Thai IT Professionals Individual Values, Organization Size, and Management of Software Development

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Abstract

The management of software development is a vital factor which leads to the success of the software project. The most important component involved in the project is the team members. Individual values of Thai IT professionals should affect the software development management practices. In this research, we found that individual values in small organizations include conformity and universalism while large businesses are influenced by self-direction and universalism. In case of medium organizations, there are additional individual values which are achievement and benevolence. Mixed individual values are required for the smooth software development management practices. Moreover, Thai IT professionals are influenced by professional culture and national culture.

Keywords: individual values, organization size, project management, software development management practices

1. Introduction

Software development industry in Thailand has become an important role in both business organizations and government agencies. This is because of high competition which requires utilizing the capability of information technology, especially software. However, most software development projects still have faced the failure problem. According to the report from the Standish Group in 2009, the rate of successful IT projects decreased with 32% of all projects succeeding (delivered on time, on budget, with required features and functions); 44% were challenged (late, over budget, and/or with less than the required features and functions); and 24% failed (cancelled prior to completion or delivered and never used). Although, we cannot find the statistics like the Standish Group, we believe that Thai IT projects follow the same western manner. In this report, the experienced project manager is a success factor. As a result, effective project management is significant to any software development project.

When software development is emerged, a work team is a significant component as it is a primary mechanism for developing software. Teams with the right people are more likely to be effective and efficient in software projects (Klein *et al*., 2002; Gorla & Lam, 2004). Many researchers identify characteristics of the members of the IT team in terms of skills, knowledge or expertise (Project Management Institute, 2008; Schawalbe, 2010, Siau, K., et.al., 2010) while some of them research on personality characteristics (Kaiser and Bostrom, 1982, Stevens, 1998). Although, there are many researches related to organizational culture (Harper and Utley, 2001, Leung, 2002, Jirachiefpattana, 2005, Leidner. and Kayworth, 2006), there have been few studies on individual values of IT professionals. In social sciences, individual values play an important role in explaining how work to be done (Meglino and Ravlin, 1998, Ros, et.al., 1999, Lord and Brown, 2001, Rice, 2006). Furthermore, organization size also impact on performance and behaviors (Majumdar, 1997). Talacchi (1960) stated that different size of organization has a differential impact on level of employee satisfaction. What his/her wants or desires are derived from the values (Meglino and Ravlin, 1998). Because, software development projects mostly employ human resources, the values of each member of software development project typically influence the way he/she works on the project, in particular different size of organization.

In this study, we explore which individual values of Thai IT professionals influence on software development management practices that contribute to the successful delivery of a software product, regarding to the organization size. For this purpose, we adopt the theory of the structure and content of the basic values distinguished by individuals (Schwartz. 1992) and employ the software development management practices used in the survey in the European countries (Dutta, et.al, 1999) modified by Leung (2001-2002). In addition to the objective of the research, we classify the organizations by the number of employees based on the definition of Canadian Council (Industry Canada, 2003).

2. *Theoretical Background*

2.1 Organization Sizes

2.1.1 Definitions

The size of a business can be defined in many ways, by the value of its annual sales or shipments, or by its annual gross or net revenue, the size of its assets, or the number of its employees. In different countries, the definition is quite different, for example, EU categorizes companies as "micro" if they employ than 10 employees, those with fewer than 50 employees as "small", and those with fewer than 250 as "medium" (European Commission, 2005). By contrast, in the United States, small business often refers to those with less than 100 employees, while medium-sized business often refers to those with fewer than 500 employees. The traditional definition of the organization sizes in Germany had a limit of 250 employees, while, in Belgium it could have been 100 (Briciu, Groza, and Gânfălean, 2009). In Canada, The Canadian Council of Ministers of the Environment defines service-business size according to the number of employees. Small business has less than 50 employees. Medium Business has 51 to 500 employees (Industry Canada, 2003). Because software development is a service business, this study therefore classifies the size of organization according to the definition of Canadian Council.

2.1.2 Organizational Characteristics

Organizational size is considered important for its structure and process. Small firms are less hierarchical and have the organizational flexibility and freedom to take more risks than larger ones which are operated accordance of a more aggressive business plan (Winger, 1994). Employees in small firms are directly influenced by managers compared with managers of large organizations (Çakar and Ertürk, 2010). In the beginning stages of a company, control and coordination occurs through informal interactions and centralized decision making. When the company grows, its attention shifts to develop a set of formalized systems (Tony Davila, 2005). Small organizations can be more innovative because they have greater flexibility/adaptability (Lee and Xia, 2006). However, majority of small businesses have financial and resource problems, a lack of in-house IS personnel and expertise, short-range management perspectives, lack of adopting standards and planning (Orser, et.al, 2000; Lee and Xia, 2006; Laporte, et.al, 2008).

By contrast, larger organizations tend to be formalization, more decentralized decision-making, greater task specialization, and more complex forms of communications. The study by Orser et.al (2000) showed that larger firms were more likely to involve in planning than small ones. Many studies on organizational innovation suggest that organizational size should positively affect organizations' capability to adopt innovations, partly because large organizations have more complex and diverse facilities that contribute to the adoption. In addition, they are more aggressive in their innovation endeavor (Lee and Xia, 2006; Çakar and Ertürk, 2010).

2.2 Individual Values

To identify individual values, a measurement is required. The most popular scales for measuring values are those of Rokeach (1973), Inglehart (1971), Schwartz (1992) and O'Reilly, et.al (1991). We discuss each in turn. Rokeach (1973, p.5) defines value as "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence". He argues that each value is ordered in priority of importance relative to other values. Thus, individuals differ in their value system because of variations in personal and cultural experiences. Rokeach identified two kinds of values which are instrumental values and terminal values. Each contains 18 values. Terminal values refer to end-states of existence whileas instrumental values are defined as modes of behavior used to arrive at end-states. While terminal values focus on 2 groups: personal and social, instrumental values are subdivided into moral versus competence value classifications.

Another widely used values measures is materialism/postmaterialism (MPM) proposed by Inglehart (1977). He refers materialist values as the values related to economics and political stability while postmaterialist values are the values concerned with social and peace. He and his colleagues conducted surveys in nine European countries. The results showed bipolar. The negative pole contained five materialist items and the opposite group included five of six postmaterialist items.

Later, Inglehart and Baker (2000) designed the World Values Surveys to provide a comprehensive measurement of all major areas of human concern, from religion to politics to economic and social life. The result illustrated two dimensions reflected the different worldviews of the people of the rich societies and those of low income societies. The two dimensions included (1) Traditional/ Secular-rational and (2) Survival/Self-expression values. Inglehart and Baker related a shift from traditional to secular-rational authority to modernization, and a shift from survival to well being called postmodernization, a replacement of material goals.

O'Reilly, et.al (1991) developed an instrument called "Organizational Cultural Profile" (OCP) to measure person-organization fit. This instrument contains 54 value statements that can be used to assess organization values and individual preferences. Their research provides a based definition of the pattern of values that explains organizational culture. This pattern is consistent to the pattern of attributes of the individual preferences. The individual values include eight dimensions which are innovation, attention to detail, outcome orientation, aggressiveness, and supportiveness, emphasis on rewards, team orientation, and decisiveness.

Schwartz (1992) defined values as conceptions of the desirable that guide the way individual to select actions, evaluate people and events, and explain their actions. In this view, values are trans-situational criteria or goals ordered by importance as guiding principles in life. From 21 questions, Schwartz grouped them into 10 basic values (see Table 1). Then, he organized these basic values into 2 dimensions. The first dimension is openness to change versus conservation that emphasizing on independent thought and action and favoring change (self-direction and stimulation) in contrast to conservation that emphasizing self-restriction, preservation of traditional practices, and protection of stability (security, conformity, and tradition). The second dimension is self-enhancement versus self-transcendence that emphasizing acceptance of others as equals and concern for their welfare (universalism and benevolence) to those emphasizing the pursuit of one's own success and dominance over others (power and achievement). Hedonism is related both to openness to change and to self-enhancement.

In order to response the objective of this research, the Schwartz Value Survey (SVS) is selected as our measure of these values because it meets two important criteria. First, it is a globally developed and validated measure of individual values by many researchers (Schwartz's research are cited by other academics more than 3000 publications). Second, the SVS is a measure of individuals' core values, not their present transient work behavior values. Thus, it was important to use a measure that taps into the enduring core values of the individual that will be reflected in their future, as well as present work behavior, given the dynamic business environment in Thailand.

2.3 Software Development Management Practices

As Schwartz stated that values as a guide for selection or evaluation of behavior and events, software development management practices should be influenced by the values of members of the software development team. There are many researches regarding to software development practices. Many of them researched only some particular practices such as software maintenance, schedule estimation, techniques, tools, (Banker, et.al., 1998, Cusumano, et.al. 2003, Verner, et.al., 2007). However, there were a few researches that studied cover various aspects of software development management. Dutta et.al (1999) conducted a survey on software management practices in European communities. The questions of the survey were influenced by the previous researches, such as Capability Maturity Model (CMM), Europe's Bootstrap Model and Process Improvement and Capability dEterminator (SPICE). In the survey instrument, they divided software development practices into 5 areas which are organizational and management practices, standards and procedures, metrics, control of development process, and tools and technology. They found that adoption levels are higher in some areas, such as organization and management practice, and control of development process. By contrast, management practices related to metric, and tool and technology are less adopted by the European countries.

In 2001-2002, Leung adopted the practices introduced by Dutta, et.al as a starting point for studying the situation of software development management in China and Hong Kong. He selected only those practices with average adoption rate over 50% and arrived at 20 practices for his study as presented in Table 2.

Verner, et.al (2007) explored project management practices in order to provide a basic set of factors influenced the success of projects. They developed a questionnaire to collect data from Australian software developers. There were five aspects of project management: project manager, requirement analysis, cost/schedule estimation, risk assessment and post-mortems.

Although Verner, et.al provided a set of software development practices, the practices focused on five areas of project management. These practices are different from the study of Dutta, et.al and Leung which covered more aspects of the management practices. Furthermore, the survey questionnaire was conducted in wide range of countries in Europe. Hence, we adopt the set of software development management practices provided by Leung (2001-2002) as the independent variable in our research.

3. Methodology

The aim of our research is to find out the influence of Schwartz's individual values on the adoption of good software development management practices, in particular different organization size. In order to find out the answer, a questionnaire was used to collect relevant data. The questionnaire consisted of three parts. The questions of the first part asked about general information related to the respondent and his/her organization. The second part consisted of twenty one questions related to his/her values according to Schwartz's instruments. The last part asked about twenty software management practices modified by Leung (2001-2002). For the questions in the second and third section, we employed five Likert scales to represent the level of the respondent's opinion. The questionnaire was translated from English into Thai. The Thai version needed some adjustments so that it was suitable for completion by Thai speakers. The questionnaire was reviewed and edited wordings by a Thai IT academic professor graduated PhD. from Australia. The questionnaire was pretested with thirty Thai IT professionals who were not included in the sample.

The target respondents of the research were the persons working in computer departments and related to software development project in the IT outsourcing companies in Thailand. Unfortunately, there are a lot of people working in this industry. Therefore, the sample size is 384 calculated with 95% confident from unknown population. The survey used the drop-off, pick-up method to collect data (Steele, et.al 2001). We sent the questionnaires to 400 Thai IT professionals working in twenty IT outsourcing companies sampled from the list of software and IT firms provided by the National Software Industry Information Mining (NSIIM). There are 384 responses which equal to 96%. We got high response rate because of one of our colleagues is working as a business analyst in an IT consulting firm and has a good relationship with people in this industry. The organizations of the respondents are grouped into 3 categories: small (number of employees less than 51), medium (number of employees range 51 to 500) and large (number of employees more than 500). From the responses, we found that there were 107, 182 and 95 organizations, respectively.

To answer our research question, we employ stepwise regression analysis to identify which individual values influence on which software development management practices. We drop low coefficient correlation and selected only the values which contain coefficient more than .250 in to the regression analysis. Individual values dimensions are derived from twenty one questions and served as the independent variables. Similarly, the dependent variables are calculated from twenty software development management practices. To analyze data, SPSS is utilized.

According to criteria for utilizing regression analysis, multicollinearity tests were performed. The variance inflation factor (VIF) and the condition index (CI) are the statistics generally used to test the collinearity. According to Hair, et.al (1998), VIF is an index of the effect of other predictor variables on a regression coefficient. If the regression model contains a high VIF, it means that there is a high degree of collinearity or multicollinearity. Generally, the accepted VIF is not greater than 10.0. In this study, VIFs ranged from 1.00 to 1.410 (Table 5-7) which well below the threshold value.

In addition, CI is also employed to measure the presence of collinearity. Thus, if the value of CI is larger than 30 and the proportion of variance for each regression coefficient is .90 or above, these indicate a problem of collinearity (Hair, et.al 1998). In the case of our study, most CIs are less than the threshold value, except the test of control of software development process and 4 individual values (self-direction, benevolence, universalism, and power). Fortunately, the variance values do not exceed .90. Therefore, there are no collinearities. Together, these two collinearity diagnostics indicate no problem associated with multicollinearity in the research data.

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4. Findings

4.1 Demographic Data

We found that demographic data of three groups are not too different. Most respondents are female, except the small organizations; age less than 30 years; graduated bachelor degree from university in Thailand in Information Technology, and Computer Science; and currently work as programmers or systems analysts. Most of them work in small and medium companies less than 5 years and have experienced related to software project divided into 2 groups: 1-5 years, and more than 10 years. These mean that the respondents consist of experienced IT professionals and less experienced ones. Only large organizations employ most experienced staffs and work for more than 5 years. Most IT projects in small come from government office while medium companies involve the projects from fashion, clothes and cosmetics industries. However, the responses from large organizations tell us that their software projects are less related to government office and manufacturing; the projects come from various industries.

4.2 Descriptive Data Related to Individual Values and Software Development Management Practices

In cases of individual values, there is no different among organizations. We found that in regardless to organization sizes, the 3 highest average score are benevolence, universalism, and hedonism, respectively while power is the lowest average value as presented in Table 3. The results reflect that most respondents believe they are careful, helpful, loyal, honest, responsible, and forgive to people around them. They also think that everyone is equal; the justice is important; people must listen to others and concern about environment. At the same time, they prefer pleasure and enjoy life. On the other hand, most the respondents do not give credit to wealthy, authority and social power. Hence, Thai IT professionals give the focus on other people closed to them which matches to Thai national culture (Hofstede, and Hofstede 2005).

Table 4 also shows the average scores of the software development management practices. The practice scores of each category has quite similar pattern; except the respondents from large businesses give the most important practice to metrics. All practices receive scores more than 4 from 5.0. This means that the respondents highly agree with the practices though they work in different organization size. The next sections present the results from regression analysis. The results show to what extent the individual values influence on the software development management practices, regarding to the size of organizations.

4.3 The Influence of Individual Values on the Software Development Management Practices

4.3.1 Small Organizations

The results from stepwise regression analysis for small organizations are shown in Table 5. There are only 2 individual values included in the regression models to explain the variation of the management practices. These are conformity, and universalism. Only conformity value affects on the organizational structure and management practice about 25.9 % (R^2 = .259). The rest of management practices are influenced by universalism value about 26.4%, 17.2%, and 17.8%, respectively.

According to the findings of this study, the conformity value is involved in only the first software development management practice. It allows members of software team in small businesses to obedient in order to be accepted by people around them (Hofstede and Hofstede, 2005). Especially, Thai culture gives importance to "Pu Yai" (respect for managers, elders, teachers and so on). The belief in "Pu Yai, would permit Thai IT professionals fall into line with their senior managers. As the result, Thai IT professionals easily follow the practices directed by the project manager. The universalism value indicates that Thai IT professionals prefer justice, listen to other people and have broadmindedness. This value supports Thai IT staffs to perform standard and procedures, metric establishment, and control software development process. For IT project, metrics is needed to measure quality of outputs from an IT team. Establishing metrics not only just create them but the team also has to feedback the facts about the metric for product and process improvement. Moreover, in order to get confident and satisfaction from clients, universalism value promotes the IT staffs to reasonably accept those practices.

4.3.2 Medium Organizations

Table 6 documents individual values included in the regression models for medium businesses. These are self-direction, conformity, universalism, achievement, and benevolence. The findings show that the organizational structure and management is influenced by self-direction, conformity and universalism about 26.9% (R^2 =.269).

Meanwhile self-direction and achievement can explain the variation in adoption of the standards and procedures about 26.2% (R^2 = .262). This research also found that the metrics practice is affected by self-direction and achievement about 20.8% (R^2 = 20.8). In addition to the research outputs, the control software development process can be explained by self-direction, benevolence, and universalism. The amount of explanation is about 23.7% (R^2 =.237).

The research findings reveal that self-direction related to every software development management practice. This may be because larger firms gain more flexibility, more formal management process, and more skilled or professional workers than small businesses (Damanpour, 1992; Chang and Ho, 2006; Laporte, et.al, 2008). Normally, skilled workers prefer self-direction values. Therefore, formal management process supports these professionals to perform the software development management practices as it allows IT staffs to plan and control their works, to follow standard and procedure established by the organization, and to utilize data and statistics for quality improvement. The self-direction value not only allows creative people like Thai IT people to show a strong achievement but also allows them to demonstrate their independent thinking and exploring risk, benefits and viability of project (Mumford, 2000). The achievement of this practice indicates their capability and successful. In addition to, other members will respect him or her.

Although IT professionals are independent, prefer freedom of thinking; do not like using power or controlling (Prager, 1999), the self-direction value of Thai IT professionals should not be an obstacle for managing the practices. This may due to the activities for this practice aim at controlling the achievement of quality and closing the project, not for preventing their creative. While the conformity is another individual value influenced the organizational structure and management, the universalism value affects 3 management practices: organization structure and management, metrics, and control of software development process. The effect of these two values can be explained as stated in small organizations.

Moreover, the regression model shows that the benevolence value influences only the management of control of software development process. According to Schwartz (1992), the motivational goal of this value focuses on preservation and enhancement of welfare of people with whom one is in close contact. This value also creates trust among people in the team and clients. Activities related to perform control of software development process include controlling resources, obtaining signoff, and setting procedures for testing and for controlling changes. To exercise those activities, trust from people involved in the project may be required (Brunetto and Farr-Wharton, 2007).

4.3.3 Large Organizations

In the case of large organizations, the outputs from the regression analysis are presented in Table 6. Individual values included in the regression models are self-direction, conformity, and universalism. The individual values which involve self-direction, and conformity influence the acceptance of the organizational structure and management about 24.1% (R^2 = .241) whereas only the self-direction affects on the standards and procedures, and control of software development process about 30.3% and 24.5%, (R^2 = .303, and .245) respectively. Meanwhile, the metrics practice is explained its variation by the self-direction, and universalism about 24.5%.

As stated in the previous section, this type of organizations can employ high technical knowledge workers and follows on formalization and standardization more than smaller organizations. Moreover, IT projects done in larger organizations are likely complicated with resulting in utilizing expertise from high skilled workers. This kind of workers, especially IT professionals are autonomous. As a result, IT professionals prefer freedom in order to organize how they handle their works (Dinger, et.al. 2010). Software development management is difficult tasks which require creative staffs to generate ideas and explore new solutions in order to accomplish their jobs. Therefore, self-direction value encourages Thai IT professionals to perform such complicate software development practices in such the large firms.

Similarly to small and medium organizations, the organizational structure and management practice is influenced by conformity while universalism value affects on the metrics. The explanation of their influence is not different from other organizations.

5. *Conclusion and Implications*

Thai IT professionals rank benevolence, universalism, and hedonism as first-three important values. While the control of software development process is the most important practice for small and medium businesses, but the metrics is the first rank for the large organizations. When we analyzed the effect of the individual values on the software development management practices in difference type of organizations, the results illustrate that dominant individual values in small organizations include conformity and universalism while large businesses are influenced by self-direction and universalism. In case of medium organizations, the influenced individual values are not only the same as those organizations but also achievement and benevolence. Although, benevolence, universalism, and hedonism obtain the highest scores, only universalism is involved in the influence regardless of the different organization size. This is because theses individual values provide cooperative and supportive social relations of people both inside and outside groups. As a result, smooth functioning is arisen (Schwartz and Bardi, 2001).

With disregarding to the size of organizations, this study also reveals that conformity value is the only one affected on the acceptance of the organization structure and management practice. The underline of this value is Thai culture and religion. Obedient and respect to older people is the one of the most important teaching foundation in Buddhism. Hence, conformity value promotes smooth group working. However, this value has more influence in small organizations than the larger ones. In contrast, the common individual value affected on all software development management practices in larger organizations is self-direction value. This is resulting from management style and capability to employ experienced staffs.

In case of organization structure and management practice in larger organizations, we found that there are conflict values: self-direction and conformity. Even though conformity value located on the opposite of self-direction (open to change VS conservation), both of them support Thai IT professionals to accept hierarchical management, follow plan, and search and create new solutions. In contrast, the metric practice in small businesses is explained by universalism while self-direction is the additional value included in the motivation for the larger enterprises (Schwartz and Bardi, 2001). However, self-direction receives higher influences than universalism in large organizations.

For the medium businesses, there are several individual values are involved in the explanation. Self-direction and achievement influence the standards and procedures while the control of software development process is influenced by self-direction, benevolence and universalism. Nevertheless, only self-direction contributes to these management practices in large organizations. This finding implies that when the organizations grow up, the motivation values will change to self-direction which allows IT professionals to work productively.

According to the discussion above, we can generally suggest that to manage IT project, a project manager should be aware that Thai IT professionals are bounded with IT professional individual values and national culture. Moreover, mixed individual values are required for the smooth software development management practices. Therefore, if IT organizations need to encourage these management practices, they have to balance the conflict of individual values and to promote supported values even though they do not be involved in the regression models. Although changing individual values is a very difficult tasks and unable to do in a short time, Thai IT project managers should evaluate individual values of every team member in order to understand their colleagues. The project manager should make explicit the need to perform the software development management practices. Moreover, recognition and reward systems should be set up with regard to performance of the member related to the practices. Even though, power is the last ranked, it is probably needed to authorize some legitimacy power in order to encourage IT staffs to work for the project. However, the project manager should employ his/her leadership to lead appropriate behavior of the members and maintain or create project environment for keeping on the self-direction value.

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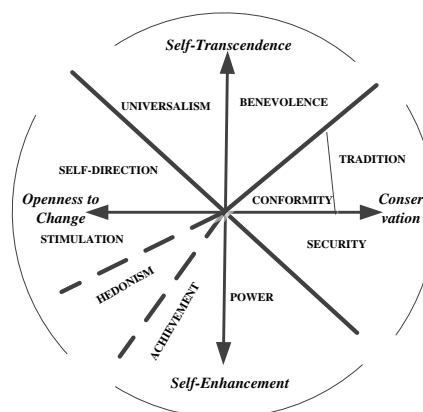**Figure 1: Model of Relations among Ten Basic Values (Schwartz, 1992)**

Table 1: Meanings of 10 Basic Individual Values

Basic Individual Values	Meaning
Power	Social status and prestige, control or dominance over people and resources. (social power, authority, wealth, preserving my public image)
Achievement	Personal success through demonstrating competence according to social standards. (successful, capable, ambitious, influential)
Hedonism	Pleasure and sensuous gratification for oneself. (pleasure, enjoying life, self-indulgence)
Stimulation	Excitement, novelty, and challenge in life. (daring, a varied life, an exciting life)
Self-Direction	Independent thought and action-choosing, creating, exploring. (creativity, freedom, independent, curious, choosing own goals)
Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature. (broadminded, wisdom, social justice, equality, a world at peace, a world of beauty, unity with nature, protecting the environment)
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact. (helpful, honest, forgiving, loyal, responsible)
Tradition	Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide the self. (humble, accepting my portion in life, devout, respect for tradition, moderate)
Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms. (politeness, obedient, self-discipline, honoring parents and elders)
Security	Safety, harmony and stability of society, of relationships, and of self. (family security, national security, social order, clean, reciprocation of favors)

Source: Schwartz (1992)

Table 2: Common Software Development Management Practices

Management Areas	Management Practices
Organizational Structure and Management	1. Have a software project manager for each project 2. Have a software quality assurance plan 3. Establish a change control function for each project 4. Ensure user/customer input at all stages of the project 5. Ensure critical non-software resources available according to plan 6. Usage of prototyping methods in checking the requirements of the software
Standards and Procedures	7. Formal assessment of risk, benefits, and viability of projects prior to contractual commitment 8. Application of common coding standards to each project 9. Formal procedures for estimation of effort, schedule and cost 10. Test planning prior to programming 11. Periodic reviews of status of each project by management 12. Formal procedures for passing over deliverables from one group to another 13. Independent testing conducted by users or a Software Quality Assurance team
Metrics	14. Record and feedback of estimated versus actual efforts into estimation process 15. Log post-implementation problems and track the effectiveness of solution 16. Existence of records from which all current versions and variants of systems can be quickly and accurately reconstructed
Control of Software Development Process	17. Production of estimates, schedules, and changes only by the project managers who directly control the project resources 18. Have procedures for controlling changes to requirements, design and documentation, and code and specifications 19. Obtain signoff from all parties before changing project plans 20. Ensure testing/verification of every function

Source: Leung (2001-2002)

Table 3: The average score of Individual Values Classified by Organization Sizes

Individual Values	Small N = 67			Medium N = 222			Large N = 95		
	Mean	SD.	Rank	Mean	SD.	Rank	Mean	SD.	Rank
Self-direction	4.0746	.47874	4	4.0180	.48004	5	4.0684	.57709	6
Stimulation	3.7015	.73371	9	3.7162	.70268	9	3.7211	.81448	9
Hedonism	4.0896	.61500	3	4.1757	.56540	3	4.1316	.60235	3
Security	3.9552	.61380	6	3.9640	.55760	6	3.9263	.54562	7
Tradition	3.8209	.63783	8	3.7590	.61965	8	3.8737	.66831	8
Conformity	3.9104	.62113	7	3.9482	.55736	7	4.1105	.63656	4
Universalism	4.4129	.50616	2	4.4925	.44359	2	4.5158	.48808	2
Benevolence	4.4776	.50327	1	4.5180	.47768	1	4.5632	.49056	1
Achievement	4.0224	.58668	5	4.0608	.57445	4	4.1053	.59203	5
Power	3.5597	.69371	10	3.5721	.68549	10	3.6526	.67270	10

Table 4: The average score of Software Development Management Practices Classified by Organization Sizes

Software Development Management Practice	Small N = 67			Medium N = 222			Large N = 95		
	Mean	SD.	Rank	Mean	SD.	Rank	Mean	SD.	Rank
Organizational Structure and Management	4.1164	.63737	4	4.1342	.63517	4	4.0905	.66574	4
Standards and Procedures	4.2257	.57786	3	4.1802	.60662	3	4.1895	.70378	3
Metrics	4.3532	.59425	2	4.3498	.59597	2	4.3789	.64249	1
Control of Software Development Process	4.3881	.58108	1	4.3694	.66408	1	4.3605	.73270	2

Table 5: Influence of Individual Values on Software Development Management Practices in Small Organizations

	Organizational Structure and Management		Standards and Procedures		Metrics		Control of Software Development Process	
	Constant	Conformity	Constant	Universalism	Constant	Universalism	Constant	Universalism
b	2.074	.522	2.206	.487	2.206	.487	2.253	.484
SEb	.434	.110	.589	.133	.589	.133	.574	.129
β		.509		.414		.414		.421
t	4.782	4.767	3.748	3.671	3.748	3.671	3.928	3.746
sig	.000	.000	.000	.000	.000	.000	.000	.000
Tolerance		1.000		1.000		1.000		1.000
VIF		1.000		1.000		1.000		1.000
	$R = .509$, $R^2 = .259$, $R^2_{adj} = .292$, SEE = .55285, F = 22.724, Sig = .000		$R = .514$, $R^2 = .264$, $R^2_{adj} = .252$, SEE = .49961, F = 23.291, Sig = .000		$R = .414$, $R^2 = .172$, $R^2_{adj} = .159$, SEE = .54496, F = 13.479, Sig = .000		$R = .421$, $R^2 = .178$, $R^2_{adj} = .165$, SEE = .53101, F = 14.036, Sig = .000	

Table 6: Influence of Individual Values on Software Development Management Practices in Medium Organizations

	Organizational Structure and Management				Standards and Procedures			Metrics			Control of Software Development Process			
	Constant	Self-direction	Conformity	Universalism	Constant	Self-direction	Achievement	Constant	Universalism	Self-direction	Constant	Self-direction	Benevolence	Universalism
b	.661	.405	.227	.212	1.267	.548	.175	1.319	.371	340	.505	.419	.237	.284
SEb	.418	.087	.078	.096	.339	.077	.065	.405	.087	.081	.484	.089	.095	.108
β		.306	.199	.148		.434	.165		.276	.274		.303	.170	.166
t	1.582	4.643	2.896	2.207	3.739	7.082	2.700	3.259	4.246	4.213	1.044	4.730	2.490	2.298
sig	.115	.000	.004	.028	.000	.000	.007	.001	.000	.000	.298	.000	.014	.023
Tolerance		.773	.709	.745		.898	.898		.856	.856		.855	.750	.675
VIF		1.293	1.410	1.342		1.114	1.114		1.168	1.168		1.170	1.333	1.482
	R = .519, R^2 = .269, R^2_{adj} = .259, SEE = .54674, F = 4.871, Sig = .028				R = 512, R^2 = .262, R^2_{adj} = .255, SEE = .52359, F = 7.290, Sig = .007			R = .457, R^2 = .208, R^2_{adj} = .201, SEE = .53264, F = 17.753, Sig = .000			R = .487, R^2 = .237, R^2_{adj} = .226, SEE = .58411, F = 5.280, Sig = .023			

Table 7: Influence of Individual Values on Software Development Management Practices in Large Organizations

	Organizational Structure and Management			Standards and Procedures		Metrics			Control of Software Development Process	
	Constant	Self-direction	Conformity	Constant	Self-direction	Constant	Self-direction	Universalism	Constant	Self-direction
b	1.398	.420	.239	1.458	.671	.839	.500	.334	1.806	.628
SEb	.505	.111	.101	.434	.106	.541	.101	.120	.470	.114
β		.364	.229		.551		.449	.253		.495
t	2.770	3.779	2.371	3.361	6.360	1.549	4.947	2.791	3.841	5.487
sig	.007	.000	.020	.001	.000	.125	.000	.006	.000	.000
Tolerance		.888	.888		1.000		.853	.853		1.000
VIF		1.126	1.126		1.000		1.172	1.172		1.000
	R = 490, R^2 = .241, R^2_{adj} = .224, SEE = .58645, F = 5.621, Sig = .020			R = 551, R^2 = .303, R^2_{adj} = .296, SEE = .59067, F = 40.448, Sig = .000		R = .594, R^2 = .353, R^2_{adj} = .339, SEE = .52233, F = 7.790, Sig = .006			R = .495, R^2 = .245, R^2_{adj} = .236, SEE = .64025, F = 30.110, Sig = .000	