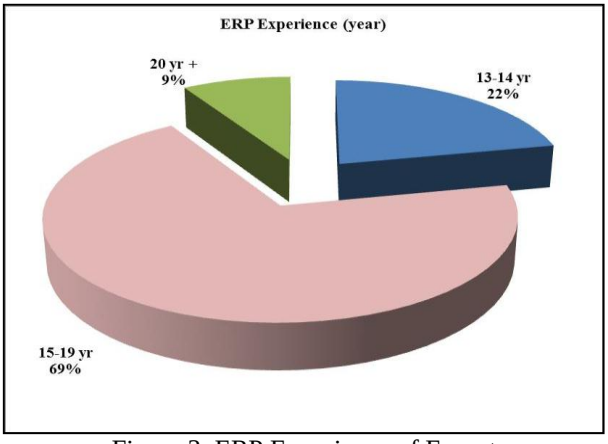

Figure 3. ERP Experience of Expert

Expert competence can be confirmed from the certification or training that has been acquired. Certification and training are scattered in various modules or functions. An expert can have more than one certification expertise in modules or functions and normally not more than two modules, Figure 4.

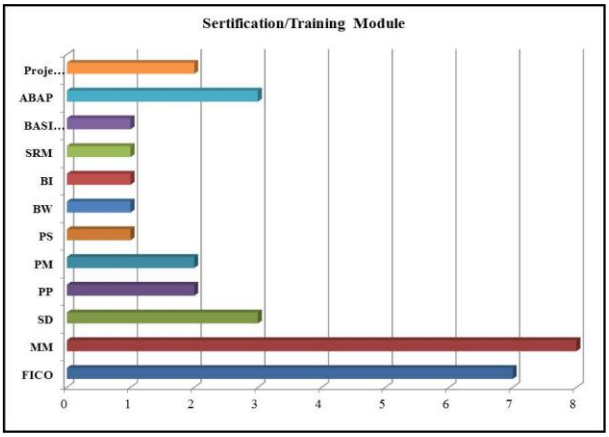

Figure 4. ERP Competence of Expert

Another interesting picture to be seen is the industry experience of the respondents. Experience of experts are spreading across 17 industries, see Figure 5. An expert may have expertise in more than one industries.

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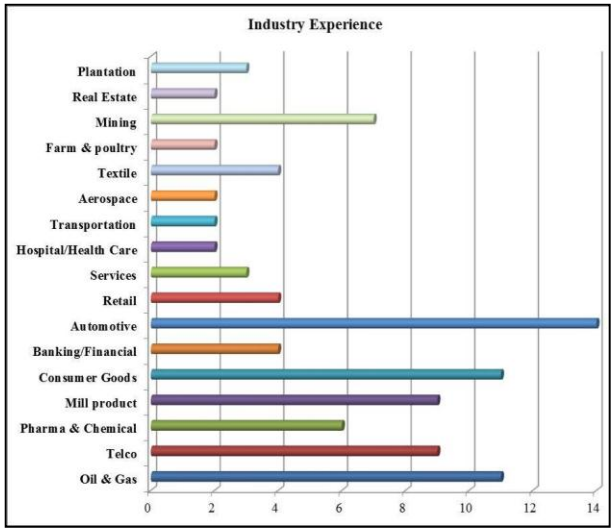

Figure 5. Industry Experience of Expert

Model Validation of PADS Methodology

Partial Least Square (PLS) Path Modeling Analysis
The data were processed using software SmartPLS (Ringle *et al.* 2005). The results of data processing with PLS path modeling analysis can be seen in Figure 6. The latent variable structural equation can be written as follows:

PADS Metodologi = 0,614*Selection Criteria + 0,204*Approach-Tools

The value of the coefficient for each independent latent variable determined the structure model of PADS methodology. Component of selection criteria has a relatively more important role than the component of approach-tool with value of the coefficient 0.614 or 75%, while the approach-tool has a coefficient 0.204 or 25% in developing latent constructs PADS methodology. Greatest reflection latent variables by indicator variables is the selection criteria of quality of use (ISO25010) indicators with value 0.795 (79.5%), meaning the selection criteria latent variable can be explained 79.5% by the indicator variable quality of use and then vendor-consultant with value 0.781 (78.1%), the quality of software (ISO25010) 0.690 (69%), fit strategy 62%, change management 54.3% and cost 22.6%. The latent variable of approach-tool is reflected by each indicator TFNN then TFGA 91.1%, 92.3% and 77.4% by delta model. Delta assessment indicator provides the greatest reflection 83.5% to the latent variables PADS methodology, followed by the selection indicator 82.2%, analysis-evaluation 78% and preparation 62.1%.

Goodness Criteria of PLS Path Model
According Hanseler *et al.* (2009) criterion for the good of the PLS models include outer and inner models. Outer model is a causal relationship between latent and indicator variable while inner model is a causal relationship between latent variables. Composite, indicator reliability and AVE are measuring outer model analysis, can be seen in Table 2. Outer model analysis confirms reliability and validity model, see Table 2 and Table 4. Inner model measure the structural framework of the model on the latent variables and how the causal relationship between latent variables with R^2, path coefficients and effect size.

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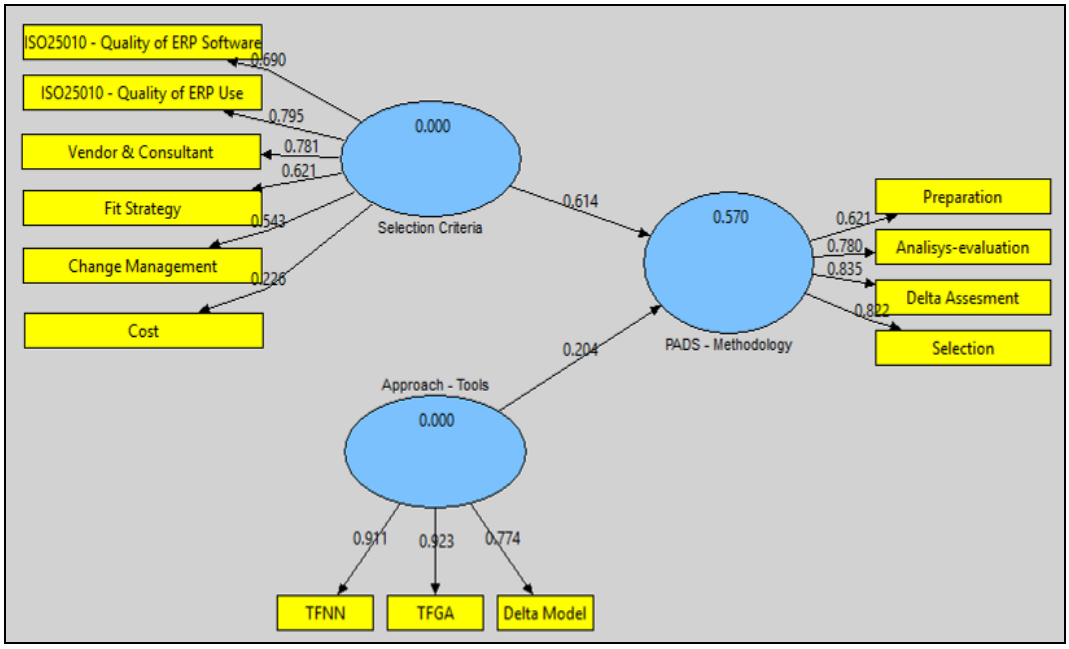

Figure 6. PLS validation result

Table 2. Outer model – standard vs research

No	Criterion	Standard versus Reseach Result
1	Composite reliability ρ_c	Standard: Measure of internal consistency $\rho_c > 0.6$ Research: All laten variable have the values $\rho_c > 0.6$. Values for each laten variable: selection criteria, PADS methodology and approach-tools are 0.79, 0.85 and 0.90. And Cronbachs Alpha values 0.699, 0.769, 0.838.
2	Indicator reliability	Standard: Absolute standardized outer (component) loadings should be > 0.7 or Igbaria *et al.* (1997) should be > 0.5 Research: All indicator values get loading order > 0.5 except for cost indicator (0.226) but the result of t bootstrap test on cost indicator is still significance.
3	Average variance extracted (AVE)	Standard: AVE or √AVE > 0.5 Research: All the laten variable AVE and √AVE > 0.5 exception for selection criteria AVE = 0,41 and √AVE = 0,64.

Table 3. Inner model – standard vs research

No	Criterion	Standard versus Reseach Result
1	R^2 model	Standard: R^2 values of 0.67, 0.33, or 0.19 described as substantial, moderate or weak by Chin (1998) Research: R^2 model value of PAD methodology is R^2 = 0.57 means moderate - substansial.
2	Path coefficients	Standard: The estimated values for path relationships in the structural model should be evaluated in terms of sign, magnitude and significance. Research: All coefficient values are significance with t bootstrap test.
3	Effect size f^2	Standard: $f^2 = (R^2_{included} - R^2_{excluded}) / (1 - R^2_{included})$ values of 0.02, 0.15, 0.35 mean whether a predictor latent variable has a weak, medium, or large effect at the structural level. Research: f^2 values of selection criteria laten variable = 0.504 means having large effect at structural model and approach-tools = 0.169 means medium effect at structural model.

R^2 model = 0.57, means 57% variances can be explained by model and categorised as moderate-substansial (Chin 1998), see Table 3.

All coefficient values are significance according to t bootstrap test, see Table 3 and Table 5. Selection criteria has large effect and approach-tools has medium effect at structural model, see Table 3.

Table 4. Reliability and validity of latent variable

	Composite Reliability	Cronbachs Alpha	AVE	√AVE
Selection Criteria	0.790148	0.699288	0.408339	0.639014
PADS Methodology	0.851358	0.769434	0.591789	0.769278
Approach-Tools	0.904302	0.838318	0.760131	0.871855

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Table 5. Result of t bootstrap test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	t Statistics (|O/STERR|)
Selection Criteria -> PADS Methodology	0.614066	0.620993	0.064826	0.064826	9.472522*
Approach-Tools -> PADS Methodology	0.203735	0.210926	0.092095	0.092095	2.212227*

Test of Student's t for Model Validation

Test of student's t is used as supplement the results of the PLS path analysis for PADS methodology models formed. The validity of the model will be determined by the validity of each of the components that comprise the selection criteria, approach-tools and PADS methodology along its stages. The hypothesis test is :
H0 : Model Valid (average score ≥ 70)
H1 : Model Invalid (average score < 70)
Score limit value of 70 is used to refer to the minimum passing score of module certification. t-test performed on the three components of the model include ERP selection criteria (SC), approach-tools (AP) and PADS methodology (PM). The t test results can be seen in Table 6.
The average value of the highest score obtained by the component selection criteria (CS) with average value 84.78 and then PADS methodology (PM) and approach-tools (AP), with average value 84.13 and 79.78. The results of the t test shows all the variable get p-value = 1, so it can be concluded that the null hypothesis (valid models) can not be rejected statistically by the data. The test reconfirms the results of PLS path analysis that PADS methodology valid for all latent variables.

Table 6. Result of t test validation

t test for selection criteria (CS), approach-tools (AP) and PADS methodology (PM)

Test of mu >= 70 vs < 70

Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P-val	PNrj	PNks
CS	23	84,7826	9,2292	1,9244	88,0871	7,68	1,000	>0,100	>0,150
AP	23	79,7826	10,0542	2,0964	83,3825	4,67	1,000	>0,100	>0,150
PM	23	84,1304	8,0696	1,6826	87,0198	8,40	1,000	>0,100	>0,150

The Qualitative Survey Result

Some experts provide notes or comments related to the PADS methodology as qualitative results. Selection criteria using ISO25010, P21 expert said, "With the use of the complete ISO25010 criteria will get the ERP application and implementor that in line with expectation". Furthermore, regarding the components of the approach-tools, delta model is a very good strategy and helpful, as said by experts of P21, "Delta Strategy helps accelerate getting the right solution to determine a suitable system", and P22 experts say, "Delta model is a very good concept". Components, mechanisms and stages of the PADS methodology according to expert is helpful in ERP selection process as P22 expert said, "Mechanism and stages are very helpful. Especially about the selection criteria in each stage that are not known by all IT team". This qualitative result is generally also very supportive to previous quantitative assessment.

A Real Case Sample of an Enterprise

Simulation of PADS methodology also was conducted to a consumer product company (PT Nippon Indosari Corpindo) in Indonesia and got a good feedback as complete and helpful methodology for ERP system selection in addressing improper package selection, unproven methodology and select the right ERP system carefully, where ERP selection is as part of critical success factors in ERP lifecycle adoption.

5. CONCLUSION

From the results of this study can be drawn conclusions:
1. The PADS methodology for ERP selection using a delta model has been developed, validated and tested for a sample case of an enterprise.
2. The PADS methodology integrates ERP selection qualitative and quantitative approach, guides the process, criteria, inputs, outputs and tools in every stage of the selection. TFNN, TFGA, and delta model as a approaches-tools contribute 25% component of the PADS methodology. PADS methodology incorporates important criteria in the ERP selection that complies with the ISO25010 quality standards on software quality.
3. Together with vendor-consultant, fit strategy, change management and cost in the selection criteria contribute 75% to formation of the model.

Future Research

The proposed ERP selection methodology has not been designed to distinguish the scale size of an enterprise. Therefore, it is suggested to extend the research on the proposed ERP selection methodology for various industrial scales to examine whether there are statistically significant differences in various scales of

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enterprises. The more advanced research is to link or integrate the PADS methodology for ERP selection with another system for ERP implementation and maintenance as a continuous and cyclical process in enterprises.

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