The 2nd International Conference on
Information Technology
and
Business Application (ICIBA) 2013

"ICT for a better life"

22 - 23 February 2013
Aryaduta Hotel, Palembang
Indonesia

The 2ⁿᵈ International Conference on

Information Technology

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The Rector's Greeting

Greetings and a warm welcome to the all Academic Researchers, Practitioners, Industry and Business Person as well as Policy Makers. Thank you for attended this 2nd INTERNATIONAL CONFERENCE on INFORMATION TECHNOLOGY and BUSSINESS APPLICATION 2013 (ICIBA 2013).

ICIBA is an annual event focusing on state of the art technologies pertaining to digital information and communications and its application in business and industry as well as government. The applications of advanced information technology to such domains as networking, security, education, finance, geosciences, health, transportation, supply chain management and logistics are among topics of relevance to ICIBA. The conference features keynote speakers, the best student award, poster award, technical open panel, and workshops/exhibits from industry, government and academia as well postgraduate student colloquium.

All papers for the ICIBA 2013 on this Conference Proceeding (ISBN) was indexed by EBSCO, Google Scholar, and sent to be reviewed by EiCompendex and ISI Proceedings.

Our gratitude to all the participants who has take a part in this conference, I hope we can take the advantage of academic research findings, to have better insight about the importance of IT and business application, to the country's economic development

Sincerely yours,
Prof. Ir. H. Bochari Rahman, M.Sc

RECTOR of BINA DARMA UNIVERSITY

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Management

ANALYSIS AND DESIGN OF INFORMATION SECURITY MANAGEMENT SYSTEM (ISMS) AT COMPUTER NETWORK INFRASTRUCTURE OF BINA DARMA UNIVERSITY

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Abstract. *Edi Surya Negara "Analysis and Design of Information Security Management System (ISMS) for Computer Network Infrastructure at Bina Darma University" guided by. H. Bochari Rachman and Ahmad Lutfi.*
Information is one of a very valuable asset owned by a company or organization. Sufficient resources and adequate, should be allocated to protect information assets through the implementation of information systems security policies measured in accordance with existing standards. Bina Darma University is one of the university in South Sumatra that carry out education system by using information technology. Therefore we need an information security policy in accordance with the standards of information security. Information security policies are able to developed based on standard Information Security Management System (ISMS) or better known as the Information Security Management System (ISMS) ISO / IEC 27001. Information security management system provides a systemic approach to the form control objective in managing sensitive information with the aim of securing information. The approach taken to achieve this is to use the model of Plan-Do-Check-Act (PDCA). PDCA is a recurring activity to solve a problem of quality control.

1 INTRODUCTION

Information is one of assets which has important positon for management in strategies or operational sides. Security can be got by doing some strategies which can do with concurrtent and it implementation with well. One of strategy which can be done to ensure that the information security run well is apllying Information Security Manajement System (ISMS) Information security is information guarding from all threat which may be done to make certain efforts or certify business continuity, reduce business risk, and maximum investment back and business opportunity (ISO 27001 in Sarno dan Iffano, 2009, 27). According to Syafrizal, M. (2007) that information security includes to protection toward following aspects :

1. Confidentiality aspect refers to aspect which certify confidentiality of data or information, ensure that information can be accessed by owner and certify confidentiality of data which is send, accept, and saving.
2. Integrity aspect refers to aspect which certify that data cannot change without permission from authorized, keep the accurately and totality of information and the process method certify this aspect.
3. Availability aspect refers to aspect which certify that data will be available when it is needed, ensure the used which has opportunity to use information and the supporting tools (things which has connection).

ISO/IEC 27001 is Infomation security standard which populer in using. ISO/IEC 27001 contains which specification or regulations which should be filled in building the information security management system. It has independent quality toward information technology, presuppose the using of management approach based on the risk and it is designed to guaranted the security control which is used is able to protect information asset from damages and give emphasize to the security level which is use by the authorized.
ISO/IEC 27001 refers to the standard document of the information security management system (ISMS) which gives general description about the things which should be done in implementation of the information security concept. Sarno dan Iffano (2009, 187) state that security control based on the ISO/IEC 27001 includes to 11 seciruty control clauses security control clauses, 39 control objectives 133controls. Syafrizal, M., (2009) give more explanation that information security which is launched at October 2005 by International Organization for Standarization and International Electro technical Commission. This standard change BS-77992:2002.
Bina Darma University is one of university in South Sumatera which uses education system with applicate the information technologies, such as: e-learning, website of university, web mail, information system academic, wifi area, and so forth. To keep the security and guaranted each of information technology asset, it is need application of Information Security Manajement System(ISMS) and making management document of information technology which can control whole of information security at University of Bina Darma.
Standard of information security is one of important thing to be used at University of Bina Darma until it gives guaranted toward information which is included it. The problem which will be finished in this research is how to design Information Security Manajement System (ISMS) at University of Bina Darma by using ISO/IEC 27001 approach ? and how to make document management of information security at University of Bina Darma in order it can control what implementation of information security policy has suitable with the standard of ISO/IEC 27001 ?
The objectives of this resrach is producing standard document of information security at infrastructure of University of Bina Darma networking and document management of information security to give guaranted toward infomation security like ISO/IEC27001 at University of Bina Darma. This research is expected to has significances in giving a model and document management of information security management system (ISMS) at infrastructure of University of Bina Darma networking.
These are some of study which make research about information security management system (ISMS) as one of standard of information security policy.

1. Azis maidy muspa dan Aris tjahyanto make research about information securities management system based on ISO/IEC 27001. This research talk about academic information managing system. The finding of this research is information securities management system fo Magister of Management Technologu ITS. This document is used as cheklist guiding or control about standard quality/manual quality, procedure quality, instruction and form based on ISO/ICE 27001:2005 for observation toward academic information managing system.

2. Herny februariyanti (2006) research about standard computer security management. A succes way of information security system is vision and commitment form the leader of management. Other, information security system is alos decided from design process, implementation, configuration, and the using. Management of security operation should be filled many important thing, namely control and protection, monitoring and editing, and also understanding toward threat and vulnerabilitas.

3. Henricus Bambang Triantono (2007) do a research about security policy by using standard BS 7799 / ISO 17799 at information of organization security management system. This research discusses how to use the security policy by using standard BS 7799 / ISO 17799 at information of organization security management system – ensure that all of efforts are working to get the maximal security.

2 METHODOLOGY OF THE RESEARCH

Methodology of the research is way to collect data by looking objectives and significances of the research. Therefore, the writer does this research with some steps like analysis process and design of information security management system at infrastructure of computer network of Bina Darma University.

2.1 Methodology

PDCA model approach is kind of resarch methodology which is used in this researh (Plan – Do – Chek – Act). This is a process to solve the problem about four iterartif steps which is common used in quality control. Other, it use OCTAVE method to do Risk Analisis.
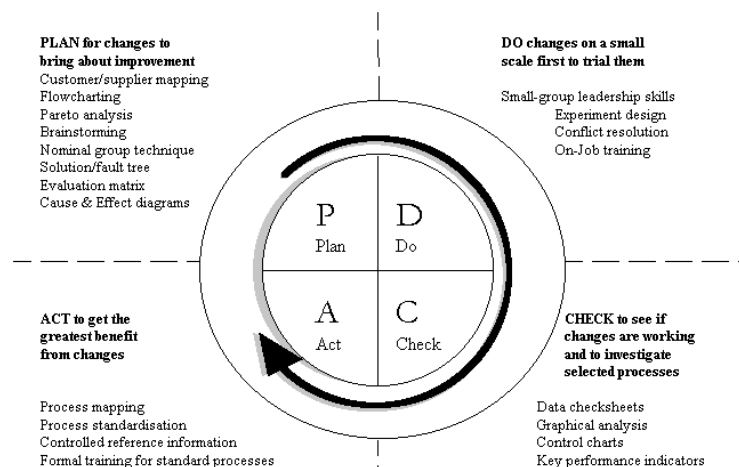
Figure 1. PDCA Model

Source : http://www.hci.com.au/hcisite3/toolkit/pdcacycl.htm

3 RESEARCH FINDING

3.1. OCTAVE-S Method Analysis Risk

Risk analysis by using OCTAVE-S method has activities as following below.

Fase 1 : Build Asset –Based Threat Profile.

Process S1: Identify Organizational Information.

S1.1 Establish Impact Evaluation Criteria.

S1.2 Identify Organizational Asset.

S1.3 Evaluate Organizational Security Practices.

Process S2 : Create Threat Profile.

S2.1 Select Critical Asset.

S2.2 Identify Security Requirements for Critical Asset.

S2.3 Identify Threat to Critical Asset.

Fase 2 : Identify Infrastructure Vulnerabilities

Process S3 : Examine Computing Infrastructure In Relation to Critical Assets.

S3.1 Examine Access Patha.

S3.2 Analyze Technology – Related Processes.

Fase 3 : Develop Security Strategy and Plans

Process S4 : Identify and Analyze Risk Process.

S4.1 Evaluate Impact of Threat.

S4.2 Establish Probability Evaluation Criteria.

S4.3 Evaluate Probabilities of Threat.

Process S5 : Develop Protection Strategy and Mitigations Plans.

S5.1 Describe Current Protection Strategy.

S5.2 Select Mitigation Approaches.

S5.3 Develop Risk Mitigation Plans.

S5.4 Identify Changes to Protection Strategy.

S5.5 Identify Next Steps.

The result of the evaluation at the phase 1 shows the number of questions in worksheet which is suitable with *very much, somewhat, not at all, don't know* categories and it will be described in *spotlight.* For this case, there are two analysis areas, namely:

- Strategic Practice Areas
- Operational Practice Areas

Spotplight :

Green – Has implementation in very good category until it does not need upgrading

Yellow – Has implementation by there are many things that should be upgrading

Red – Does not implementation

Strategic Practice Areas	Operational Practice Areas
1. Security Awareness and Training 2. Security Strategy 3. Security Management 4. Security Policies and Regulations 5. Collaborative Security Management 6. Contingency Planning / Disaster Recovery	1. Physical Access Control 2. Monitoring and Auditing Physical Security 3. System and Network Management 4. Monitoring and Auditing IT Security 5. Authentication and Authorization 6. Vulnerability Management 7. Encryption 8. Security Architecture and Design 9. Incident Management

Analysis at Strategic Practice Areas is shown as following histogram:
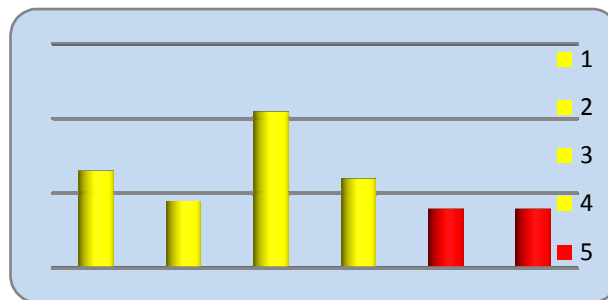
Figure 2. Histogram Strategic Practice Areas

Based on the histogram above, it can be seen that *Security Awareness and Training, Security Strategy, Security Management, Security Policies and Regulations* have *Spotplight yellow* which means it has implementation but there are many thing that is upgraded, meanwhile *Collaborative Security Management, Contingency Planning / DisasterRecovery* menjunkukan *Spotplight red* means does not implementation.

Anlysis at operational practise areas is shown at following histogram below.
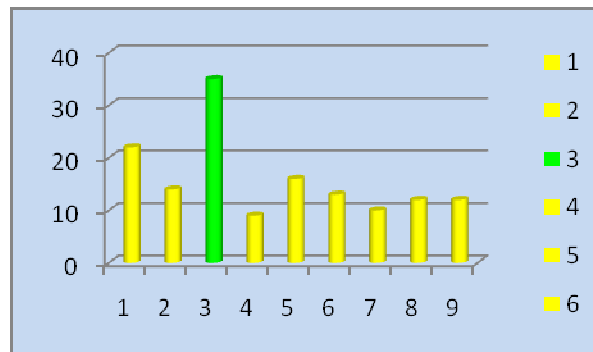
Figure 3. Histogram Operational Practice Areas

Based on the histogram above, ti can be seen that *System and Network Management* has *Spotlight green* means it has implementation with very good until it does not need upgrading, meanwhile *Physical Access Control, Monitoring and Auditing Physical Security, Monitoring and Auditing IT Security, Authentication and Authorization, Vulnerability Management, Encryption, Security Architecture and Design, Incident Management* have *Spotlight yellow* which means it has been implementation but it still need many upgrading.

3.2. Design Fase

OCTAVE-S method analysis risk is chosen as reference. Design of *Information Security Management System* at Bina Darma University belongs to ISO/IEC 27001 standard and it use SWOT analysis as basic for management design of information security policy.

Design of *Information Security Management System* is started by doing risk analysis. The result of risk analysis will be used as basic to do design which belongs to ISO/IEC 27001 standard. The process of making decision and analysis belongs to Assessment Checklist at ISO/IEC 27001.

SWOT analysis is arranged based on the interview toward authorized of Network Operation Center (NOC) and the result of questions list which is answered based on condition of the infrastructure security at Bina Darma University currently.

Based on the analysis which is done by the team, it is found that *Strengths*, *Weakness*, *Opportunities,* and *Threat.*

1. **Strengths**

   Nowadays, the internal factor which be *Strengths* of Bina Darma University in information security, namely:.
   a. *Asset Management* which implementation with good.
   b. *Access Control* toward infrastructure of information system which is implementationed with good.
   c. *Communication and operations management* which have been run at information technology at Bina Darma University.

2. **Weakness**
   a. There is no *security policy* at information security policy at Bina Darma University.

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b. There is no announcements toward civitas academic of Bina Darma University toward *Human Resources Security.*
c. There is no *Information Security Incident Management* in using of information security Bina Darma University.

3. **Opportunity**
   a. Development of information technology which is based on information security.
   b. Information security certificate of ISO / IEC 27001.
   c. The credence of other party toward certify of information security which is used in Bina Darma University.

4. **Threats**
   a. The using of instant application is raising and it gives negative effect toward information security.
   b. By upgrading the quality of information technology in other institute, Bina Darma University should develope information technology which orientation to information security.
   c. The negative effort which is done by *hackers and crackers* to disturb quality of institute can effect decrease of information even it make stop the information.

Based on the result of SWOT analysis which is done to get many strategies in upgrading information security at infrastructure of computer networking of Bina Darma University.

A. **Strengths Opportunities (SO) Strategy**
   1. Upgrading service for stakeholder.
   2. ISMS implementation refers to the ISO/IEC 27001 which follows the information security certificate.
   3. Decision of information security policy to upgrading quality of education service.

B. **Weakness Opportunities (WO) Strategy**
   1. Making of information technology security to upgrading quality of education service.
   2. Developing of *Human Resources Security to allow the announcement and seminar.*
   3. ISMS implementation refers to the ISO/IEC 27001

C. **Strengths Threats (ST) Strategy**
   1. Review the function of technology at organization continuously until it is suitable, accurate, clear and avoid from virus and hacker.
   2. Upgrading of information security technology is suitable with ISO 27001 standard.
   3. Arrange of document policy and information security procedure at Bina Darma University.

D. *Weakness Threats (WT)Strategy*
1. Making of information security technology policy to upgrading quality of education service.
2. Upgrading of *Human Resources Security to allow the announcement and seminar.*
3. Upgrading information security technology is suitable with ISO 27001 standard.

Arrange of document policy and information security procedure refers to supporting effort from risk analysis and SWOT analysis which is done toward infrastructure of computer network at Bina Darma University. The documents of information security policy at Bina Darma University are following below.

1. Information Security Management System Policy Document.
2. Pilot of Classify Information Policy Document.
3. The control of Right Access Policy Document.
4. Procedure control of Right Access Document.
5. The Using of Information Source Policy Document.
6. Security of Hardware Computer Network and Information Security Policy Document.

4. CONCLUSION

The conclusion which is got from the research finding is information security management system (ISMS) design has been produced in information security management document at infrastructure network of Bina Darma University. The result of analysis is shown the implementation priority of current.

Information Security Management System at Bina Darma University, as following below.

1. Make security configuration at infrastruture of computer network, make design of infrastructure security, arrange the policy document, and information security management.
2. Upgrading the *security awareness* at management, lecture, students, and officer.

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ANALYSIS OF CLOUD ADOPTION TRENDS IN EMERGING ECONOMIES USING TETRA-THREAT FRAMEWORK

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Key words: *Cloud Computing, Tetra-Threat Framework, Emerging Economies, Sustainable Advantage*

Abstract .*Technology has always acted as a leveler across businesses, economies and countries. This paper looks at Cloud Computing as a new wave technology option and the leveling impact that it has got between developed and emerging economies. The paper analyses the 'driver cum inhibitor landscape' of cloud computing adoption using the tetra-threat framework, a structure that analyses the sustainability of competitive advantage. In the context of emerging economies, the paper explains the cloud acceptance patterns of predominantly 'new customer' emerging markets with two counties in perspective – India a BRIC nation and Indonesia a MIST nation.*

1   INTRODUCTION

Technology in general and mass-adoption technologies in particular has always leveled the playing field across businesses, economies, individuals and nations. The arrival of the Personal Computer in the 1980s and the ubiquitous acceptance of the Internet in the 1990s reduced information arbitrage between the developed world and the new age developing world. The computer-internet duo eliminated the advantages of size, scale and scope hitherto held by a smaller and privileged eco-system and created an equal opportunity platform for all firms to reach out to global markets – be it to raise capital, or to source raw material or to finally sell their end produce. The explosion of the dot com business at the turn of the millennium was a definitive expression of this new found reach. The bubble bursting later is only a manifestation of Darwinism playing out in the digital landscape.

Today, Cloud Computing is at the threshold of creating another level playing field – reducing investment arbitrage. ICT investment is today a prime driver in the success of any industry / firm. Gathering, storing, retrieving, analyzing and interpreting information is the key to understanding environment dynamics, thereby improving business advantage. Platforms like ERP, CRM, SCM, DWBI and the likes are all key engines created with the technology backbone to levitate businesses to the next levels of performance. Yet, the acquisition and effective usage of these tools require a significant upfront capital investment. This again gives an undue advantage to players having the capacity to go for investments. Scale rules the game. Thus,

though the information is ubiquitous, thanks to the internet, its effective assimilation, storage, processing and usage is not on a level ground till the arrival of cloud. Cloud significantly reduces upfront CAPEX investment and simultaneously offers a lesser OPEX environment. One can think of cloud as the enabler of democratization in data processing. The value-add possibilities are immense.

Several studies have been conducted and documented on the economic impact of the acceptance of cloud as a business offering. The section on literature survey will list them in fair detail. Most of these studies are survey driven and user perception driven. This paper tries to fit in the sustenance of Cloud Computing as a business offering in the tetra-threat framework proposed by Pankaj Ghemawat [1]. The analysis is done using the same framework at two different levels. At level one, the industry which is analyzed is the entire ICT industry itself. In the context of ICT, Cloud Computing comes across as a substitution offering. As will be seen later, substitution – be it in technology or any other realm - offers optimality for new customers while being a sub-optimal option for existing customers. Since the growing markets of BRIC and MIST nations will have significantly more 'new' customers - given the currently low technology penetration – any new wave and cost effective technology will have a higher acceptance in the emerging world than in the developed world. The argument is applicable for the entire emerging markets and the two countries in mention – India and Indonesia are only illustrative examples.

At a second level, the same tetra-threat framework is imposed upon cloud, treating it as a stand-alone fledgling industry.The sustenance of the cloud offering is studied in the context of the framework's four possible threats – imitation, substitution, holdup and slack. This second level analysis tries to understand the reasons for the inhibition in cloud adoption today despite a fairly clear appreciation of the gains. The structural analysis is supported by some survey data from Indian as well as Indonesian SME respondents who are on the threshold of a possible cloud adoption.

2 INDIA AND INDONESIA – A COMPARISON

India and Indonesia have much more in common than a similar sounding currency. India, the fastest growing BRIC nation (the others being Russia, Brazil and China) and Indonesia the fastest growing MIST nation (the others being Mexico, South Korea and Turkey) have many common strengths and weaknesses. Indonesia started with a hyperinflation economy in the 1960s, but by using a series of price stabilizing measures achieved a sustained GDP growth of almost 7% for three consecutive decades before being temporarily set back by the sweeping East Asia Crisis in the late 1990s. The crisis caused the Indonesian economy to contract by an unprecedented 13% in 1998. But from the turn of the millennium, the country is back to the growth path and is registering a growth rate of around 6.5% in the new decade. Indonesia is now poised to join the trillion dollar economies with its current GDP hovering around the 900 billion USD mark.

India on the other hand had a flat and nominal growth rate of just about 3% till the economic liberalization was ushered in in the early 1990s. Since then the country has never looked back and is now one of the fastest growing economies in the Asian block lagging only behind China. Despite liberalization and considerable privatization and disinvestment, India still continues to be a dirigiste economy with its ruling class still having a neo-socialistic hangover of the Nehruvian era. In GDP terms, India is twice the size of the Indonesian economy and is expected to join the 2 Trillion GDP club by 2014.

On the positive front, both nations are attracting a lot of global investment, have stable democratic governments, are ICT friendly in terms of governmental regulations and have been insular to the most recent recession that has been holding the western world in a vice-like grip since 2008. Yet, on the flip side, both India and Indonesia have a lot to catch up in terms of power grid quality, internet penetration, broad band availability and data security management. As we shall see soon, a significant ramp up in these vectors will catapult both the countries to the top of the pile in the respective Goldman Sach groups to which they belong – BRIC and MIST.

3   LITERATURE SURVEY

As mentioned in both the abstract and the introduction, the cloud computing environment is analyzed using a framework called tetra-threat framework which has been proposed by Pankaj Ghemawat [1]. The model will be explained in fair detail in the next section. Comparison between Indian and Indonesian economies has been mostly taken from the internet, blogs and consultancy reports. One of them is an economic cum historical perspective offered by Thee Kian Wie [2]. The state of cloud readiness in Asia is given in the Asia Cloud Computing Association Report [3]. The report analyses the cloud industry as a function of attributes like Government Regulations, Data Protection Policy, Business Efficiency Index, Risk Management, Broadband Quality and the likes. Another white paper on the State of Cloud Computing Security in Asia by Dave Asprey gives indications of why businesses are still hesitant to move towards the cloud [4].

Coming to the research world that has reviewed the emerging area of Cloud Computing and its potential impact on business, cloud has been defined as '*The illusion of infinite computing resources available on demand*' by Michael Armbrust et al in a marquee paper from Berkeley [5]. The paper by Vaquero et al provides a more complete definition of cloud and associates various systems and stakeholders involved with cloud [6].Yashaswi Singh et all have come down from the strategic perspective to the tactical and explained the storage of data in cloud environment and its associated security issues [7]. Moving to the literature available on the Indian SME sector, Amit Singh Sisodiya talks about the challenges that the sector faces amidst deregulation, globalization and rapid technological disruption [8]. Monika Sharma et al talks specifically about the ERP cloud adoption by the SME diaspora and its associated cost savings [9]. The work done by Kaushalesh Lal takes one closer to the interdependence of SME and technology and explains the leveraging power of ICT in augmenting the existing labor productivity [10]. Incidentally consulting houses like KPMG, Gartner and Forrester have done extensive studies on global acceptance of cloud computing by small to medium size enterprises. The list is very long and hence the consulting house reports have not been given a specific citation.

Moving to some of the research work specifically done in the Indonesian cloud context, Charles Lim et al specifically evaluate the risk of cloud adoption with Indonesia in context [11]. Sinung Suakanto et al bring in some performance measurement matrices in the context of Cloud Computing Services [12]. Roland Tumbelaka et al compare the solution providers in the current Indonesian market and examine various business models in the realm of cloud computing [13]. Finally, Dedi Rianto Rahadi et al look at cloud computing implementation from the Indonesian SME perspective [14]. Many of the papers in the Indonesian context are analysis done on the service provider side.

Some of the authors of this paper have done some previous work in similar lines. Easwar et al look at the drivers and inhibitors of cloud adoption with a specific SME sector perspective [15]. The data in this work is Indian SME data. Easwar et al have also done studies on the Net Present Value (NPV) behavior for full vs. fractional adoption of cloud [16]. The study looks at the unknown fears of cloud adoption which stretches across dimensions like security, privacy, variability, redundancy, down time, contract breach management and the likes and develops a mathematical model to monetize these risks. The Net Present Value studies done were converted into a cash flow model with variability analysis also built in by the same authors [17].

As can be seen, most of the work done so far has been survey driven and response analysis driven. This paper builds on the established knowledge framework that has already been gathered empirically and proceeds to build a conceptual analysis framework which can assess the sustainability of competitive advantage of the cloud computing platform using the Tetra-Threat Framework.

4   THE TETRA – THREAT FRAMEWORK

The tetra-threat framework analyses the threats to sustainable performance for any business from two perspectives –nullification of added or scarcity value and difficulty in appropriability or capture of the added value. Added value is the scarce and therefore highly utilitarian value originally created by the industry / firm. This scarcity can be diluted and the value proposition of the original added value can be negated by two threats - Imitation and Substitution. These are two of the four threats in the tetra-threat framework. Imitation represents the 'duplication' of the original added value and is a direct threat to sustainability. Imitative development of scarce resources is all-pervasive and undermines the value of scarcity. Substitution is an indirect way to weaken the added value and is a 'displacement' technique compared to the duplication route of imitation. Imitation expands the supply of added value (by duplication) whereas substitution reduces the demand for a given added value (by displacement) by bringing in a 'superior' added value.

The full realization, capture or appropriability of the value already brought to the table can be subverted by two more threats – Hold Up and Slack. Together, the foursome of threats is referred to as the tetra-threats for performance sustainability. Hold up is a measure of the inability of the firm / industry to appropriate the added value because the value tends to get 'diverted' to complementary players in the system. Hold up is an external threat to value appropriability. Slack on the other side is an internal threat to the full realization and capture of value. Slack indicates a tendency for persistent internal sub-optimization. Slack threatens to 'dissipate' the hard-earned added value.

Picking up the 4 Ds mentioned in the last two paragraphs, the four value annulling routes in business sustenanceare *Duplication, Displacement, Diversion and Dissipation*. This paper analyzes the effect of the 4Ds in the context of Cloud Computing in two levels. At level 01, the entire ICT (Information and Communication Technology) industry is studied as a holistic ecosystem. Once the implications at that level are understood, at level 02 the sub-ecosystem called Cloud Computing is independently studied using the same framework.

5 TETRA-THREAT FRAMEWORK IN THE CONTEXT OF ICT INDUSTRY [LEVEL 01]

This paper proposes to do a two level Tetra-Threat Framework analysis of the Cloud Computing Industry. As mentioned earlier, at level one, the entire ICT industry is considered in its entirety. As far as the ICT landscape goes, Cloud Computing – as a business proposition is a Substitution entry. As explained below, the arrival of Cloud triggers the concept of displacement of added value. In this context, added value should be measured ex-ante to cloud arrival and compared ex-post after cloud arrival to get a sense of the displacement of value. The level 01 Tetra-Threat diagram is shown in Figure 01.

That Cloud Computing is a 'substitution'platform is highlighted by the following arguments. Cloud Computing moves the market from buying the product called computers to buying the underlying service called computing. Cloud Computing is a substitutional switch from asset ownership to asset utilization. Cloud Computing relieves the buyer from expensive upfront capital investment. Firms in a fund crunch would prefer to use up their precious high-cost initial seed capital to build assets that drive their revenue growth. In such a capital constrained scenario, any option of deferring capital investment will ease out the initial cash flow pressures. IT investment is a sunken cost for all firms except IT firms and hence firms – given an option like Cloud Computing – can choose the option of deferring upfront investment. Continuing on the 'substitution' pitch, Cloud Computing switches rigid fixed costs to flexible variable costs. Cloud converts current CAPEX (capital expenditure) to deferred OPEX (operating expenditure). Thus, from many perspectives, the Cloud offering is a substitute to the traditional in-house asset heavy computer usage model.
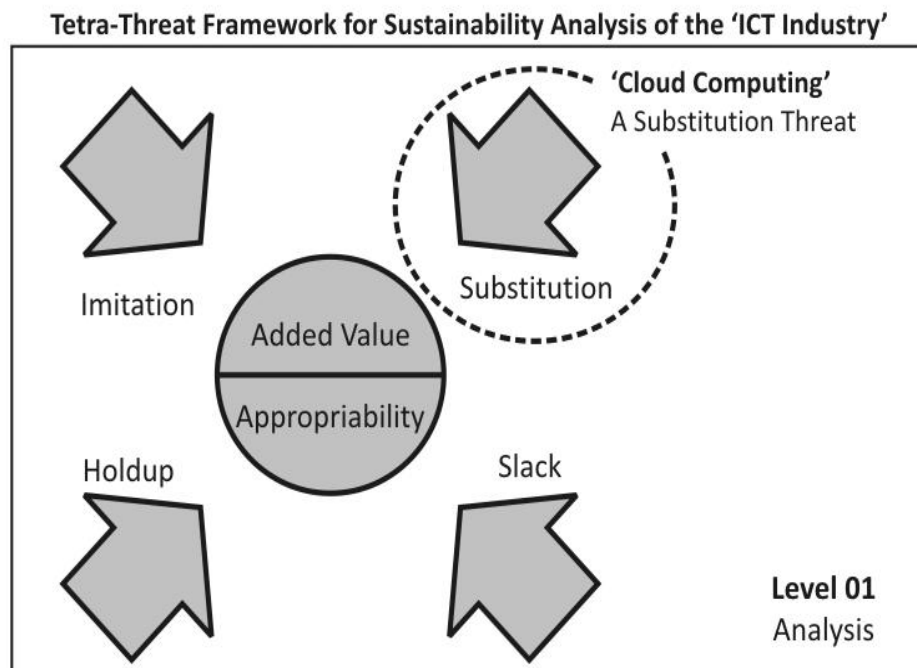
Figure 1 : Level 01 of Tetra-Threat Framework - ICT Industry

Once Cloud Computing – as a business proposition – is understood to be a substitution move, it now needs to be established that such a move will be more beneficial to emerging markets like BRIC and MIST nations. Any substitution is a suboptimal offering for the existing consumers and an optimal move for the new consumers. A few examples will drive home this point.

Take mobile telephony and its rate of growth in developing countries. Both China and India have a higher mobile usage than traditional land line usage. When mobiles first came to the market, the population who did not have any communication tool quickly went for the 'mobile only' option skipping land line. When electric cars come to the market in a big way, faster acceptance would be by those populations who are not saddled with an IC engine car. Those with an IC engine car will be slower to adopt the new age car since it is a suboptimal solution for them. Another example is the modular kitchen which is gaining a higher acceptance from those who are getting their flats and apartments currently ready. People who have an existing house with traditional kitchen will find that the switch to modularity requires heavy civil engineering reconstruction. Mobile telephony, electric cars and modular kitchens are all examples of substitution platforms. They all offer a suboptimum solution to the existing user biosphere.

Coming back to cloud, between switchers and new adopters, the diffusion of new technology will be more with new adopters (developing emerging countries) than switchers (developed countries). Both MIST nations & BRIC nations have low ICT penetration today. Hence the acceptance of this substitution technology will be higher in the emerging world. For developed countries, there is a clear sunk cost to be taken care of in terms of existing capital already invested in traditional non-cloud platforms. A case study in the Asian context is Japan which is more reluctant to go to cloud than its emerging economy neighbors. Scaling the argument down from countries to firms, the smaller and new adopter SME firms are globally more receptive to Cloud than the established IT asset-heavy firms.

6 TETRA-THREAT FRAMEWORK IN THE CONTEXT OF CLOUD COMPUTING INDUSTRY [LEVEL 02]

At the second level, we analyze the sub-industry within the ICT – the nascent Cloud Industry. The level 02 Tetra-Threat diagram is shown in Figure 02.
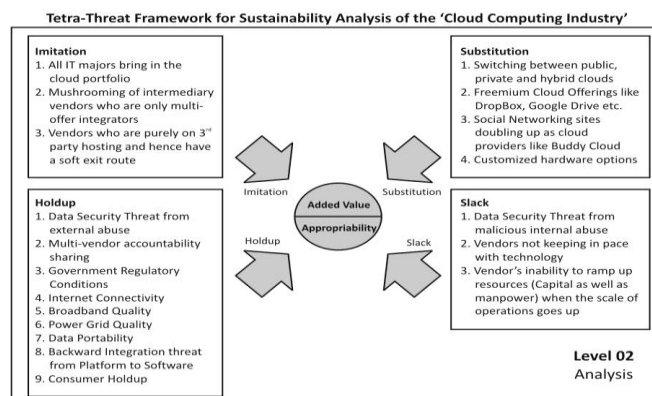
Figure 2: Level 02 of Tetra-Threat Framework – Cloud Computing Industry

When the tetra threat framework is considered specifically in the context of cloud computing, then several real as well as perceptional threats to its sustenance can be mapped. The eco-system now comprises of only cloud vendors and service providers. The inhibitors for the penetration of rapid cloud usage can now be understood from this framework. It can be shown that though adoption and usage potential is more for the emerging economies, on the flip side, the sustainability threats are also more for the same economies. This is particularly so in the context of value appropriability because of the threat of Hold up.

For improving penetration and user acceptance, the industry is advised to look at the level 02 diagram holistically and come up with integrated solutions rather than take a piecemeal approach. The tangible and measurable gains of cost, technology and convenience are getting obscured by latent, real and perceived risks associated with security, efficiency and vendor reliability. Each of the four tetra-threat vectors is now dealt with in some detail.

6.1 Imitation

Imitation represents the duplication of the original added value and is an endemic risk across all industries. The drivers for this risk can be divided into two broad classes in the cloud context. Primarily imitation risk comes from the intermediary vendor who essentially is a multi-offer integrator. He is typically the SaaS provider at the last mile and integrates the infrastructure and platform support from other hardware vendors in the cloud space. In product analogy terms, he represents a value added reseller. By and large, these last mile SaaS vendors go for pure third party hosting of their services. So for a market at the threshold of cloud adoption, the intermediary vendor is perceived to have a soft and easy exit route since he has got no sunken capital. Some of the exit stories of fly-by-night operators only tend to increase the 'reputation fate sharing' of other genuine value adding operators. The other class of players who contribute to the imitation threat are the IT majors who are essentially software service vendors, but migrating now to the cloud selling space. Though they will have no dearth of scale or scope, their sustained interest in the new cloud vending route can come under radar.

To put it in simple terms, the adopting market does not find a simple provider-user relationship in the complicated cloud market. Hence there is a perceived ambiguity of escalation point for the end user when he perceives trouble. As will be seen in the subsequent section, vendor related dilemma has been given the highest risk score by Indian respondents.

6.2 Substitution

Cloud itself was a substitution move into the ICT market a few years back. So its substitution in the immediate future is not a high possibility. But technological advances combined with business model hybrids do pose a few substitutes to the cloud. When we talk about cloud as a business offering, we allude to the public cloud with its distributed revenue possibilities. Public cloud has two substitutes in the form of hybrid clouds and private clouds. High end customers who understand the value proposition of cloud can migrate to their own internally operated private clouds, thereby reducing the growth potential of the public cloud offering vendors. It is akin to firms developing their own versions of crude yet internally effective ERP systems thereby depriving the ERP vendor of a business opportunity.

Another business model substitute for the 'pay-as-you-use' cloud offering is the freemium offerings like Drop Box, Google Drive, Sky Drive and the likes. Unless the user wants

premium upgrades, the basic no-frills offering comes as free. This can impact cloud penetration inthe typically low usage emerging markets where the free version would currently serve the purpose of a significant chunk of customers.

Social networking sites are today doubling up as cloud providers offering bare services. An example is Buddy Cloud which is a file / data saving and sharing platform. Customers can build many applications and uses intelligently built around such offerings.

Finally customized hardware options like FPGA [Field-Programmable Gate Arrays] offer speed and power consumption improvements of over two orders with respect to conventional processors. Hence for analyzing big data – an area where scalable cloud computing is a strong entrant – customized options like FPGA offer a substitutional possibility.

Many of these options are nascent and have not gained high end user penetration. But then, cloud computing itself is a new technology and it has peaked in the Gartner hype cycle only as late as 2009. It remains to be seen how the paid cloud subscription market will sustain its momentum in the face of competition from private / hybrid clouds, freemium models and social networking sites.

6.3 Holdup

Inability to capture the full value potential of cloud offerings because of systemic Holdup driven by several external factors appears to be the most potent threat for high cloud acceptance. The most obvious threat – real as well as perceived – in the cloud ecosystem is the threat of data security. Potential buyers would be quite wary of the privacy and confidentiality of their data. The fear of data security stems from the threat of external abuse. Denial of Service attack (DoS), Distributed Denial of Service attack (DDoS) and its variants are examples of external abuse.

A holdup situation can also be driven by unfriendly government policies on ICT. Emerging economies like Philippines, Vietnam, Thailand and Indonesia have a relatively low score in Government prioritization of ICT (3.5 to 4.5 out of 10). Countries like Japan, Hong Kong and Singapore are high up in this list (8.0 to 9.5) with India having a better than average score of 6.6 [Asia Cloud Readiness Index Report, Ref. 3]. The government policies will combine with regulatory frameworks for licensing requirements and IP protection to make or mar the growth of the Cloud.

In addition, external support factors like internet connectivity, broad band availability, broadband quality, power grid quality etc will all add up to the Holdup perspective. In most of these parameters, the emerging economies score worser off than their developed counterparts. Sometimes select consumer groups can themselves double up as a Holdup factor. Banking sector and Government sector could be considered as two sectors that could impose their own constraints in how to run the cloud-based operations. Since cloud – as mentioned earlier – operates on a multi-vendor platform, performance accountability cannot be pinned down. This also creates a hold up.

6.3 Slack

Slack is internal sub-optimization of any system. If DoS and DDoS represents external threats to data security, malicious insiders with access to client data can act as data security threats from inside. Poor hiring standards coupled with low moral / ethical quotient can lead to slack driven security threat. Also, vendors not keeping pace with technology, not ramping up

resources, not investing at the right time all this is the slack element that threatens the sustenance of cloud. Though malicious intent would have no emerging market specificity, inability to ramp up and keep pace would definitely have.

7 SOME GAIN / RISK PERCEPTION DATA FROM INDIA AND INDONESIA

Though this paper is primarily a conceptual research paper aimed at fitting the cloud computing environment into the tetra-threat framework, some preliminary data has been gathered on ex-ante consumer perception to cloud acceptance. The data has been collected from one BRIC nation India and one MIST nation Indonesia. The sample space of 50(India) and 30 (Indonesia) is chosen from a random diaspora of SME firms, fairly well divided between manufacturing and service sector. A respondent populationthat has not yet adopted cloud services in any significant way is consciously chosen and hence our responses are purely perceptional and do not reflect a post-buy usage driven feedback.

In gain perception study, three gain vectors have been identified – Cost Gain, Technology Gain and Convenience Gain.Deferred capital expenses [CAPEX] gain and reduced operating expenses [OPEX] gain together constitute the Cost Gain Vector. The speed and innovation that the cloud vendors can bring constitutes the second Technology Gain Vector. Dynamic innovation of cloud offerings is something that cannot be matched by the individual technology buyer. Scalability, flexibility, customization and mobility ushers in the thirddimension of posited gain i.e. Convenience Gain Vector. In a traditional platform, capacity up-scaling is possible. Cloud offers the unique convenience of up-scaling and down-scaling.

As far as risk perception goes, any new technology comes in with a set of risks – real, latent or perceived. For sectors like SME which are fairly new to technology adoption, this perception of risk will only be heightened. Cloud adoption risks are again plotted along three vectors – Vendor Risk, Security Risk and Efficiency Risk. Fear of lock-in with an incompatible vendor, lack of guarantee of business continuity and service availability, reputation fate sharing with a vendor and unclear licensing issues come under the portfolio of Vendor Risk. Data security, data privacy, data confidentiality and loss of governance & control of IT delivery cover the second dimension of Security Risk. Latency, downtime management and data transfer bottlenecks sum up the last risk on Efficiency. The risks and gains enumerated have been arrived at after extensive literature review.

The Gain and Risk perceptions plots for India Vs. Indonesia is given in Figure 03.
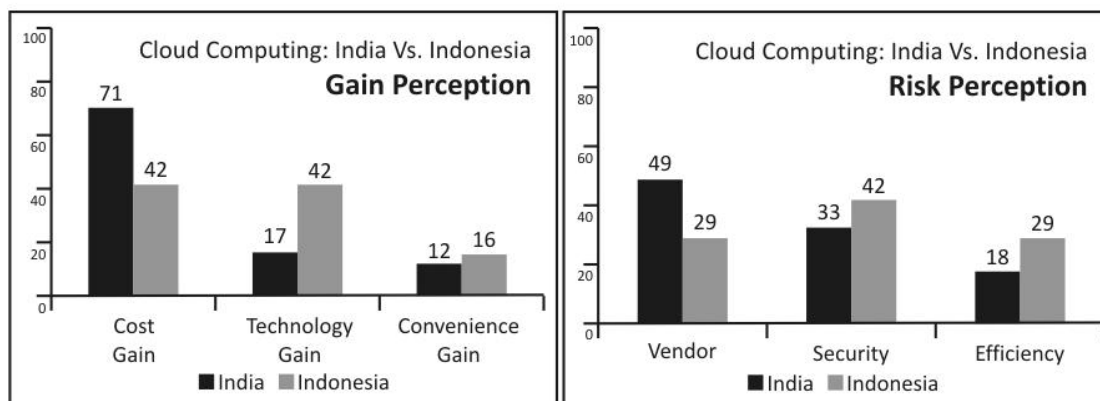
Figure 3: Gain and Risk Perception for Cloud Computing: An India-Indonesia Comparison

20

As far as gain goes, convenience is the least perceivable one before real usage. The advantage of scalability and flexibility is probably difficult to perceive for the ex-ante user. Hence respondents from both countries have pushed convenience related gain to the third slot. On the contrary, both cost gains and technology gains are more easily understood even before adoption. India has voted heavily for the cost angle of the cloud gain which Indonesia has cast an even vote for cost and technology. On the Indian side, the cloud promotions are primarily driving the potential buyer to the attendant cost benefits. Indian Cloud vendors like Ramco focus their ads on slogans like 'No CAPEX', 'No Maintenance Cost' etc. This could have tilted the Indian scale in favor of cost.

Coming to risk, Indonesia, which is more recent into the cloud scene compared to India, has uniformly spread its risk profile across all the three vectors. The most obviously perceived risk of security risk gets the highest vote among fairly comparable votes. India has put vendor related risk at a higher plane compared to the other two risks. It only indicates a heightened perception of the Imitation and Holdup scenarios that was explained in the previous sections and its effect on vendor credibility. Satisfactory consumption of technology never gets highlighted in the social and blog pages. But any minor dissatisfaction immediately gets mileage. Since it is still early days, the vendor risk perception will continue to be high.

The aim of this study is in helping cloud vendors to understand the sustenance threats for their offering in the backdrop of the tetra-threat framework. The authors feel that the vendor biosphere should try to understand the entire environment in which they are operating. Both threats to added value and threats to appropriability should be effectively addressed for enhancing cloud adoption. Some of these problems have an added dimension in the emerging economy markets – particularly those related to Holdup.

8   FUTURE DIRECTIONS OF RESEARCH

A detailed multi-parameter driven regression analysis can be done on a country by country basis to establish the weighted drivers that inhibit higher cloud adoption. Parameters like connectivity, regulations, licensing, broadband quality, power grid quality, data portability problems, freemium offers, security threats – external as well as internal, vendor diversity and the likes can drive a cause-effect mapping to better understand cloud adoption, cloud pricing and depth of cloud engagement. The authors would recommend an Asian consortium to be formed to look into all these aspects and would be willing to collaborate and create such a multi-country research platform.

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THE IMPACT OF SOCIAL COMMERCE IN RETAILING MARKET IN SELANGOR, MALAYSIA

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Abstract. *The term Social Commerce is used to describe an emerging trend where the seller and buyer are connected to the online social media networking. Social Commerce is a subset of electronic commerce that supports social interaction between seller and buyer. It is assisting the user contributions in the online buying and selling of products and services. Facebook and Twitter are some of the examples of online social media networking in social commerce. In Malaysia, there are 1,2843620 Facebook users which makes it number 18 in the ranking of all Facebook statistics by Country. This paper is based on an on-going research conducted with the purpose of evaluating the impact of Social Commerce in the retailing market in Malaysia. The proposed of 6 C's of Social Commerce, namely content, community, commerce, context, connection and conversation will be used as a guideline for the questionnaire in this research. This paper is discussing the finding from the pilot study which focusing from the one of outstanding state in Malaysia, which is Selangor Darul Ehsan.*

1 INTRODUCTION

According to DiMaggio and Louch (1998) the use of personal social networks is to gather information as fundamental to purchasing behaviour [1]. It is something so common in our daily routine that we usually do not even make a note of it. When we make a purchase from a retail store, we often speak beforehand to the shopkeeper about suitable products. When we need to purchase something we are unfamiliar with, we consult our friends and family for advice. When we purchase a popular new product, we have an urge to tell everyone we know about it [2]

The term social commerce was introduced by Yahoo!, in November 2005 [3] to describe a set of online collaborative shopping tools such as shared pick lists, user ratings and other user-generated content-sharing of online product information and advice.The concept of social commerce is to denote user-generated advertorial content on e-commerce sites [3], and to include collaborative e-commerce tools that

enable shoppers "to get advice from trusted individuals, find goods and services and then purchase them" [3]. The social networks that spread this advice have been found to increase the customer's trust in one retailer over another [2][3].

There are two most popular examples of social networking that apply a commerce adoption in their application. There are Facebook Commerce (f-commerce) and Twitter Commerce (t-commerce). Facebook commerce, refer to the buying and selling of goods or services through Facebook, either through Facebook directly or through the Facebook Open Graph. Twitter Commerce (t-commerce) are widely used in Brazil, where this application integrated payment system such as PagSeguro. This t-commerce is used to make purchases in real time via direct message (DM).

2 RETAIL INDUSTRY IN MALAYSIA

Retailing is a commercial transaction in which a buyer intends to consume the good or services through personal, family or household use. Retailers are business firms engaged in offering goods and services directly to consumers. In Malaysia, the supervision of the wholesale and retail sector falls under the supervision of the Ministry of Domestic Trade and Consumer Affairs (MDTCA) through the Committee on Wholesale and Retail Trade. The Committee was set up in 1995 to regulate and supervise the industry, including foreign participation in the sector. In achieving our 2020 Gross National Income (GNI) target, retail will be a key driver of domestic consumption, which in turn will spur economic growth [4].

Within the Wholesale and Retail National Key Economic Area (NKEA), the Entry Point Projects (EPPs) have been grouped along the themes of 'Modernise, Globalise and Revolutionise'. The EPPs within the Modernise theme address the process and system gaps in the traditional retail outlets. The aim is to modernise this sector with the expansion of modern format stores, improve the skills of small retailers in information technology, customer services, stock management etc. To Globalise is to further develop the retail sector for Malaysia through the export of our skills and products[4]. Malaysian mall operators are amongst the best in the region and we are now taking these capabilities across to other countries like Vietnam, China, India, Sri Lanka and Indonesia. We will also seek to offer global exposure to small and medium enterprises via virtual malls and this has already begun in 2011. To Revolutionise our Wholesale and Retail sector, the deployment of new concepts and skills are needed. The new concept including the successful removal of import duties on all finished goods making shopping more reasonable for both locals and tourists. A low unemployment rate, rising disposable incomes and a strong tourism industry are key factors behind the forecast growth [4].

3.1 The Increasing demand in Retail Industry

Global consumer spending in 2011 remained cautious in the aftermath of the global financial crisis and in persistently uncertain economic times. However, a strong local performance has fuelled steady growth in Malaysian retail, with a fair number of both international and domestic players expanding their operations. In addition, the country saw healthy 6% real GDP growth for the year, despite the volatile economic climate. Much of this was driven by strong domestic demand, which came as a result of increased urbanisation and more locals enjoying higher

purchasing power. Besides that, the consumer sophistication in terms of taste and preferences in the products consumed continued to rise in 2011 [5].

With more locals adopting urban lifestyles, this exposed a growing number of rural consumers to popular retail trends and marketing campaigns, ultimately influencing their purchasing behaviour. This was, in turn, reflected in the retail landscape, with companies introducing a myriad of new advertising campaigns, products and services to better cater for their increasingly discerning consumers.Grocery retailers saw value growth rates of more than twice that of non-grocery retailers. This was largely attributed to the strong performance of hypermarkets as chains such as Giant and Tesco have been rapidly expanding their network of outlets. In addition, they also started to offer more non-grocery products such as apparel and electrical appliances. This has greatly increased their appeal as a one-stop shop for both the grocery and non-grocery needs of the average consumer.With the influx of foreign companies entering the Malaysian retail landscape, many domestic players have been under increasing pressure. Retailers such as traditional grocery retailers and stationers have seen sales plummet as consumers turned to foreign rivals boasting a more modern environment or even the internet. Even traditional local powerhouses such as The Store Corp Bhd saw value sales steadily decrease over the review period, especially in light of the strong competition from their foreign counterparts[4].

2.2 The Six C's of Social Commerce

There are six C's of Social Commerce that has been discussed at the 2011 BankInter Foundation for Innovation [3]. This references the original 3 C's of E-Commerce and adds 3 new C's to update for an era of Social sharing.

Content - The basic need to engage with customers, prospects and stakeholders through valuable published content on the web. Early examples of this were the brochure sites for organizations and this has matured into a vast and growing body of material being published in real time onto the web.

Community - Treating the that audience as a community with the objective of building sustainable relationships by providing tangible value. Early incarnations of Community were mobilized through registration and engaged via email programs, this evolved into online forums, chat-rooms and membership groups where users were able to interact with each other, an early example being Yahoo! Groups.

Commerce - Being able to fulfill customers needs via a transactional web presence, typically online retailers, banks, insurance companies, travel sales sites provide the most useful business-to-consumer services. Business-to-business sites range from online storage and hosting to product sourcing and fulfillment services.

Context - The online world is able to track real-world events and this is primarily being enabled by mobile devices. An online bill payment via Google Checkout or a checkin at a physical location via Facebook or Foursquare links a the real world event to an online data entity such as a business or a place. This is a vital element to Social Commerce where the data is now available to organizations wishing to provide products and services to consumers.

Connection - The new online networks are defining and documenting the relationships between people and these relationships may originate in the physical world or online and may manifest in the other as a result of a connection in the first.

Conversation - A conversation between two parties will likely surface a need that could be fulfilled, thus providing a potential market for supplier organizations. The challenge is for suppliers to be able to tap into those conversations and map those into the range of products and services that they supply.

3 PROBLEM STATEMENT

There are myriad ways that social media sites affected commerce. The first, and most obvious, way how social media has affected commerce is that businesses now receive real-time feedback. With sites such as Facebook, Google+ and Twitter customer interaction response is almost instant [6]. This feedback does not just go back to the company that the customer has dealt with, it is also shared with the customer's online followers and friends. For companies receiving positive feedback this is a boon, and free advertising. Consumers also, of course, are able to leave negative feedback about a company or business [7]

In the days before social media, negative company experiences might stay within an individual's circle of friends; now, stories of bad customer service and disappointing products can run quickly through social media networks. It has become more difficult for companies contain its negative publicity [8]. Social media is an enormous conversation everyone is invited to join; with all that talk, it's difficult for businesses to track statements about their brand that are negative or even defamatory. Companies have the added burden of tracking statements and responding when necessary; the response, however, might be of limited effect if the negative statement has already made the social media rounds. Due to the problems mentioned above, it is significant to review the impact of social commerce in the retailing market in Malaysia.

4 METHODOLOGY

This research is based on the descriptive survey research. The population chosen for this study is a respondent which has experience with social commerce and live in Selangor. In order to obtain information for this study, a questionnaire was used. The questionnaire has been distributed to randomly 30 respondents. Each respondent is given one week's grace to complete these questionnaires. Upon the estimated time frame, the researcher will personally collect all the questionnaires that have been sent out. This done to simply make sure that all the questionnaires were returned accordingly and within the stipulated time frame. The questionnaire is based on the following research objectives and research questions.

Research objective
1. To investigate the impact of Social Commerce in Retailing Market in Selangor, Malaysia.

2. To examine the relationship between 6 C's (namely: content, community, commerce, context, connection and conversation) towards the level of acceptance of Social Commerce in Retailing Market in Selangor, Malaysia.

Research question

1. To what extent is the impact of social commerce in Retailing in Market in Selangor, Malaysia?

4 RESULT AND DISCUSSION

According to G Darren and M. Paul (2006) stated that a correlation is often called a bivariate correlation to designated a simple correlation between two variables, as frequently observed in multiple regression analysis or structural equation modelling. According to Karl S. Pearson has credited on the assumption that two variables involved are approximately normally distributed, the formula often performs well even when assumptions of normality are violated or when one of the variable is discrete. Please do not panicked [9]. The following analysis will indicate which factor that gives impact to social commerce.

Table 1: Correlation between Factors

	Content	Community	Commerce	Context	Connection	Conversation
Content	1					
Community	0.279	1				
Commerce	0.493	0.259	1			
Context	0.319	0.259	0.259	1		
Connection	0.551	0.295	0.709	0.118	1	
Conversation	0.210	0.336	0.135	0.734	0.032	1

Correlation is significant at the level 0.05 level

Table 1 above identified that there is a significant strong positive correlation between Context and Conversation (r = 0734) at 5% level of significance. This mean that the society believe that the online facilities provided by any entity will relates to collaboration among supplier and customer.

Another two factors which indicate a strong positive relationship are between Commerce and Connection (r= 0.709) which means that the business activities correlates with interactions between individuals.

Content and Connection also indicates a strong positive correlation (r = 0.551) at 5% level of significance whereby we can conclude that the published content do attracts the interactions between customer and supplier or individuals.

There is also a strong positive correlation between Content and Commerce (r = 0.493) which shows that the growth in business activities rely on published information or content. Others factor also indicates positive correlation among themselves but it only signify small effect towards social commerce.

4 CONCLUSION AND RECOMMENDATIONS

Shopping has increasingly moved into the online arena in the past few years. Retailers quickly realised that they can market themselves on the web in today's' sharing social society. With the extensive influence of online social media on almost all facets of life, it has become a tool not just for creating social networks but also business networks. The impact of social commerce has brings a *new* wave of entrepreneurs *to* spice up their own business. The analysis showed that the factor of Context, Conversation, Commerce, Connection and Content contributed to the impact of social commerce in Selangor. Therefore, social media could be one of the best options to flourish their businesses.

We hope that our study will motivate future research into the impact of social commerce to the human capital aspects. Future areas of related study include: analysis of user browsing data to develop refined consumer choice models for social commerce, study of entrepreneurial and communication skills in both buyer-seller relationships, and the and challenges of the effects of globalization in Asian countries which could influence consumer choice in social commerce.

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GOAL-ORIENTED REQUIREMENTS ENGINEERING : STATE OF THE ART AND BEYOND

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Abstract. *Nowadays requirements engineering definition already transform towards Goal-Oriented Requirements Engineering. Requirements engineering have become important part in software development process. Traditionally requirements engineering just elicit data and manual business operation from user or stakeholder to decide what the system-to-be features, meanwhile goal-oriented requirements engineering is a goal-driven methods that give a rationale of the system-to-be and also ask why a certain functionality is need and how it can be implemented. This paper reviews the currents researches on requirements engineering and especially on goal-oriented requirements engineering. We have analyzed benefit and limitation, and also we present goal-oriented requirements engineering state of the art. From there, we propose what research topic can be explored and discuss goal-oriented hot research topic beyond now.*

1. INTRODUCTION

Requirements engineering is the most crucial and important phase of software development process. For information systems project, the requirements analysis ensures that the proper information system functional can be made. Obtaining good quality of requirements for information systems is complex and need a lot of effort to have it. If the requirements have not been captured correctly during the requirements engineering process, then it can make whole information system projects collapse even for the worst case, it can be failed. Most information system development problems occur when requirement engineering process is not fulfilled.

Traditionally, definition of requirements is a detailed assessment of the system need. "*Requirements definition must say why a system is needed, based on current or foreseen conditions, which may be internal operations or an external relationship. It must say what system feature will serve and satisfy this context. And it must say how the system is to be constructed*" as [1] stated.

But it is already changed in today requirements engineering definition. The definition already transform to goal-driven methods definition and make a new term as Goal-Oriented Requirements Engineering that refers to use of goals for requirements elicitation, elaboration, organization, specification, analysis, negotiation, documentation and evolution [2]. Goals already been recognized as one of components involve in the

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requirements engineering process, and in previous research, requirements engineering research has focused on goal as a way of providing the rationale (*why*) for an envisioned system [3].

The main contribution from this paper is to show the state of the art of goal-oriented requirements engineering from previous research and discuss about future open topic for research in this topics. In section 2 of this paper, we start with overview about requirements engineering research, and we continue give overview about state of the art for goal-oriented requirements engineering (GORE) in section 3. In section 4 we discuss about benefit and limitation in goal-driven methods. Topics in future research about GORE we discuss in section 5, and finally we conclude it all in section 6.

2. RESEARCH IN REQUIREMENTS ENGINEERING.

As discussed in backgrounds, traditional definition of requirements engineering already changed to goal-driven methods definition of requirements engineering. [4] provides one of the clearest definitions of requirements engineering related with goals in seminal paper: *"Requirements engineering is the branch of software engineering concerned with the real-world goals for, functions of, and constraints on software systems. It is also concerned with the relationship of these factors to precise specifications of software behavior, and to their evolution over time and across software families"*.

And another new definition of requirements engineering is: *"Requirements engineering is the process of discovering the purpose of software system by identifying stakeholder ("people or organizations who will be affected by the system and who have a direct or indirect influence on the systems requirements [5]") and their needs by documenting these in a form to analysis, communication, and can be implemented"* [6].

Both of definition show that Requirements engineering is a process and activities that must be done by stakeholder and developer teams to define feature and functionlity of system-to-be.

Nowadays definition of requirements engineering, activities that are covered by requirements engineering that already defined by [7] are :
- *Domain analysis:* the analysis process to investigate existing system and find alternatives of function which the software should be built. Enviroment, problems and deficiencies in the current system are identified and analyzed to get current behavior. In this process, general objective of the system-to-be can be defined.
- *Elicitation:* indentified data and alternatives of solution to achieve system objectives. One of the techniques is define different boundaries between the system-to-be and its enviroment.
- *Negotiation and agreement:* evaluation of risks, alternative requirements and assumptions that found in elicitation process; all parties negotiate to recieve the best aggreement with the best tradeoff.
- *Specification:* the requirements and assumptions are formulated in a detailed way to describe fitures of the system-to-be.
- *Specification analysis:* the specifications are checked for deficiencies and for feasibility. Find alternatives solution to reduse risk of obstacle from requirements definition.

- *Documentation:* the various decisions made during the process are documented together with their underlying rationale and assumptions. Documentation should be store in storing media or tools so we can trace the history.
- *Evolution:* the requirements are modified to accommodate corrections, environmental changes, non-functional requirements change or new objectives decide by stakeholder.
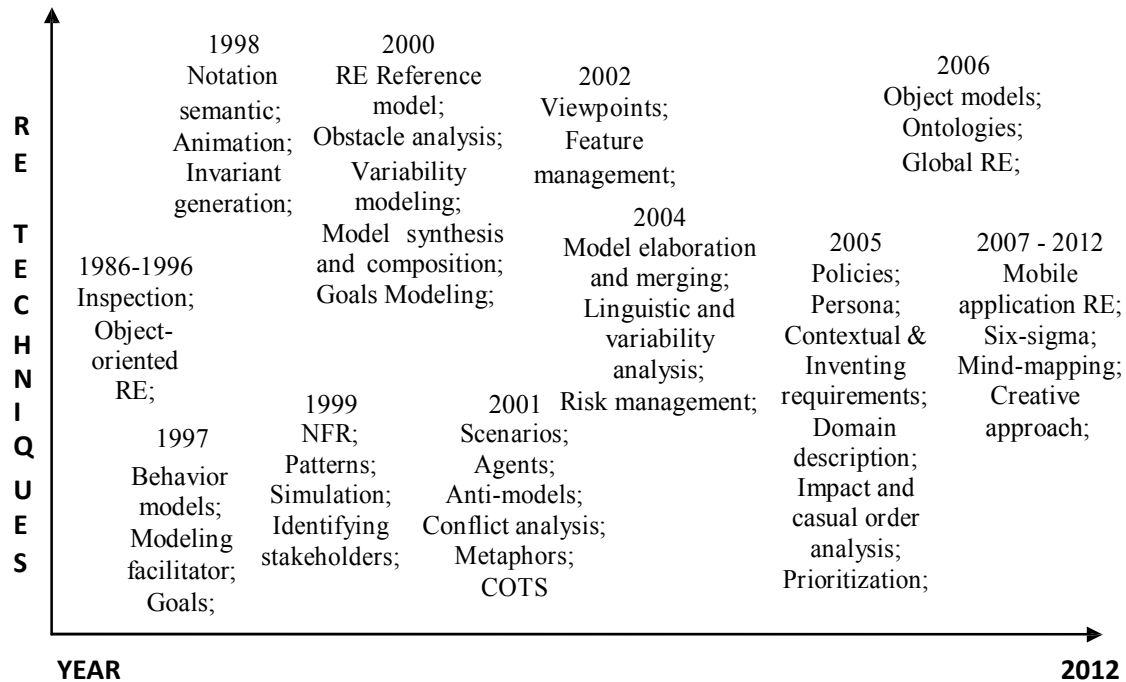
Graph 1: State of the Art Requirements Engineering Techniques

From previous research by [8], we can conclude there are various requirements engineering techniques, methodologies, and tools that already researched before. Based on their paper, we create the roadmap about the state of the art of requirements engineering that show in Graph 1. We organize the information based on publishing year of the seminal paper about the topics in requirements engineering and we also add more information in current research. The new requirements engineering research topics we add are: Mobile application RE that have been researched by [9], Six-Sigma requirements engineering approach proposed by [10], Mind Mapping requirements engineering approach proposed by [11] and creative framework approach in requirements engineering that have been researched by [12]. This paper will focus on Goal-Oriented Requirements Engineering (GORE) research topics.

3. STATE OF THE ART: GOAL-ORIENTED REQUIREMENTS ENGINEERING

Traditional requirements engineering have limitation especially when dealing with complex software systems development. Requirements engineering in traditional way just elicits data and information from user or stakeholder to decide what the new system will be. The system functional and features will be defined based on manual operational procedure that the organization running before and do not capture the rationale for the

new software systems. The requirements process only elicitate on data and manual operations. The process capture why they were there and whether they were sufficient for achieving the higher-level objectives that arise naturally in any requirements engineering process.

Traditional requirements engineering research take start from the initial requirements statements, which express customer's wishes about "what" the system-to-be should do. Traditional requirements engineering tasks is to produce a requirements document from analyst to pass on to the developers team. It emergence the limitation of traditional requirements process that it ignores to focus on "why" the system should do.

Goal-driven requirements engineering takes the view that requirements should initially focus on the *why* and *how* questions rather than on the question of *what* needs to be implemented [3]. Goal-oriented requirements elaboration process ends where more traditional specification techniques would start. "Traditional" analysis and design methods focused on the functionality of the system to be built and its interactions with users. Instead of asking what the systems need to do, goal-driven methods ask why a certain functionality is need and how it can be implemented. Goal-driven methods give a rationale for system functionality while also tracking different implementation alternatives to match the best solution to achieve definited goals or objectives.

Several variaty of Goal-Oriented Requirements Engineering (GORE) techniques have been proposed in previous research. The earlier goal-oriented techniques are Non-Functional Requirements (NFR) Framework [13], Knowledge Acquisition in autOmated Specification (KAOS) [14], agent-oriented software engineering (AORE) methodology requirements engineering techniques i*/TROPOS [15], Goal-oriented Requirements Language (GRL) [16] , and Goals-Skills-Preferences (GSP) framework [17].

And the others GORE techniques based on [18], that have been summarized with respect to the coverage of different requirements engineering process are Deriving Tabular Event-Based Specifications from goal-oriented model (DTEBS), Goal-Based Requirements Analysis Method (GBRAM), Attributed Goal-Oriented Requirements Analysis Method (AGORA), Visual Variability Analysis (VVA) for goal models, Goal-Oriented Idea Generation Method (GOIG), Deriving-Operational Software Specifications (DOSS), Agent-Based Tactics for goal-oriented requirements elaboration (A-BT), goal-oriented requirements elicitation based on General System Thinking Heuristics (GSTH), Goal-Oriented Requirements Analysis for Data Warehouse (GORA for DW) [19], Goal-Obstacle Analysis (GOA), Extended KAOS [20], Probability Framework for GORE [21] and Domain Specific Language based on KAOS (DSL) [22].

From all information above, we analyze and make state of the art of Goal-Oriented Requirements Engineering techniques that show at Graph 2.

4. BENEFIT AND LIMITATION ON GOAL ORIENTED REQUIREMENTS ENGINEERING

To get more understanding about goal definitions in some goal oriented techniques, based on [23] paper, it described goal definition from these earlier techniques and for this paper, we add two more definition to complete the information that show in table 1.
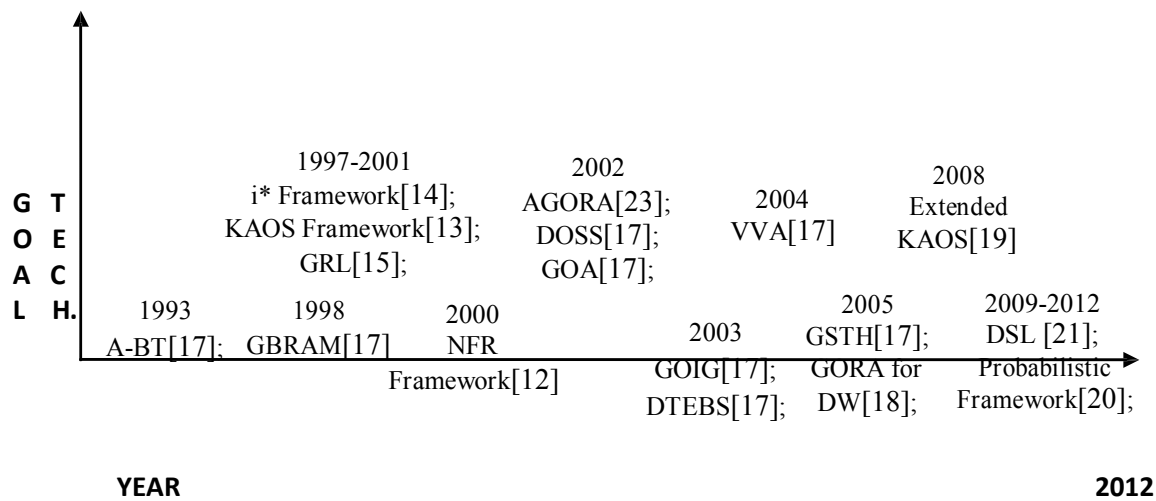
Graph 2: State of the Art Goal-Oriented Requirements Engineering Techniques

Table 1: Overview of goal concept definitions about GRL and AGORA.

	GRL[16]	**AGORA**[24]
Goal	"a condition or state of affairs in the world that the stakeholders would like to achieve."	"the needs of the customers"
Achievement Goal	Not defined	"goal that satisfied when the sub-goal are achieved"
Soft goal	A goal for which "there are no clear-cut criteria for whether the condition is achieved."	Not defined
Belief	"represent design rationale"	Not defined
Constraint	Place a condition, positive, or negative, on the achievement of a (hard) goal	Contribution value and preference matrix

From previous research and analysis, Goal-Oriented Requirements-engineering have some benefit because :

- Goals can be became aim of requirements engineering completeness. The system-to-be specification is complete when all the goals can be proved to be achieved. With goal we can avoids irrelevant requirements because goals provide a precise criterion for sufficient completeness and for requirements pertinence that make rationale requirements [3]. It can make more spesific definition in requirements early process and give more support for the next phase in requirements. Goal formalization can prove if the refinements are correct and complete [25].

- Goal refinement provides a mechanism for structuring complex requirements documents for increased readability. A goal refinement tree also provides traceability links to links high-level strategic objectives to low-level technical requirements [26].

- Goal modeling offers the opportunity to examine several alternatives because we can identify several distinct subsets of goals which satisfy the same high-level goal in different ways. These alternatives goal refinements provide the right level of abstraction to validate the performed selection and suggest the neglected solutions. Each decision tree allows the resolution or satisfaction of a given goal to create solution to complex enviroments [27].

- Requirements engineers are faced with many alternatives during the requirements elaboration process. Goals models provide solution way to communicate requirements to stakeholder [26]. With goal model we can capture variability in the problem domain through the use of alternative goal refinements, obstacle, behavior, and assignment of responsibility. Goals can give more early detection and recognized the roots for detecting conflicts among requirements [3]. Goals refinement and obstacle analysis can provide solution to handle conflicts in requirements phase. Management of conflict among multiple viewpoints can be detected by goals definition with alternatives solution that give from the obstacle analysis process.

- The goal refinement structure can indicate a comprehensible and detailed structure that is helpful in the requirements document [25] .It can be used to explain the real problems to stakeholders or customers and can be used in requirements negotiation phase to get the best tradeoff between all parties.

- Separating stable from more volatile information is another important concern for managing requirements evolution. Goals are much stable than operation procedure to get functional requirements definition. With higher level goals that can be defined in high-level strategic objective of the company, the requirements will be more stable to be implemented in the system-to-be [26].

But there are also limitation and problems for using GORE:

- Unless a rigorous automated reason is used with formal methods, an abstract model may go unquestioned [18].
- Some goal-oriented only can be used in early stages of requirements engineering [25].
- Subjective evaluation in preference matrix when use AGORA may be faulting causing time consuming [25].
- Time consuming with large company and large stakeholder [25].

- Records contain vague intentions without thinking properly about the practical applications [18].
- Reuse of components or requirements engineering can be complex and not suitable to certain stakeholder [18].
- Still need more quantitate calculation and evaluation in refinement to get more clear about satisfaction achievements so it not become subjective to decide the satisfaction[21].
- Elaboration models between requirements phase and modeling-design phase in software engineering architecture not established and stable, so it have gap between requirements phase and modeling-design phase[26].

5. DISCUSSION OF BEYOND RESEARCH OF GORE

Goal-oriented Requirements Engineering can capture requirements from goals and rationale the system-to-be, the refinements tree can trace technical operation procedure to high-level strategic level, but before that process, a Goals-Skills-Preferences (GSP) framework was sketched for the analysis of alternatives in the domain of personal software. This to make differences and preferences about stakeholder, users and developers teams. These preferences need also to make sure that the project is worth to take by developer teams. Sometimes the project can failed because the stakeholder don't meet the basic requirements to have a new system, so the developers team don't have to waste their effort to make a new system for them. We need to explore about the Stakeholder and User Preferences Factor before we start goal-driven information system development methodology. We should make sure that stakeholder have strong leadership to make user follow the new functional operation after new system has been implemented, because the objective we use goal-driven methodology should make new system with why factor, not what factor that defined by user.

One of limitation to use GORE is time consuming with large company and or large stakeholder[25]. To make evaluation in preference matrix and make probability calculation for qualitative measurement in the refinements tree need complex calculation and specification. We need to find simplify methods but can determine correctly from alternatives have given in the refinement tree. The methods can be quantitative with weighted or priority leveling. When select the alternatives we can choose which one more important than the other to solve first, the achievement of the goal can be solve by priority level that defined. From the selection it can be used to make the functions in new systems, and the others can be define as an obstacle or others terms with alternative scenarios to be alternated choice that can be also a way to achieve the goal.

Another interesting problem is the manipulation of systems through their goal models[26]. For example, merging of several goal models could correspond to the Enterprise Application Integration; addition, removal or replacement or goals may represent requirements evolution, etc. We can also propose to make some framework between requirements phase with goal-driven methodology and data-driven methodology design and modeling, so the information system development can have both benefit from goal-driven and data-driven methodology.

We also need exploring richer models for capturing and analyzing non-functional requirements and combine with functional requirements to get complete requirements

models. Especially, we need to reduce user requirements factor in the requirements capturing and analyzing, we should make user requirements as a support requirements data not as main requirements data, we should make sure that goals is the why factor of the new system have been made and need to make. Elaboration between requirements phase and design-modeling phase in information system development are needed to make sure complete function in new system.

Domain and requirements models should ideally capture more knowledge about the multiple aspects, concerns, and activities involved in the requirements engineering process. We can explore how to find the best compromises between model expressiveness and precision, for richer analysis, and more simplicity, so we can use the models for better usability. Reuse of components and previous requirements can also increase knowledge of goal-oriented requirements. We should research about techniques to assessment the reuse of these factors in our process.

There are also issue about how goal-oriented requirements engineering can develop the systems-to-be and how the new system become transformation tools to re-organize organization structures and operational procedures.

6. CONCLUSION

The state of the art of requirements engineering show the research has begin when the requirements engineering have separated from the software engineering discipline, because requirements engineering has become an important and complex part in the whole development proses. The roadmap of requirements engineering research start with object-oriented requirements engineering and transform to goal-oriented requirements engineering in the earlier 2000's [3]. Previous researched in the ontology area give more perspective of requirements engineering also have become a part of the roadmap. One of the current topics in requirements engineering research is about techniques of requirements engineering to make specific products which are for mobile application, web application, global software and adaptive software. And also we found that the researcher still developing in methodologies especially in goal-driven methodologies to find more elaboration and effective approach in the process.

In the GORE state of the art, ealier research already started in lately 1990's; and based on KAOS and i* (i star) methodology. Nowadays, the current research topics of GORE is to find more spesific in quantitative and qualitative calculation on the refinements tree, more heuristic and holistic definition of terms that use in GORE, and also development in modeling to make more detailed and effective models that can use in next phase of information system development phase. We found that KAOS still become the most popular research based methodologies in GORE.

From this paper, we can also conclude that there are a lot of benefit we can take from using GORE in requirements engineering process. The limitation and disadvantages is something that still need more research, but all the basic process and objectives about GORE already express with the benefit of GORE.

From the state of the art and discussion about GORE, we found that there are still a lot things to do based on GORE. They are :
- Stakeholder and user preference assessments before using GORE in information system development proses.

- Elaboration between GORE modeling and next phase modeling in design information system development phase.
- Knowledge based in component and previous requirements.
- Transformation of organization structure and standard operational procedure when the new system based on GORE have been implemented.

Finally from this paper we can also conclude that beyond now, research in GORE still needed and some points are important to be a research topics because it can be a good methodology in requirements engineering area especially to rationale the new system development based on high-level objective not based on user requirements and technical manual operational level .

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DEVELOPMENT OF KNOWLEDGE MANAGEMENT APPLICATION FOR ELECTRONIC DATA PROCESSING AUDIT ANALYSIS

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Abstract. Audit of financial statements is an activity of evaluation through the evidence. The evaluation is purposed to assess whether all the evidences indicate a reasonable transaction and in accordance with generally accepted accounting principles and also entities policies. If there is a discrepancy between the evidence and the rules, the findings should then be clarified. In addition to collecting the evidence, the auditor should look at the existing systems used in the enterprise as a whole, particularly the system used as enterprise financial management. This has to be done to ensure that the system runs properly. The audit system has to be done because the system generates data used in the auditing process. In other words, if the system used works properly, it will produce data that can be accounted for righteousness. Since there is limitation of knowledge from the financial auditors in using Electronic Data Processing System as accounting process tool in general, the application which capable to analyze findings obtained from auditing process of Electronic Data Processing System has to be made. The application built will analyze the audit result by using TF-IDF method. This method serves to choose a suitable recommendation to solve problems in audit findings, therefore the auditors can see the options of recommendation which were given in one of audit findings on the past and what recommendations should be given. It will help auditors, especially for inexperience auditors. By this kind of application, the auditors' assignment will be easier, faster, and lighter to be done.

1. INTRODUCTION

Accounting Information System is a subsystem of integral information system applies in enterprises. In order to create quality information, good and valid data processing process are obligatory. With the aim of protecting the computer system on maintaining data integrity, asset protection and reaching enterprises goal and also effective resources utilizing, Electronic Data Processing (EDP) audit process is essential. In the process of EDP Audit, auditors who perform audit should refer to standard set by credibility organizations, either national or international.

In initial EDP audit process, auditor must prepare a worksheet contain instruction in audit processing. There are many points and various aspects of each point. As audit

processing references, each point is containing number of various instructions. According to the point, a decision will be raised in form of suggestion and assessment of EDP reliability. Consider to high number of aspect in examining and steps variation of each point analysis, long duration of auditing analysis are require for the auditor.

Auditor experiences in analysis EDP audit cases will be influence to the time on decision making. Experience on previous case assisting the auditor on field finding analysis, where some findings are likely similar.

For inexperience auditor, these skills are able to find on previous audit document files, contain suggestion from earlier cases. However, result of increasing filing audit document becomes a problem of auditor in finding the document. A result of long time on decision making will be impact to enterprises decision and policy on conclude corporate business strategy.

According to the problem, produce on interesting study in design an audit EDP decision support system by Term Frequency-Inverse Document Frequency (TF-IDF) and Decision Table.

Aim of this study is design the application for analysis the result of audit finding, thus increasing time on decision making process of system Electronic Data Processing audit finding. This process typically performs by auditor.

Research frameworks of this study are:

1. Standard used as auditing references is based on Indonesian Institute of Accountants.
2. System User is auditor in accountancy discipline.

There are high numbers of research in TF-IDF method and or decision table; however, there are no study researched on Information System Auditing application.

This research contributes to inexperience or new auditor in increasing their understanding to common problem of audit finding and also how to get the solution.

2. LITERATURE REVIEW

2.1 Auditing

According to *Arens*, *Elder*, and *Beasley*, auditing is collection and finding assessment on information in determine and report a level of sustainability between the information and standard procedure set in [2]. This auditing definition is applied on non-computer audit in data processing (conventional auditing) and also computer audit (EDP audit). Some types of auditing are:

1. Audit of Financial Statement
2. Audit of Operational/ Performance
3. Audit of Information System

Professional organization in Indonesia provided auditing standard is *IkatanAkuntan Indonesia*(IAI orIndonesian Institute of Accountants**)** andalso include EDP system audit standard, beside the financial statement audit standard.

2.2 Electronic Data Processing (EDP)

Electronic data processing (EDP) is a series of activity support by computer in producing raw information into valuable information, considered to the purposes. EDP system describes a system to perform data processing activity. EDP system contains

several subsystems. Overall subsystems are the resource on data processing. This subsystem recognize as terms of configuration or computer component which consist of man, procedure, software, hardware, and facility.

1. Man

   In EDP, man has a complex and important role. Computer system are not only perform development, modification, maintaining, and operation of computer, or requiring a sufficient professional individual skill and practice, but must required a credible individual.

2. Procedure

   In computer system, procedure is a policy of management in managing computer system implementation and also instructions which must be followed by computer user.

3. Software

   Software is a program which is containing several instructions in order to reach the goal, creates by the programmer.

4. Hardware

   Hardware is all physical equipment used in order to implement various function of data processing system.

5. Facility

   In electronic data processing, facility is a specific room to store the computer, such as server room, to keep the function of computer.

2.3 Text Mining

Text mining is data mining in terms of text, where the data resource is obtain from document. The purpose is finding the texts which are represent the content of the document in order to analysis the correlation of document. There are some steps to separate the text in order to produce a basic text from a sentence. Those steps are:

1. Case Folding

   Case folding is a step in modifying all the document words into lowercased words. Only "a" to "z" letters are acceptance.

2. Tokenizing

   Tokenizing is cutting input string steps based on the words structure.

3. Filtering

   Filtering is gathering wordlist step from the result of tokenizing step. In this step, stoplist algorithm is able to perform or saving the wordlist.

4. Analyzing

   Analyzing is determining step, how the correlation between each words on the document.

2.4 Term frequency-Inverse Document Frequency

On the previous research entitled of *PenerapanKonsep Knowledge Management System (KMS)UntukPengelolaanHasilProyekKonsultasiMenggunakanAlgoritma Text Mining* (or *Application of Knowledge Management System [KMS] Concept in Processing of Result Consultan Project by Text Mining Algorithm* by AcengNursamsudin[1], applying Tf-Idf method and produce document similarity. Before entering the exploration process in producing similarity by TF-IDF method, pre-processing process are perform, where the steps on pre-processing process are case folding, tokenizing, filtering, and analyzing

process. Result of pre-processing process is in form of words data by containing tf and df value. Term Frequency-Inverse Document Frequency (TF-IDF) is a method which offers weight correlation some words to document. This method combined two concepts of weigh calculation, calculation in finding word frequency on certain document and inverse document frequency which contain the words. Formulas in finding IDF value are:

$$\textbf{IDF}_t = \textbf{log (D/df}_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(equation 1)}$$

Where :
T   = Words t^{th} of the keywords
Df   = Number of Document contains words t^{th} of the keywords
D   = Number of all document in database
IDF = Document frequency ratio on word t^{th} of the keywords.

Number of input document contained the keywords will recognized in finding df value. Every words will be located words position in the document, then number of document contain the words is df value. Formula in finding weight on TF-IDF is:

$$\textbf{W}_{d,t} = \textbf{tf}_{d,t} * \textbf{IDF}_t \ldots\ldots\ldots\ldots\ldots\ldots\text{(equation 2)}$$

Where:
d   = Document d^{th}
t   = Words t^{th} of keywords
tf   = Frequency of words t^{th} of keywords in document d^{th}
W   = Document weight of dth towards t^{th} keywords
IDF = Document frequency ratio of word t^{th} from keywords

Value of tf is obtained by searching the number of words in the document which are containing the input keywords. Document contains the keywords will capture and enter pre-processing process, which are case folding, tokenizing, filtering and stemming, and result the basic words and every words emerging will be calculated as tf value.
When every result of document weight is processed and every weight document is recognizing, then ordering process perform in recognizing similarity. Similarity reference is, when W value is high then similarity document is also high.

2.5 Decision Table
Decision table is one of the methods in simple decision making. In this method, table is assistant which contain relation of several attribute which influence to certain attribute. In General, decision table is used in problems solving which no much engaging alternative.
In decision table, truth value in certain condition is valued by logical value of every attribute. Generally, decision table is in the form of:

$$D = E \{E_1, E_2, \ldots., E_k\}$$

Where D is truth value in some condition, and Ei is attribute truth value in i^{th} (i=1,2,.., K).

3. RESEARCH METHODS

In conducting this research, the methods used in this research are TF-IDF and Decision Table. In general, the system to be built in this research can be seen in Figure 1.
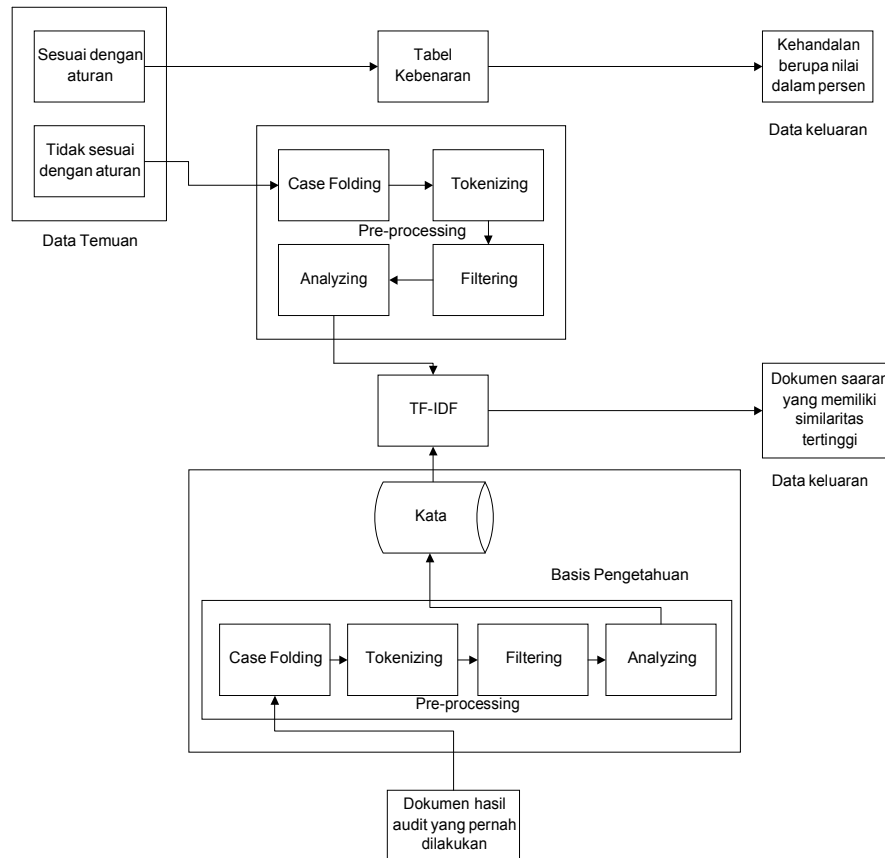
Figure 1Overview of General Process of the System

In Figure 1, there is a general process beginning with data input in the form of documents of the previously performed auditing, an assessment of the audit reliability and a search of suggestive document consistent with the findings; these documents serve as the basis or reference for further processes.

Those documents of audit results will have to pass through a pre-processing phase consisting of several stages, i.e. case folding, tokenizing, filtering and analyzing. In the case folding stage, the documents of audit result in the form of sentence will be lowercased, and once the sentence is lowercased, then, it is followed with tokenizing, i.e. dividing the sentences into words. The next stage, i.e. filtering, is where those words are separated based on whether or not they are important. Furthermore, the correlation of those words is searched through the stage of analyzing. The output of this pre-processing phase will be stored in storage for words.

After the basic documents are ready to use, then, the data from the audit result are inserted into the system. From here, such audit results will be analyzed by the system. Based on the analysis finding data, then, any finding inconsistent with the rules (in the form of text) will be sent to pre-processing phase. Afterwards, a level of similarity of the finding data to the document of audit result will be searched using TF-IDF. The

output of this process is a suggestive document resulting from the previously performed audit with high level of similarity.

The input data consistent with the rules (in the form of choice) will be sent to calculation stage using decision table. In such decision table, every finding shall have value and will be summed, thus, the output of this stage is the reliability of the system under the audit in percentage.

4. RESULTS AND DISCUSSION

4.1. Text Mining Process

Text mining is used to classify words representing findings and documents which are the results of audit. Text mining process will be also employed in TF-IDF calculation process. There are two processes using text mining in this part, i.e. during the document storage and the search of documents of the audit results.

4.1.1. Document Storage Pre-Processing

The documents to be stored as the knowledge basis on the system shall pass through a pre-processing in which some phases exist. For example, there are several documents for a number of categories with different steps from PDE audit process result such as:

Category: Separation of PDE and Non-PDE Department Functions

D1 : Terdapattumpangtindihtugassetelahdilakukanpenelaahanpadabaganorganisasi.

D2 : Terdapatprosedur yang daridepartemenpemakai yang tidakmenjaminindependensi.

D3 : Terdapatpenyimpanganfungsipadapemrograman dan strukturorganisasi yang tidakjalan.

4.1.2. Case Folding

In this case folding process, each of the existing sentences serves as the document for knowledge basis and it contains upper case letters, hence, they will be lowercased

> Terdapattumpangtindihtugassetelahdilakukanpenelaahanpadabaganorganisasi.

before *Case Folding*

> terdapattumpangtindihtugassetelahdilakukanpenelaahanpadabaganorganisasi

Case Folding Result

Case Folding D1

> Terdapatprosedur yang daridepartemenpemakai yang tidakmenjaminindependensi.

before *Case Folding*

> terdapatprosedur yang daridepartemenpemakai yang tidakmenjaminindependensi

Case Folding Result

Case Folding D2

Terdapatpenyimpanganfungsipadapemrograman dan strukturorganisasi yang tidakjalan.

before *Case Folding*

terdapatpenyimpanganfungsipadapemrograman dan strukturorganisasiyang tidakjalan

Hasil*Case Folding*

Case Folding D3

4.1.3. Tokenizing

In tokenizing stage, the document within which a sentence exists and has been lowercased in the case folding stage will be, then, divided into its constituent words

terdapattumpangtindihtugassetelahdil akukanpenelaahanpadabaganorganis asi
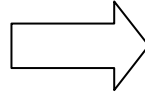
before *Tokenizing*   *Tokenizing*Result

terdapat tumpang tindih tugas setelah dilakukan penelaahan pada bagan organisasi

Tokenizing D1

terdapatprosedurdaridepartemenpem akai yang tidakmenjaminindependensi

before *Tokenizing*

terdapat prosedur dari departemen pemakai yang tidak menjamin independensi

Tokenizing Result

Tokenizing D2

terdapatpenyimpanganfungsipadapemro graman dan strukturorganisasi yang tidakjalan

before *Tokenizing*
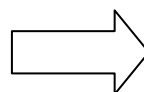
terdapat penyimpangan fungsi pada pemrograman dan struktur organisasi yang tidak jalan

45

*Tokenizing*Result

Tokenizing D3

4.1.4. Filtering

The filtering stage is the one to omit those words classified as unimportant from the document. This stage is performed upon the completionof tokenizing stage.

terdapat tumpang tindih tugas setelah dilakukan penelaahan pada bagan organisasi	tumpang tindih tugas bagan organisasi

before*Filtering*   Result*Filtering*

Filtering D1

terdapat prosedur yang dari departemen pemakai	prosedur departemen pemakai tidak independensi

before *Filtering*   result *Filtering*

Filtering D2

terdapatpenyimp anganfungsi padapemrogram an dan strukturorganisas i yang tidak jalan	penyimpanganfu ngsi pemrograman strukturorganisa si tidak jalan

before*Filtering*   result *Filtering*

Filtering D3

4.1.5. Analyzing

The analyzing stage aims at finding and calculating the correlation between the words and the existing document containing the words after passing through processes in the previous stages.

Table 4.1 Frequency of Word Appearance in Document

Kata	Dokumen	tf
Tumpang	1	1
Tindih	1	1
Tugas	1	1
Bagan	1	1
Organisasi	1	1
Prosedur	2	1
Departemen	2	1
Pemakai	2	1
Tidak	2	1
Penyimpangan	6	1
Fungsi	6	1
kontrol	7	1
Group	7	1
Kelompok	7	1
Sistem	7	1
Operasi	7	1
Bercampur	7	1
Independensi	2	1
Penyimpangan	3	1
Fungsi	3	1
Pemrograman	3	1
Struktur	3	1
Organisasi	3	1
Tidak	3	1
Jalan	3	1
Penyatuan	4	1
Fungsi	4	1
Sistem	4	1
Pemrograman	4	1
Analisis	5	1
Sistem	5	1
Pemrogram	5	1
Mengakses	5	1
Pirantikeras	5	1
Kebebasan	5	1
Struktur	6	1
Organisasi	6	1
Tidak	6	1
Berjalan	2	1

Table 4.2 Frequency of Number of Documents Containing the Same Words

Kata	df	Kata	df
Tumpang	1	Jalan	1
Tindih	1	Penyatuan	1
Tugas	1	Sistem	3
Bagan	1	Analisis	1

Kata	df	Kata	df
Organisasi	3	Pemrogram	1
Prosedur	1	Mengakses	1
Departemen	1	pirantikeras	1
Pemakai	1	Berjalan	1
Tidak	3	kontrol	1
Independensi	1	Group	1
Penyimpangan	2	Kelompok	1
Fungsi	3	Operasi	1
Pemrograman	2	Kebebasan	1
Struktur	2	Bercampur	1

4.2. Pre-processing Findings

The findings input in the audit assessment process, the pre-processing is implemented in finding documents that have high similarities between present findings and findings in the documents in terms of knowledge base. This pre-processing has different stages from pre-processing whose stages ending up on filtering only, The results of filtering will be the key for calculation in the TF-IDF. For example, there are findings in audit as follow:

- Terdapattumpangtindihtugas.

The above findings will be processed by pre-processing through case folding, tokenizing, and filtering. This stage has rules similar to those of pre-processing when storing documents. Results of these stages are as follows:

```
tumpang
tindih
tugas
```

Result of finding Pre-processing

4.3. Search Documents

Searching documents is done by using the TF-IDF method. The findings that become the keywords in the search should be already in the form of results of filtering, and then the similarities will be searched by calculating the weight matched in the documents in the knowledge base

Tabel 4.3 Calculation of TF-IDF

Kata	W						
	D1	D2	D3	D4	D5	D6	D7
analisis	0	0	0	0	0.845	0	0
pemrogram	0	0	0	0	0.845	0	0
mengakses	0	0	0	0	0.845	0	0
pirantikeras	0	0	0	0	0.845	0	0
berjalan	0	0	0	0	0	0.845	0
kontrol	0	0	0	0	0	0	0.845
group	0	0	0	0	0	0	0.845
kelompok	0	0	0	0	0	0	0.845
operasi	0	0	0	0	0	0	0.845

Kata	W						
	D1	D2	D3	D4	D5	D6	D7
kebebasan	0	0	0	0	0.845	0	0
bercampur	0	0	0	0	0	0	0.845
tumpang	0.845	0	0	0	0	0	0
tindih	0.845	0	0	0	0	0	0
tugas	0.845	0	0	0	0	0	0
bagan	0.845	0	0	0	0	0	0
organisasi	0.36	0	0.36	0	0	0.36	0
prosedur	0	0.845	0	0	0	0	0
departemen	0	0.845	0	0	0	0	0
pemakai	0	0.845	0	0	0	0	0
tidak	0	0.36	0.36	0	0	0.36	0
independensi	0	0.845	0	0	0	0	0
penyimpangan	0	0	0.54	0	0	0.54	0
fungsi	0	0	0.36	0.36	0	0.36	0
pemrograman	0	0	0.54	0.54	0	0	0
struktur	0	0	0.54	0	0	0.54	0
jalan	0	0	0.845	0	0	0	0
penyatuan	0	0	0	0.845	0	0	0
sistem	0	0	0	0.36	0.36	0	0.36

Therefore, weights for each document are as follows:

W for D1 = 0,845 +0,845 +0,845 = 1,845
W for D2 = 0 +0 +0 = 0
W for D3 = 0 +0 +0 = 0
W for D4 = 0 +0 +0 = 0
W to D5 = 0 +0 +0 = 0
W for D6 = 0 +0 +0 = 0
W for D7 = 0 +0 +0 = 0

From the results of weight calculation, the first document has the highest similarities compared to the other documents.

4.4 Reliability Assessment

In this process, the system reliability value will be searched by using the Decision Table. In determining this reliability, the user will include weight for each category. The example for system reliability assessment is as follows:

There are two categories that are PDE and non-PDE department functional separation and functional separation within the PDE Department with the weights included are 20, 30.

Table 3.5 Decision Table

No	Attributes	Category	
		Matched	Not
A	Functional separation of PDE and non-PDE (weight 20)		
1	Review organizational chart and duty description to gain proofs on functional separation.	√	
2	Interview personnel of PDE and user departments to gain conviction that the procedures made to guarantee organizational independence have been understood and obeyed.	√	
3	Carry out sudden observation on the actual operation and notice the managerial supervision level implemented.	√	
4	Review managerial policies leading to the independence of PDE department from user department.	√	
5	Carry out direct visual observation some times to find out if the present organizational structure is well-implemented and if there is any deviation from functions such as programming and etc.	√	
6	Pay a visit during employee shifts to make sure that the duty separations are really implemented.	√	
7	Carry out vouching on certain transactions in connection with personnel of DPE department.		√
8	On on-line system, review the list of users with authorization to make sure that there is a sufficient duty separation between users and programmers.		√
B	Functional separation within PDE Department (weight 30).		
1	Review the organizational chart of PDE department to make sure that the systemic and programming functions are separated from computer operation.		√
2	Carry out sudden observation on PDE Department to find out if system analysts and programmers do not have freedom to access hardware, files, and programmers in a unlimited way.		√
3	Carry out observation on operational control group to determine whether they are independent of systemic, programmer, and operational groups.	√	
4	Carry out observation on bibliographic function operation or carry review on logs to determine if the log usages are well-administered and whether only authorized personals can delete date files.	√	

Calculations :
1. In functional separation of the PDE and non-PDE Departments:
        Weight = 20/100 = 0.2

Total guidance = 8
Total matched replies = 6
Total not-matched replies = 2
Therefore:
Value per category = Total appropriate reply/(Total guidance) * 100
= 6/8 * 100
= 75

After the value per category is known, multiply the weight with the value per category, the result is 15.

2. In the Functional separation within the PDE Department category :
Weight = 30/100 = 0.3
Total guidance = 12
Total matched replies = 7
Total not matched replies = 5

Therefore:
Value per category = Total appropriate/(Total guidance) * 100
= 7/12 * 100
= 58.33

After the value per category is known, multiply the weight with the value per category, the result is 17.5.
This calculation also applies to the other categories. All value categories will be totalized, so that the PDE reliability will be known.

5. CONCLUSIONS

- The system can assist the auditor in assessing Electronic Data Processing (EDP) audited immediately gained from findings included so that the reliability values will be acquired and the TF-IDF method can provide sufficient results to bring out results to be used as knowledge in taking conclusions in the audit report.
- The system can unite perceptions among auditors by the usage of the guidance following the Electronic Data Processing (EDP) audit rules released by Indonesian Accountant Association).

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IDENTIFICATION OF MEDICINAL PLANT BASED ON FRACTAL BY USING CLUSTERING FUZZY C-MEANS

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Keywords: *Identification of medicinal plants, fractal, fractal dimension, fractal code, fuzzy c-means*

Abstract. *Identification of medicinal plant species automatically is still a problem in recognizing various kind of medicinal plants in Indonesia. The research purpose is to develop medicinal plant identification system by using fractal and Fuzzy C-Means (FCM) clustering. Fractal method is used to extract image feature of the medicinal plant leaf. However, FCM clustering is needed to classify image feature medicinal plant into some class or cluster. Two fractal approaches used in this research are fractal dimension and fractal code. Fractal dimension is based on similarity of the medicinal plant leaf image pattern and counted by box counting method, however fractal code is based on similiarity of the medicinal plant leaf image texture. This research used data from the collection in Biofarmaka IPB plantation and glasshouse of Ex-Situ conservation of Indonesian Tropical Forest. 600 data are used in this research consists of 20 variety of medicinal plants for each 30 samples. This experimental result shows that 85.04% of FCM clustering is based on fractal dimension and 79.94% FCM clustering is based on the fractal code.*

1 INTRODUCTION

Indonesia is one of nations who has a great potentiality in providing medicinal plants. It is distinctly proved that 40,000 species plants in the world, 30,000 species which are high level plants, grow in Indonesia, and 7,000 of them are medicinal plants, Ref.[8]. A great variety of medicinal plants makes difficulty in identifying them, therefore a capability of identification medicinal plants is very important.

A process of identification is depend upon a result of feature extraction. Leaf becomes one of elements which can be used to extract. The shape and the texture of leaf can be classified as a characteristic of medicinal plant. One of them is to extract feature based on fractal. There are two features extraction approaches by using fractal method : first, fractal dimension is based on shape design similarity level of an image, second, fractal code is based on the similarity of texture design on itself and its image, Ref.[1].

To make the process of medicinal plant identification is easier, we firstly categorize plants by using clustering Fuzzy C-Means (FCM). This clustering takes fuzzy

classification model which classified one data that can be a species of all classes or a shaped cluster and each data in one class or cluster might be identified by a member degree.

Some researches using fractal methods such as, Ref.[2] takes fractal dimension in Iris Recognition System which classify 3 methods e.g. Bayes, Euclidian and K-nearest neighbor (K-NN). Ref.[5] used fractal code to introduce a character design and an Arabian digit by using Support Vector Machine (SVM) and Radial Basis Function (RBF) Neural Network. Other researcher that used fractal method and clustering FCM is Ref.[6] which used fractal dimension and FCM in classifying undersea images. Ref.[3] use fractal code and FCM to insert watermark on a picture.

Based on those former researchers, it is suggested that this research urge the identification system of medicinal plants based on fractal using clustering FCM might be.

2 STAGGES OF THE RESEARCH

The stages of the research can be shown at Pig.(1).
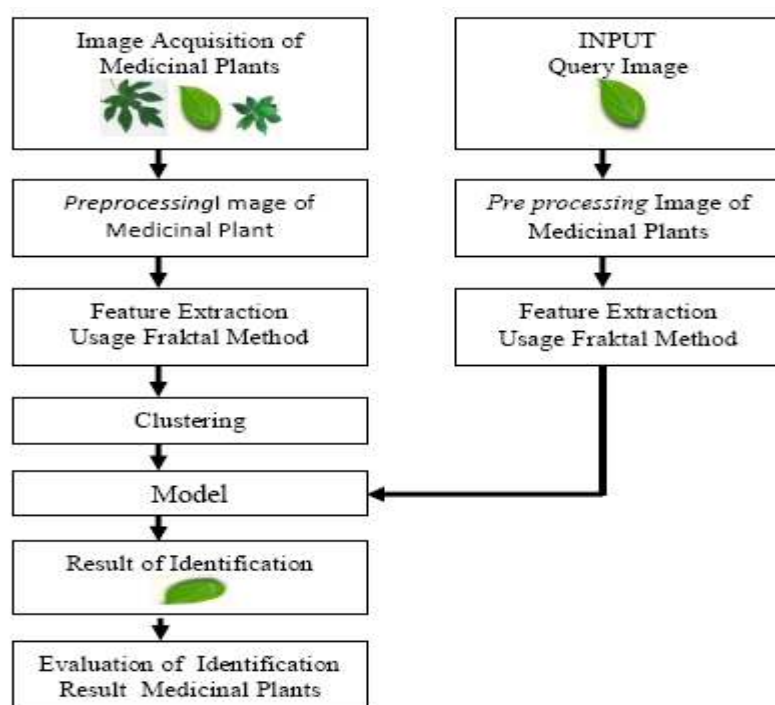
Figure 1: Stages of the research.

2.1 Image Acquisition of Medicinal Plants

In this stage, medicinal plant image is acquisitioned by using a sensor array of digital camera. Data used in this research is a collection of medicinal leaf plants at Biofarmaka IPB plantation and a glasshouse of Ex-Situ conservation of Indonesian Tropical Forest, IPB's Department of Forestry. There are 600 data used in this research, included 20 species of medicinal plants and each of them consists of 30 samples. The data is divided

into practice data and test data which each of them 67% and 33% (20 practice data and 10 test data).

2.2 PreprocessingImage of Medicinal Plant

Preprocessing conducted in this research is to customize the image measurement into 16 x16 pixel and change the image shape into grayscale 8 bit format. (2^8 = 256 ash degree).

2.3 Feature Extraction of Medicinal Plant using Fractal Method

There are two fractal method approaches which are used to extract feature, they are fractal dimension and fractal code.

Fractal Dimension

Fractal dimension of medicinal leaf plant image is counted by using box counting method which is as the same as, Ref.[7].

$$D(s) = \frac{\log(N(s))}{\log(s)}$$

(1)

with :
N = a number of measurement box r which filled with an object pixel
D = fractal dimension object
r = ratio.

These are the box counting levels :
1. Dividing medicinal leaf plant image for r shaped boxes.
2. Counting a number of boxes $N\,(r)$ which has object space of the image
3. Counting log value (l/r) and $log\,(N)$.
4. Making a straight line by using value $D(s)$.
5. Counting the slope from the straight line which is a fractal dimension of medicinal plant image.

Fractal Code

Fractal code is based on main characteristic of the fractal, which has slope of itself, Ref.[9]. These are some stages of fractal coding such as :
1. Showing pixel intensity value of the original image.
2. Setting domain block by dividing the original image into sub-image 8x8 pixel and 4x4 pixel. The averages of each four pixels from the sub-images are counted into 4x4 pixel and 2x2 pixel.
3. Setting the range block by dividing the original image by using Quadtree partition. The partition will divide the image into four parts as recursively become 2x2 pixels.
4. Counting the contrast scale factor (s) or the brightness factor (g) and root mean square (RMS) with the similarity of 2, 3 and 4 , Ref.[10].

$$s = \frac{n^2\left(\sum_{i=1}^n d_i r_i\right) - \left(\sum_{i=1}^n d_i\right)\left(\sum_{i=1}^n r_i\right)}{n^2 \sum_{i=1}^n d_i^2 - \left(\sum_{i=1}^n d_i\right)^2}$$

(2)

$$g = \frac{\sum_{i=1}^{n} r_i - s \sum_{i=1}^{n} d_i}{n^2} \quad\quad (3)$$

$$RMS = \frac{\sum_{i=1}^{n} r_i^2 + s\left(s \sum_{i=1}^{n} d_i^2 - 2(\sum_{i=1}^{n} d_i r_i) + 2g \sum_{i=1}^{n} d_i\right) + g(gn^2 - 2\sum_{i=1}^{n} r_i)}{n^2} \quad (4)$$

With:

s = contrast scale
g = brightness level
n = amount of pixel intensity of the block which being examined
r_i = range block element if range block is $R = \{ r_1, r_2, ., r_n)$
d_i = domain block element if domain block is $D = \{d_1, d_2, ., d_n)$
RMS = root means square

2.4 Clustering Medicinal Plants with Fuzzy C-Means

The research carry out two experiment plans: clustering FCM based on fractal dimension value and fractal code value. Clustering has been done to 400 practice data. These are the following stages :

1. Input data matrix for mat n x m (n= amount of sample data, m = attribute data are fractal dimension value or fractal code
2. Setting a parameter which are need such as, Cluster amount *(c)* = 20, Degree *(w)* = 2, Maximum iteration (maxiter) = 100, Stopping criteria *(e)* = 10^{-5}, Former objective function *(P₀)* = 1, Former Iteration = 1.
3. Forming former partition matrix *U* (cluster member degree) randomly with 5 equations, Ref. [4].

$$U = \begin{bmatrix} \mu_{11(x_1)} & \mu_{12(x_2)} & \cdots & \mu_{1n(x_n)} \\ \mu_{21(x_1)} & \mu_{22(x_2)} & \cdots & \mu_{2n(x_n)} \\ \vdots & & & \\ \mu_{c1(x_1)} & \mu_{c2(x_2)} & \cdots & \mu_{cn(x_n)} \end{bmatrix} \quad\quad (5)$$

With:
U = former partition matrix
$\mu_{11(x_1)}$ = data member degree to-x and cluster to $-c$

4. Counting cluster center with 6 equation, Ref. [4].

$$V_{ij} = \frac{\sum_{k=1}^{n} (\mu_{ik})^w . x_{kj}}{\sum_{k=1}^{n} (\mu_{ik})^w} \quad\quad (6)$$

With:
V = cluster center
μ = nol member degree to-k and cluster to-

w^i = quality ranking degree

x = input data to-k

5. Counting cluster center with 6 equation, Ref. [4].

$$P_t = \sum_{j=1}^{m} \sum_{k=1}^{n} \left(\left[\sum_{j=1}^{m} (x_{ij} - v_{kj})^2 \right] (\mu_{ik})^w \right)$$

(7)

With:

P_t = objective function of iteration to-t

= sample data to-k, attribute to-j

= cluster center to-k for attribute to-j

μ = nol member degree to-k in cluster to-i

6. Improving member degree to find the length between cluster center and data with 8 and 9 equation, Ref.[4]

$$\mu_{ik} = \left[\sum_{j=1}^{m} \left(\frac{d_{ik}}{d_{jk}} \right)^{\frac{2}{(w-1)}} \right]^{-1}$$

(8)

$$d_{ik} = \left[\sum_{j=1}^{m} (x_{kj} - v_{ij})^2 \right]^{1/2}$$

(

9)

with:

= sample data to-k, attribute to-

j

= cluster center to-k for attribute

to-j

= quality rank degree

Examine stopping condition if *(| Pt- Pt-1 | <ε)* or *(t> maxiter)* so that clustering process must be stopped, if not the process will be back to level 4.

3 DISCUSION AND RESULT

3.1 Feature Extraction Result with Fractal Dimension

Feature extraction with fractal dimension shows 5 fractal dimension values. The first value is formed by global image extraction.The four other values are formed by local region extraction. Fractal dimension value forms in fraction around one and two as it is shown in Pig.(2).
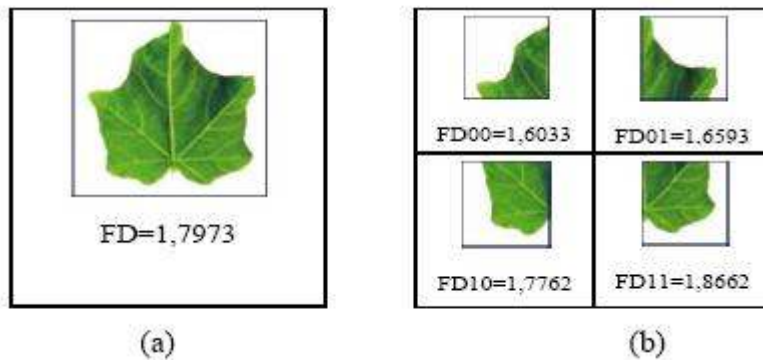
Figure 2: Fractal dimension of all Jarak Pagar leaf plants (a) and local region (b).

3.2 Feature Extraction Result with Fractal Code

Feature Extraction Result with fractal code is taken from block domain pairs and block range which has the smallest value of RMS. Contrast scale value *(s)*, brightness factor *(g)*, average block range (Avgrange) and average block domain (Avgdomain) of those pairs which are fractal code. For example : feature extraction result with fractal code is shown in Table 1.

Table 1: Fractal Code value of Jarak Pagar leaf.

	Contrast scale	Brightness factor	average block range	average block domain
Jarak Pagar leaf	1,07	224	190,3	221,8

3.3 Fractal Dimension Characteristic Vector

One of each leaf image can be gained vector characteristic which has 5 fractal dimension values (FD). Each class makes distinctly fractal dimension vector pattern and each class has its own characteristic.
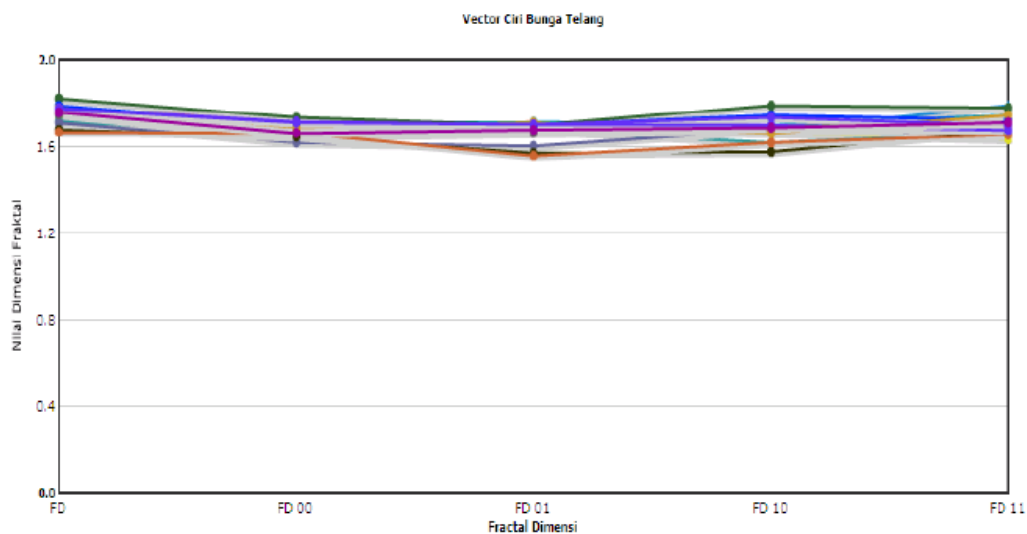
Figure 3: The class of fractal dimension vector pattern of Bunga Telang.
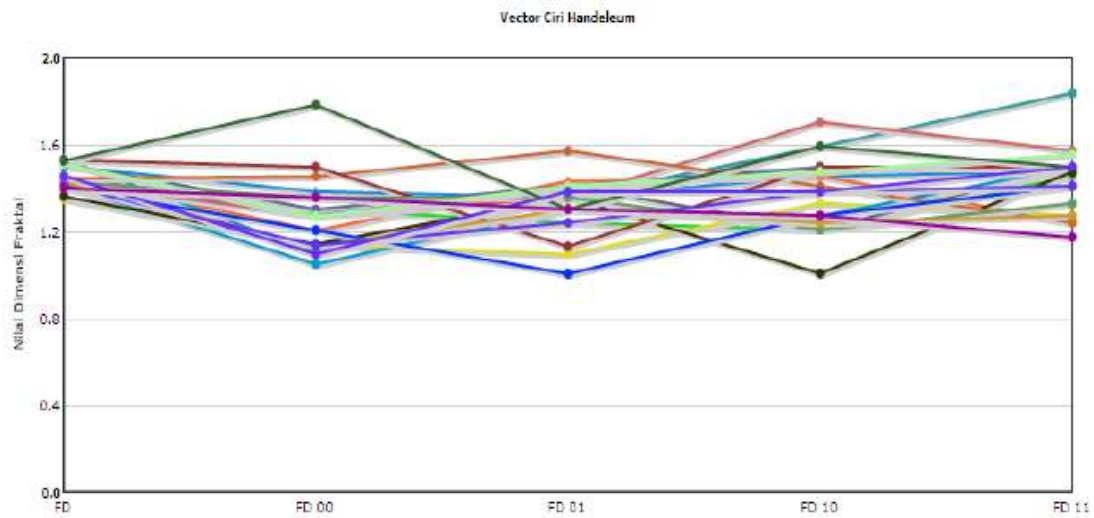
Figure 4: The class of fractal dimension vector pattern of Handeleum.

Pig.(3) shows the class of Bunga Telang leaf which has a nearly similarity of fractal dimension vector pattern. Because this leaf shaped pattern in that class is similar. Otherwise Pig.(4) shows the class of Handeleum leaf which does not have similarity of fractal dimension vector pattern. Because the leaf shaped pattern of each class is different.

3.4 Fractal Code Characteristic Vector

One of leaf image can be gained characteristic vector consists of 4 fractal code value such as : contrast scale *(s)*, brightness factor *(g)*, average block range (Avgrange) and average block domain (Avgdomain). Each class forms fractal code vector pattern which distinctly characterize the classes.
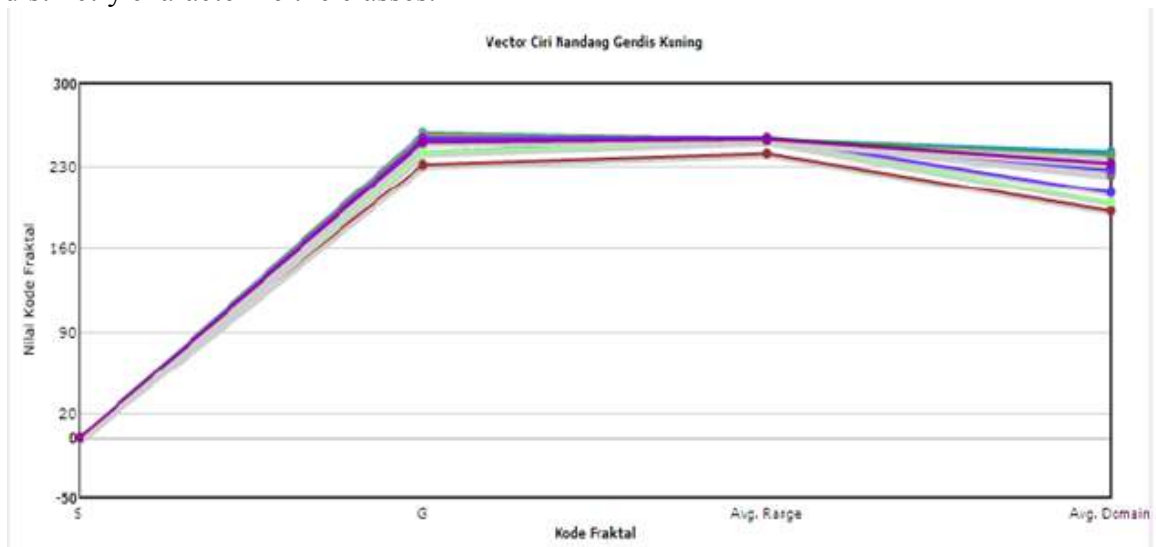
Figure 5: The class of fractal code vector pattern of Nandang Gendis Kuning.

Pig.(5) shows the class of Nandang Gendis Kuning which has nearly similarity of fractal code vector pattern. Because the leaf texture pattern of this class is similar.While Pig.(6) shows the class of Kemangi, which does not have fractal code vector pattern, but it has a different fractal code vector pattern. Because the leaf texture pattern of it is different.
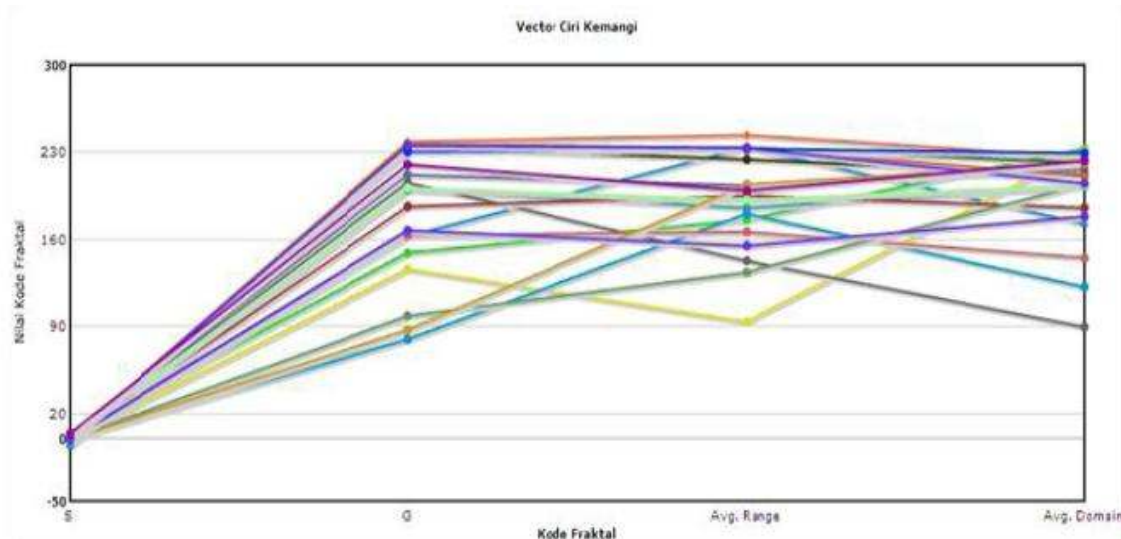
Figure 6: The class of fractal code vector pattern of Kemangi..

3.5 Evaluation System
Evaluation system is conducted to clustering model and the image identification result of medicinal leaf plant.

Clustering FCM Result Based on Fractal Dimension
The result image of clustering medicinal leaf plant with FCM based on fractal dimension is accurately gained by the level of 85,04 %. There are 3 classes which has clustering result above 80 % such as class 7 (Bunga Telang) is clusterred by 100 %, class 20 (Pegagan) is clustered by 90 % and class 17 (Tabat Barito) is clustered by 85%. Mean while two classes are below 20 % such as class 5 (Lilin) and class 14 (Handeleum) each of them is clustered by 10 %. The class that is generally clustered above 80 % has a shaped pattern and the characteristic of its vector is nearly similar as it shown on Pig.(3) for Bunga Telang class. However, the class that is clustered below 10 % has a shaped pattern and its characteristic vector pattern is different as it shown at Pig.(4) for Handeleum class.

Clustering Result with FCM Based on Fractal Code
The result of clustering image of medicinal leaf plant by FCM based on Fractal code is got at the accusation 79,94 %. There is a class which has a clustering result of 80 % such as class 16 (Nandang Gendis). Mean while the two classes are below 20 % such as class 13 (Kemangi) and class 18 (Gadung Cina). The class which is clusterred by 80 % is generally has a texture pattern and a characteristic vector pattern which is similar and shown on Pig.(5) for Nandang Gendis Kuning. However, the class which is clustered

below 10 % has a texture pattern and characteristic vector pattern which does not have similarity as it is shown on Pig.(6) for Kemangi class.

Identification Result with FCM Based on Fractal Dimension
After having identification of 200 testing data image of leaf medicinal plant, it is accurately gained those data for each class as it is shown at Pig.(7).
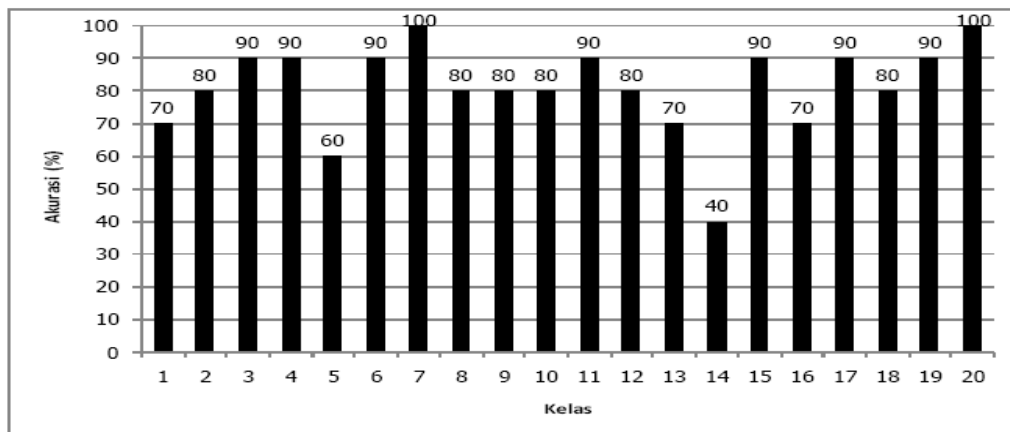
Figure 7: Graphic is accurately identified every image class of each medicinal plant based on fractal dimension.

On Pig.(7), class 7 (Bunga Telang) and class 20 (Pegagan) have an accuracy of 100 %. Whereas class 14 (Handeleum) has the lowest accuracy of 40 %. These accuracy levels are created by fractal dimension vector pattern of each class. Class 7 (Bunga Telang) and 20 (Pegagan) have almost a similar fractal dimension vector pattern. The fractal dimension vector pattern similarity is formed by those classes which have the same leaf shaped pattern and they are easily identified as it's shown on Pig.(8) and Pig.(9). But class 14 tends to have different leaf shaped pattern as it's shown on Pig.(10). Until the fractal dimension vector pattern is not similarly formed. The difference of it causes the difficulty in identifying the class.
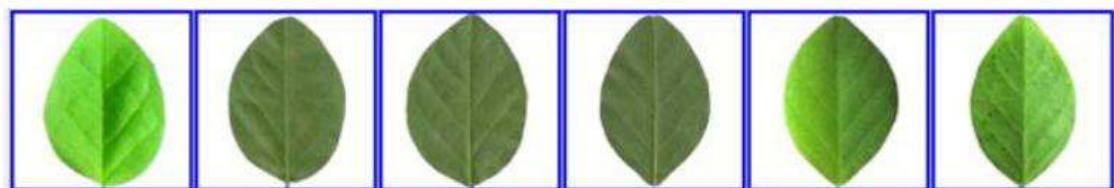
Figure 8: The leaf shaped pattern of Bunga Telang class.
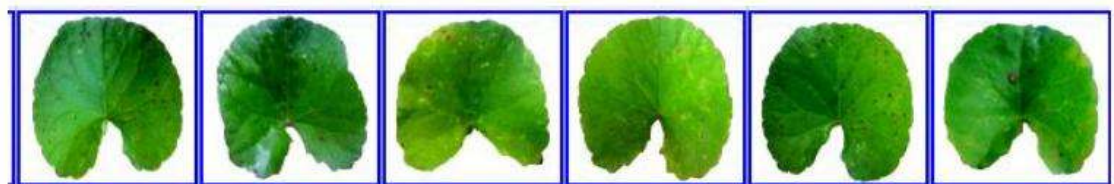
Figure 9: The leaf shaped pattern of Pegagan class.
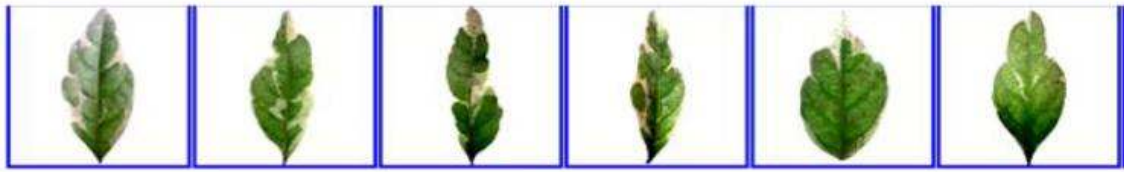
Figure 10: The leaf shaped pattern of Handeuleum class.

Identification Result of FCM Based on Fractal Code

After identifying 200 data of testing leaf image medicinal plant, it is obtained an accuracy of each class as it's shown on Pig. (11).
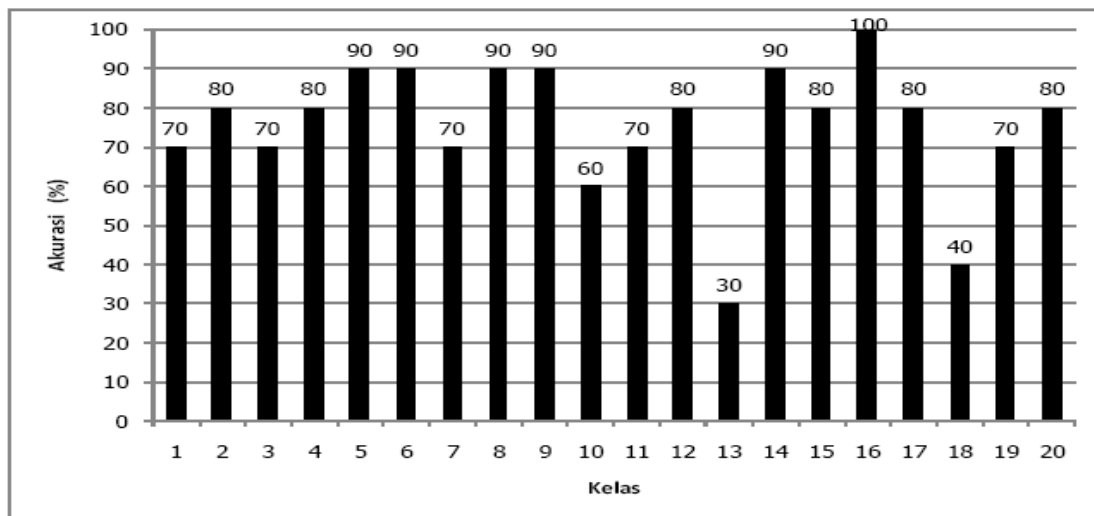
Figure 11: Bina Darma Crest. Graphic can accurately identify each image class of medicinal plant based on fractal code.

On Pig.(11), class 16 (Nandang Gendis Kuning) has the highest accuracy of 100 %. Whereas class 13 (Kemangi) has the lowest accuracy of 30 %. Class 16 (Nandang Gendis Kuning) has nearly the same fractal code vector pattern. The similarity is formed because the class has texture pattern and lightning which are easily identified as it's shown on Pig.(12). Butclass 13 (Kemangi) does not have the same fractal code vector pattern. The difference of it is formed because the class has a different texture patterns and lightning, so it is difficult to identified as it's shown on Pig.(13).
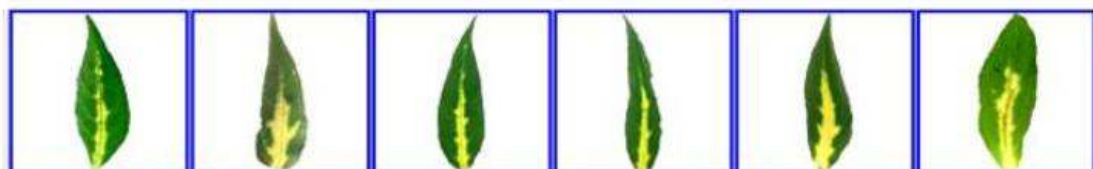
Figure 13: The leaf shaped pattern of Nandang Gendis Kuning class.
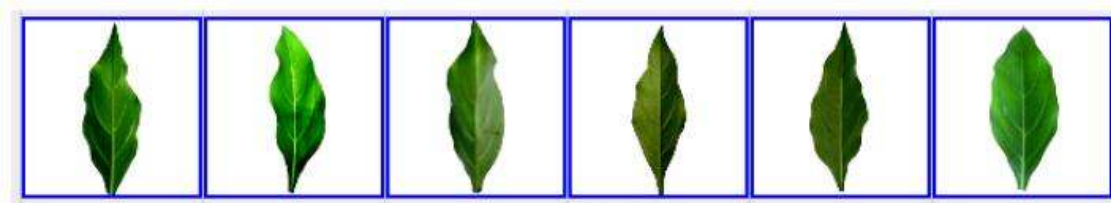
Figure 13: The leaf shaped pattern of Kemangi class.

4 CONCLUSIONS

Based on the research above, it is concluded that :
1. Fractal method and clustering FCM can be implemented to develop identification system of medicinal plant.
2. Extraction result of fractal method create different vector pattern at each class which does or does not influence it easily at the time of identification.
3. The extraction result of fractal dimension is more influenced by leaf image shaped pattern of medicinal pattern, but its result of fractal dimension is more influenced by texture pattern of medicinal leaf image.
4. The classification result of medicinal leaf image use FCM based on fractal dimension reach an accuracy of 85,04% and based on fractal code get an accuracy of 79,94%.

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ELECTRONIC SOCIAL MANAGEMENT SYSTEM – E-SMS

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Absract

Selangor State Government aware that need for upgrade their social management performance, especially on community services sector in all aspects include role and contribution from all state government components and agencies, leader of community either formal nor informal. There also a specific problem or complaint from citizen of Selangor on how to implement something and how to handle the problems and also to manage social needs among the citizen. Even sometime the complaints are the major problem to the government. So as the objective of this research is to develop social management system so that can deliver social services with efficient.There are 5 issues that can overcome by development of E-sms. First issue is needed to have Personal and household profile of citizen Selangor because this is the basic information. Second issues is to update profile of community of citizen so that the government can determine the need in planning and implementation of socio-politic strategy. Third issues is the complaint from the citizen which is form others channel example information from non-government agency normally not complete. The fourth is there is no database of information about the activity or event for the citizen iether organized by government or the citizen. The fifth is every citizen don't have directory of services that exist near them.

E-sms can be one stop center for everyone that need information or to channel their response, problem, complaint or any other things that related to the social matters. They easily can access this system via Internet through PC or smart phone. For every complaint that the user submits, they can have the information of complaint/report status. From there also each of the component in social management will know if the complaint not solved and stuck at which level, which complaint are solved and others.

1.   INTRODUCTION

Variety of immoral behavior or social problems that often occurs and report to raise the community shows that it is time that   cohesive approach, rational and professional needs to be in formal form. The concrete form as a guide for the implementation of all parties in the community, individuals, non-governmental organizations (NGOs), private sector and government.

There are some challenges and shortcomings in the approach that we hear and see in order to address the problem of multi-party and immoral behavior in our society. Refer [1] there are four Hofstede dimension that are main problem among the human.
1. Power Distance
2. Uncertainty Avoidance
3. Individualism
4. Masculinity versus Feminity

Refer [2] To meet the low power distance index; it is need to implement some approach to overcome social problems. One of the approaches is must reduce the diversity of a bureaucratic procedure. Bureaucratic constraints have often may cause the termination of any action being taken to address a problem.

One of the ways to get the lower power distance index is by using this system. Which is including the fastest way to address the problem that can help to take the fastest action to overcome the problem.

By using this system also will overcome some of the constraint such as help todefine problem and weakness, understand the problem, know the problems existence, Approach more holistic, complete of networking and coordination within executive body and have continuity in addressing the problems .

2.   OBJECTIVE

The objectives of the system are:
1. To develop the Social Profile Information System component.
2. To develop the community profile/resident information as a basic social management's component.
3. To develop cliental community profile.
4. To develop the community social event profile component.
5. To develop Information System for Community Social Services component.

3.   SYSTEM
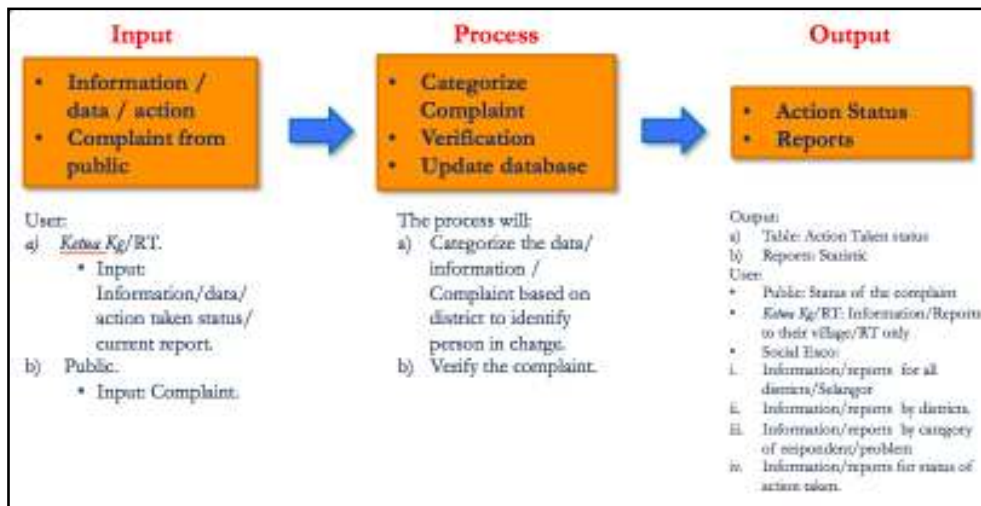
Figure 1 : Flow of the system

Input

The system users are 2 type of person, which are Public and Head Village (Ketua Kg). They need to give input their complaint to the system. For public the just need to keying the complaint of the problem that related to them or others. For example :Mdm A is a single mother for 7 children. She doesn'thas any education achievement. She needs to work to support their family.

For Head Village the input is more about the report of their action taken. For example refer to the above example: Already meet with Mdm A. Discuss about the skill that she had and advise her some short course that she can attend. Also help her to apply the financial support form the government.

Process

The administrator will channel the complaint from the public to person in charge. The channel a prose isrefer to the district and the village of the complainant personal particular that they already keying. The verification are need from the person in charge for the complaint.

Output

Action status and report is the output of the this system. The complainant or public can now the status of their complaint. The head village can get report and statistic of the complaint for their village only. The Social Exco(government) can get the report

and also the statistic for all village, all district and Selangor. The report and statistic can be customizing. For example need report by district vs problems vs year.

Interface

Figure 2 : Complain Form

This is the form of complaint. The users need to fill in the form. The most important information is district (daerah), village (Kg), Complaint Category (KategoriAduan), Sub Complaint Category (SubKategoriAduan) and Complaint (Aduan).

For complaint category, they need to select one of the following:

- Baby (Bayi)
- Children (Kanak-kanak)
- Adolescent(Remaja)
- Young (Belia)
- Adult (Dewasa)
- Senior Citizen (WargaEmas)
- Women (Wanita)

For Sub Complaint Category, For example if the choose "Adolescent" then they need to select one of the following:

- Inert
- Lonely
- Patient with Chronic
- Stress
- Disabled
- Abused (Physical/Sexual/Mental
- Without Parent
- Poor
- Juvenile

For complaint, they need to describe more about the complaint. If the complainant is not the person that in the problem so the complainant need to give detail about the particular of the person.

Other Facilities that include are :

- About the Selangor government (Kerajaan Selangor)
  - Organization Structure
  - Organization Background
  - Speech from Exco
  - Mission and Vision
  - Contact US
- Information
  - Announcement
  - News
  - Activity
- Services
  - Directory
  - Community Service
  - Forum
- Log in
  - Registration for Head Village and Social Managers
  - Log in for Head Village and Social Managers
- Q&A

4.   CONCLUSION

In the era of globalization, with challenges and enhancement of knowledge, political complexities and controversies, and inability management of social issues were still problematic to the nation. The administration and management of the social systems were not at the expected satisfactory level of the nation.

With reference to these issues, controversies and dissatisfaction, the study intentionally focused to examine the intelligent knowledge based system and creating the electronic social management system through enhancement of personal data profile, daily

livelihood, community product profile of the respective environment, community client profile and computer based profile system

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DIGITAL THREE DIMENSONAL (3D) TECHNIQUE REVIEW FOR PRE-OPERATIVE PLANNING IN TOTAL HIP REPLACEMENT

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Abstract. *Pre-operative planning is important in the process of Total Hip Replacement to provide precise and accurate information to the surgeons. Currently there are still many ongoing researches in helping the surgeon reduce their time and energy in assisting get the right size implants. Universiti Kebangsaan Malaysia Medical Center (UKMMC) for example still using analog or conventional method to find a suitable implants size for the patient. The attempting using 2D projections of 3D anatomical structures found it less effective. After the system developed can solve the problem, it introduces new issues related to producing the best way to display and use all the information in order to provide the surgeon with a user-friendly technique and with significant added value. Despite there are many development for 3D image of total hip replacement, still the conventional method be the main option to the surgeon. Researchers try to review the techniques and the solution of the 3D development used regarding on that.*

1   INTRODUCTION

Osteoporosis is characterized by an absolute decrease in the amount of bone to a level below that are required for mechanical support of normal activity and by occurrence of non-traumatic skeletal fracture [1]. In addition due to age, osteoporosis is also can arise as a result impaired development of peak bone mass due to delayed puberty or excessive bone lose during adulthood.

Usually osteoporosis mostly attach to the joint, which is tend to limits the movement of the joint. Even there are many methods developed for the pre-operative planning for total hip replacement due their high accuracy and low precision error, but they are expensive and are confined to only a few corporate hospitals and diagnostic centers in developing countries.

Referring to [1], bone structure can be estimated by observing the changes in shape and size of proximal femur radiograph. Morphometric analysis in proximal femur able is to detect the changes in the bone structure.

Preoperative planning is critical to the success of total hip replacement (THR), because it determines the quality of the kinematics of the reconstructed joint. Pre-operative planning helps surgeons to prevent intraoperative complications, giving a complete view of an entire anatomy. It also helps to define in advance size and type of

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the prosthesis, to achieve the correct position and orientation of the components and to equalize legs length [2].

2   RELATED WORKS

Several studies have been taken off for reviewing the work relating to this investigation. Scientific studies related to digital hip joint replacement is very rare. Studies relating to the investigation needs to be done to provide new ideas and reserve to conduct the study. This study not only covers the areas of THR, but also related to the study of any bones.

[3] discussed about their methodology which is they used 2D radiograph for image guided orthopedic surgery in developing 3D reconstruction of patient specific bone model. Their main concern is, 3D imaging modalities such as Computed Tomography (CT) scan is direct 3D imaging modalities such as computed tomography (CT) are restricted to a minority of complex orthopedic procedures.

The proposed framework shown that 2D x-ray image will produce edge point extraction, while 3D generic model will produced projected contours. Both of the outcomes will then combined to generate non-rigid registration between extracted edges and projected contours. This registration has been developed to be robust to occlusion, outliner, noise and deformations which are inherent problems seen in edges extracted from radiographic images. The identified point correspondences will next be interpolated to create a planar translational field in both the anterior and lateral viewpoints. This translational field will identify the deformations required by the 3D anatomical model in the equivalent viewpoint. Finally a full 3D translational field will be created through a thin plate spline based interpolation and the generic anatomical data deformed accordingly.

From this study, found that the main criteria required when developing a visualisation (reconstruction) methodology for pre-operative planning is the accuracy of reconstruction, adaptability to multiple orthopaedic cases and the level of manual intervention required, while time is not a main concern. This study is good as a methodology guideline for pre-operative planning of total hip replacement.

[4] proposed an advanced computer-aided design (CAD) based on 3D digitized reconstruction technique to form vivid 3D visualization and simulation of complex proximal humeral fractures (CPHF). Applications of the novel biomedical reconstruction and simulation technique in the special area of bone and joint surgery were elucidated. This advanced and practical method can provide vivid 3D reconstruction and visualization of proximal humeral fractures (CPHF) for orthopaedic surgeons. This procedure can declined the duration of operation, amount of bleeding, and hospital stay. However this paper discussed more on findings and not concentrated about the 3D development process or techniques.

[2] discussed about the usage of Hip-Op System as an application of 3-Dimensional (3D) medical image in orthopaedic surgery. This system upgraded the

visualisation paradigm, which called Multimodal display. This concept enhanced display interface from the CT data by Computer Aided Orthopaedic Surgery (CAOS) to meet professional expectation, and provided functional information about the effectiveness of surgical planning which is critical for the long term result and cement less implants. They also improved the CAOS system which is they provided density map displays with colours the area of the stem surface. However, this system cannot give the exact measurement from certain points to match it to the dedicated implant. This system also cannot allow user to manipulate 3D model.

[5] were produced techniques and algorithms that can be used to implement the implant transformation process such as rotation and reflection on medical images. The main objective of this paper is to show the hip joint implant transformation algorithm used in x-ray images of hip joint patients. It shows how the implant transformation process being performs using 2D. From their algorithm produced, the result shows as in Figure 1, which is the actual positions of the hip joint implant, while Figure 2 shows the implant after translated and rotated.

Figure 1: Default position for implant

Figure 2: Implant after transition

This research found that the digital hip joint implant was successfully transformed according to user requirements. This implant should be suitably translated and rotated to obtain the optimal position on the x-ray images of patients. Finally, the ability to accurately determine the digital implant position on medical images will improve accuracy of preoperative templating of THR. The algorithm proposed is good in the free user control, but limited to 2 dimensional only.

3   CONCLUSIONS

From the previous research reviews, give a guideline to the researcher in developing 3D implant for pre-operative planning. Also researcher can get an idea in finding gaps between previous researches done.

4   ACKNOWLEDGEMENTS

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Information Security: Human Resources Management and Information Security Incident Managemen

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Keywords: *Human resources management, Information security incident responses management, Code of practice*

Abstract. *Information security has becomes an essential aspect in any organization. Since most of the sensitive information is stored digitally, security becomes extremely important and need to be managed and protected on an ongoing basis. Information security management recognizes the most susceptible area in any organization and builds shields to protect them. Due to the important of information assets, a study have been conducted to explore whether information security in UNISEL comply with what has been recommended by the code of practice focusing in the area of human resource management and information security incident management. This paper presents the result from a combination of quantitative and qualitative study, arising from detailed interviews conducted with a few head of departments and unit to get their view, opinion and experiences with information security management as well as a questionnaire to identify the level of awareness among staff. The findings reveal that the needs for human resources management and information security incident are required to protect information assets of an organization.* (www.iciba.binadarma.ac.id).

1 INTRODUCTION

Nowadays, no one can deny that the computers have become part of our lives. We use computer either at home, office, school, universities or even if we are mobile. Most of the information has been stored digitally and it is important to safeguard all the information since it is the valuable asset and can become vulnerable to malicious attacks.

The issues of information system security and the confidentiality in a university computer network environment have been major concerns as early as 1975 (Kerievsky, 1975). Colleges and universities have been a target for cyber attacks for two main reasons (Katz, 2005). It is because of the extremely large amount of computing power and open access they provide for their staff, student and to their constituents as well as to the public. Even though, the concept of knowledge sharing has been implemented in most of the universities they still need to have a balance between sharing the information and information security for the sake of protecting their information so that it will not jeopardize the most valuable asset of their organization. The objective of information security is to protect the interest of those depends on information and the systems and communications that deliver the information from any harm resulting from failure of availability, confidentiality and integrity.

Information security management recognizes the most susceptible area in any organization and builds shields to protect them. A variety of code of practices,

guidelines and standards currently available to enable different organizations with different environments to be properly protected such as British Standard (BS) 7799's family or International Organization of Standardization (ISO) 27001 and 27002's family.

2 RESEARCH BACKGROUND

Information is an asset, like other important business assets they need to be protected. Information security is the protection of information from a wide range of threats in order to ensure business continuity, minimized business risks and maximize return on investments and business opportunity (ITIL, 2005).

This is due to the fact that information system and internet are not only used to increase their competitiveness, but also by criminal (Rezgui and Marks, 2008). This is becoming a trend in higher education institutions that are experiencing an increase in security threats and attacks (Marks, 2007).

This study will be conducted in UNISEL, which is one of the private universities under the state of Selangor. The reason for focusing on the universities is, it is a knowledge-intensive organization where the quality and security of their information assets should be at very high priority of all organization, right across the sector (Mok, 2005).

This research will explore whether information security in UNISEL comply with the recommended code of practice in the area of human resources management and information security incident responses. Among the well known code of practice is the ISO 27002 standard. It is the rename of ISO 17799:2005 and is a code of practice for information security. Its original standard has been published by the UK government, in 1995 and was re-published by British Standard Institute (BSI) as BS7799. In 2000 it was again re-published as ISO17799. A latest version of this appeared in 2005 together with a new publication of ISO27001. These two documents are intended to be used together, with one complimenting the other.

ISO/IEC27002 provides a code of best practices recommendations on information security management and is suitable to be used by anybody who is responsible for initiating, implementing or maintaining information security management system (ISMS). Information security deals in the context of the confidentiality (to ensure that information can only be access by authorize user), integrity (to safeguard the accuracy and completeness of the information and their processing methods) and availability (to ensure that authorized users can access to the information and the associated assets when it is required).

The purpose of this research is to identify to what extent UNISEL comply with the recommended information security code of practice in the area of human resource management and information security incident management. These two areas have been selected based on the recent studies that staff errors are rated among the top threats to information assets in organization (Whitman and Mattord, 2005). The key defense in the fight against security incidents that involve human activity is the use of ICT awareness programs (Kruger and Kearney, 2008)

3 METHODOLOGY

Triangulation method is applied on this research, which are quantitative (questionnaire) and qualitative (interview, documentation, policy or manual). A set of questionnaire have been distributed among staff in Information Communication Technology center

(ICT center- PICT), Examination unit, Record & Graduation unit, exam secretariat and faculty. Since high rates of non-responses to survey is normal (Kotulic, Clark, 2003), the total respondent that return the questionnaire for this research is about 59%(59 out of 100 respondents). The selection of these group is based on previous study by other researcher that most threat in higher education institution are in tampering grades or result and exam questions. Higher education institutions have experienced a data loss or theft in 2006, mostly in grades and exam question with 9% reporting a loss or theft of student personal information, which could affect millions of university students (Piazza, 2006)

The questionnaire is divided into 4 sections. Section A is the demographic section, section B will discuss on awareness toward the use of password, email and antivirus. Section C will ask on the topic of incident responses and section D on awareness program and training. The purpose of this questionnaire is to determine the level of security awareness among staff based on selected variable. The response or feedback from this questionnaire will be analyzed using statistical analyses tools (SPSS).

Another 4 set of interview questions based on a recommendation from information security code of practices have also been designed and an interview been conducted among selected management level, which are: the director of ICT center, manager of human resource department, head of department of Exam Unit and Record & Graduation Unit. The reason for the small number of participants to be interviewed was that, only those managers in each department had a direct influence in the selected research area and within the scope of the research.

4 DISCUSSION

4.1   Human Resource Management

According to code of practice, human resource management will be evaluated based on two general ideas which are legal agreement and security training or awareness program for the staff. The purpose of this area is to minimize the risks of human error, theft, fraud or misuse of facilities and to ensure that users are aware of any security threats and concerns, and they are fully prepared to support the corporate security policy in their routines activities.

Human errors, carelessness and greediness are responsible for most thefts, frauds or misuse of facilities. Various proactive measures that should be taken are, to make personnel screening policies, confidentiality agreements, terms and conditions of employment, and information security education and training. Alert and well-trained employees who are aware of what to look for can prevent future security breaches.

Based on the interview conducted with the human resource, UNISEL practice the concept of confidentiality agreement as recommended by the code of practice, where prior to the employment or during staff recruitment, they have to sign an agreement on terms and conditions of employment regarding confidentiality of information and assets of their organization. The agreement is known as official secret acts 1972. The university will also do the pre-employment background check for the potential new staff, if access to sensitive information may eventually be required as part of their employment.

During employment, if staff needs to be transfer from one department to another department or unit due to the changes and responsibilities, there will be a removal of access right from their previous department or unit. The job rotation in UNISEL is

normally done for those who serve between 3 to 5 years of service to give an exposure to different kind of work environment. Before they join other department, they need to go through the process of handover task and removal of access right from the previous department or unit.

For the case of termination of employment or resign from UNISEL, there will be a checklist for "Handing over document/equipment" together with the removal of access right that they have to fulfill. All of these procedures are done for the purpose of protecting the information and organization assets.

The interview also reveals that the university had never conduct an awareness program for their staff. What they have is only the induction program that tells the important of some university's information and not to be disclose to others.

Basically the questionnaire is divided into 5 categories, which are demographic section, password, email security, antivirus, incident response and security awareness.

Based on table 1 for example, it shows that almost 65 percent of the respondents do not know what they should do in the case of incident happens and only 34 percent knows how they should respond.

Table 1: Percentage of incident

Likert	What to do?	Reporting procedure	Where to access procedure/policy
	Percentage		
Uncertain	6.8	10.2	11.9
No	59.3	49.2	59.3
Yes	33.9	40.7	28.8
Total	100.0	100.0	100.0

59.4 percent of respondent did not aware whether there is any proper procedure or work rules in reporting the incident if it happens. Table 1 also shows that almost 80 percent of the respondents do not know where they can access security policy or procedure as their reference.

From these 3 cases, management should put an extra effort to held security awareness program to increase the awareness level of their staff. So many ways can be used to develop awareness among staff including circulation of brochure, pamphlets, books, presentation and workshops by those who are expert in information security, representative from any information security standard or code of practice through workshop, training or seminar, use of e-learning facilities or any other communication tools.

4.2   Information Security Incident Management

In most literature reviewed, the meaning of "incident" is related to unauthorized activity against a computer or network that will affect in a violation of a security policy. All action, event or situations are generally handled by some group of individuals who follow established incident response processes, whether they are from IT department, an ad hoc team of security staff called upon as needed or a more formalized staff. (Killcrece, G., Kossakowski, K-P., Ruefle, R., Zajicek, M., Oct 2003).

The idea of this area is on the information security events, incidents and flaws (including near misses) which should be promptly reported and properly managed. Based on the interview with the ICT center (PICT), so far, there is no central point of

contact for the staff to channel their report as recommended by the code of practice. What they did is, the staff will report to their immediate supervisor and the information will be channeled to the respective unit then the person in charge will be informed according to the type of incident before appropriate action can be taken.

There is no documentation regarding incident responses and it is not promptly reported and well managed as recommended by the information security code of practice. This will make it harder for the organization to implement a continuous improvement (learning the lesson) and to collect forensic evidence for future use. This forensic evidence can be the collection, safeguarding, documentation or any kind of evidence from a computer system to determine changes to the system and to assist in the reconstruction of events leading to the compromised. Besides that, from the documentation itself, an organization can do an incident analysis by examining all available information supporting evidence related to an incident or event. The purpose is to identify the scope of the incident, the extent of damage caused by the incident, the nature of the incident and available response strategies. It also can determine any interrelations, trends, patterns or intruder signatures.

By having a good documented incident report, it could minimize the damage from security incidents and malfunctions and the organization can learn a lesson from such incidents.

12 CONCLUSIONS

There are numerous reasons why organizations have to spend effort and resources to increase their information security level. One of the ways is to fulfill what have been recommended by the security code of practices. Some problems cannot be solved by adding more technology but by combining the technology, support from top management as well as an educated security attitude of employee, management, external IT users and partners to ensure effective information Security(Rezgui, Adam,2008). Security is not an idea of fix-and-relax. It must be an ongoing process which needs to be built, taken care, improved and review regularly.

13 ACKNOWLEDGEMENTS

A study can be conducted to see in what area an awareness program helps the universities to increase the security of awareness level of their staff. The study can detailed out based on staff behavior, attitude and their knowledge towards information security so that a sufficient material to assist university in delivering a proper awareness programme, training, camping or workshop can be held to mitigate the problem of information security.

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SURVEY ON SEQUENTIAL PATTERN IN PREPROCESSING PHASE FOR KNOWLEDGE DATA DISCOVERY

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Abstract. *Preprocessing phase in data mining plays important role in knowledge data discovery. However, data preprocessing takes much effort and long process time before it will be ready for data mining process. For sequence data, preprocessing can help choosing and sequencing data before main task such as classification, clustering etc. Sequential pattern mining can be applied in the preprocessing to prepare data based on user specified constraints for subsequent data mining process. In general, sequential pattern mining will discard data that do not possess meaning and only provide sequence data needed for the next data mining process. Several types of constraints can be chosen based on user needs. With the sequential pattern mining in preprocessing, efficient computational time is expected while accuracy can be achieved simultaneously.*

1 INTRODUCTION

The process of data mining in knowledge discovery data that contains sequences often encounters challenges such as high computation time and high number of sequential patterns that are less meaningful. This is caused by the exploding number of sequential pattern candidates obtained during the process of mining that will burden data mining process.

The requirement of finding optimal data for data mining process is indeed needed to yield more accurate knowledge and higher performance of data mining process. Sequential pattern mining can arrange data according to time sequence and yield sequences that fit with minimum support to reduce time needed for data mining process and enhance quality of discovered knowledge.

In order to solve the problem, many data mining specialists do preprocessing data before applying data mining methods to discover knowledge. Data preprocessing is a phase in data mining that has to be done before applying data mining techniques to repair and improve data quality. Preprocessing phase aims is to prepare data so that it can enhance accuracy & performance of data discovery process.

Sequential pattern mining can be used to obtain sequential patterns from data. Sequential pattern can be conditioned in accordance with the user constraints to limit number of sequential patterns and make them more meaningful to user. Reducing

number of sequential patterns will lower computational time of the subsequent data mining process.

Sequential pattern mining can also be used to identify and sort data in specific order so that it can be used as input for the main task. Sequential pattern mining is used in preprocessing to arrange data that fits with user-specified constraint and ready for the data mining process.

This paper will provide a survey of how sequential pattern mining can be implemented in preprocessing phase to get data in order for subsequent data mining process. This paper will elaborate the idea in several sections. Section I contains introduction. Section II explains about general approaches for mining sequence database. Section III explains about state of the art of sequential pattern methods and its benefits in preprocessing (before data mining process begins). Section IV contains conclusion of this paper.

2 SEQUENTIAL PATTERN MINING

Process of finding sequential patterns needs repeated database scans. It requires time-consuming computation. Moreover, number of sequential patterns found are exploded while patterns found are short and many of them do not provide significant meaning for user (trivial). Another problem is scalabity. This problem comes with the growing of mined database.

The challenges faced in sequential pattern mining is to develop an algorithm with few database scans while number of sequential patterns obtained is few and meaningful to user. For scalability issue, sequential pattern mining algorithm is challenged to mine updated database, multi database and multidimensional database effectively & efficiently. Therefore, many studies on sequential pattern mining were done to address the above problems.

Support model approach can be categorized into 3 categories : horizontal, vertical and projection approach. Basically, horizontal approach scans database for searching frequent patterns based on previous found patterns with length-k-1. For example, Apriori algorithm pays lots of computational resources since it has to scan database repeatedly to get frequent patterns. Several approaches has been developed to cope with repeated database scan problem, that is GSP (Generalized Sequential Patterns) [1], PSP [2]. Vertical approach improves horizontal approach by reducing database scans in getting frequent patterns. Algorithms with vertical approach is SPADE (Sequential Pattern Discovery using Equivalence Classes) and SPAM (Sequential Pattern Mining) [3]. PrefixSpan (Prefix-project Sequential PatterN Mining) algorithm that uses projection approach improves performance of horizontal & vertical approach [4].

For coping with exploded number of sequential patterns,   short & less meaningful patterns, several approaches has been done, that is searching for closed and maximal sequential patterns and using user-constraints. Closed sequential pattern or closed subsequences is sequence that contains no super-sequence with same support. Algorithm for getting closed and maximal sequential patterns is CloSpan [5], Bide (Bidirectional Extension) [6], TSP (Top-K Closed Sequential Patterns) [7], WCloSpan (Weighted CloSpan) [8]. To get maximal sequential patterns, several algorithms have

been developed, such as MSPX (Maximal Sequential Patterns) [9] and PMSPX (Parallel MSPX) that uses multiple samples to exclude infrequent sequences [10].

Constraint-based sequential pattern mining has also been attractive to researchers since user constraint can help pruning sequential pattern candidates. It addresses needs to get a small number of sequence patterns but interesting for user. Sequential patterns obtained will be automatically filtered based on predetermined constraints. Sequential pattern mining algorithm that is based on constraint-based is SPIRIT [11], algorithm based on occurence list constraint [12], D-MINER [13].

For answering scalability issue, sequential pattern mining algorithms have been developed based on multiple alignment model. Sometimes sequential patterns that are interesting to users are not a complete one but patterns that are appeared in many sequences. From several patterns, there can be found an approximate patterns that represents all the existing ones. Summarizing patterns uses approximation for patterns that are shared by many sequences or is called consensus patterns. ApproxMAP (APPROXimate Multiple Alignment Pattern mining) has been developed [14]. Another approach to cope with dynamic database is incremental data mining. Dynamic database allows any insert or append operations in database. This approach prevents data mining process to mine repeatedly starting from scratch to regain sequential patterns. Algorithms developed with this approach is GSP+ and MFS+ that is developed based on GSP and MFS algorithms [15]. Improvement was made and yielded IncSpan algorithm [16], CISpan [17], Pisa (Progressive mining of Sequential pAtterns) [18], a weighted approach for progressive database [19].

For multidimensional database, algorithm PrefixMDSpan was developed [20]. The algorithm was improved and become PSFP (PrefixSpan with FP-growth) [21], extended version of the PrefixSpan (EXT-PrefixSpan) [22], ApproxMGMSP algorithm (Approximate Mining of Global Multidimensional Sequential Patterns) [23] and a combination of mining algorithm for closed pattern mining and multidimensional mining [24].

3 SEQUENTIAL PATTERN IN PREPROCESSING

Results of sequential pattern mining is very useful for subsequent data mining process. Several combined approaches between sequential pattern mining and data mining process has been carried out, such as frequent pattern-based classification or frequent pattern-based clustering. For example there is an approach that combines sequential pattern mining with classification. Sequential clustering is used to classify documents with the SPAC method (Sequential Patterns for Classification) [25].

For classification of sequence database, a combined approach between the association and the classification has been done. Algorithm that combines association and classification is called CAR (Class Association Rules) [26]. This algorithm classifies special subset of rules that have been obtained from the previous association.

Sequential pattern mining in preprocessing aims to discover sequence patterns in sequence database. The patterns are being used as input for next data mining process. Data input can be in text document format or dataset.
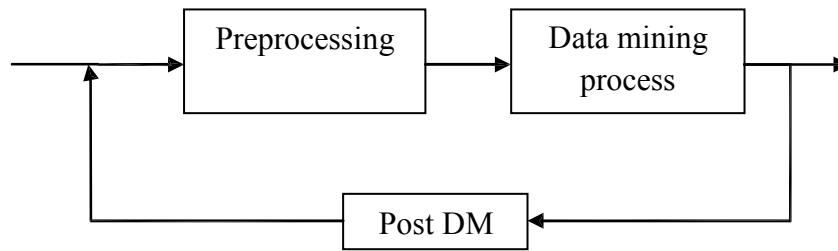
Figure 1. Overall diagram of SP in preprocessing and data mining process

Previous research on implementing sequential pattern mining in preprocessing and classification data mining process has been done for predicting the success of a plan. The sequence patterns will be inputed as features for the next classification process. Sequential pattern in preprocessing finds patterns that are correlated with target classes and classification algorithms will learn to weigh evidence from different features to classify new data [27].

A. Sequential Pattern For Preprocessing Rules

Sequential pattern in preprocessing is used to select features that become inputs to the process of data mining classification standards such as Naive Bayes and Winnow. The case is a prediction of plan whether it will be successful or fail that pay attention to the execution of such plans [27]. The case comes from the order of betting sequence in a poker game, where a study noted poker steps from 3 people to be analyzed further. Analysis uses classification to get function that can predict which poker player that will win. Classification process requires players' step data which was represented in the form of feature-value pairs vector. Additional steps were taken to give the criteria at feature selection and perform pruning on obtained rule. By selecting the feature, the accuracy of the classification process was increased by 10-50%.

By performing sequential pattern mining in preprocessing stage, it will eliminate redundant features. Redundant features as an input to the classification process is reduced. This will make classification process more effective.

B. Sequential Pattern For Preprocessing Text Document

Another application of sequential patterns in preprocessing is for text document. Text document is composed by sentences with certain order while a sentence is composed by words that give meaning to the phrase. Representing text in the form of word order would provide more meaning than just representing it as a collection of words without any order or what we may call as bag of words.

Sequential pattern on preprocessing phase is used to order words in a sentence or between sentences so that ordered words contain a specific meaning. Series of words in a phrase can be used as an input for the subsequent data mining process such as document clustering, document classification etc.

SP in preprocessing has been used for finding sequential patterns in text documents. Text was represented in the form of TF-IDF (Term Frequency, Inverse Document Frequency) [28]. Stemming and eliminating stop-word list were done to change word into root word form and eliminate prepositions such as the, a, an etc. The algorithm used to extract the sequential pattern was multiple minimum support and SPAM (Sequential PAttern Mining). After sequential pattern was obtained, then calculate confidence of each sequential pattern to get rules. Rules with the best confidence level and support were used to categorize text documents.

Global evaluation uses F_β measure which combines recall and precision metrics. From the evaluation, it was found that performance of SPaC implementation (Sequential Pattern Classification) was better than CBA (Classification Based Association). By using TF-IDF representation, accuracy of word meaning is better than just using bag of words representation.

Other study was integrating sequential patterns in preprocessing with text document clustering using K-means clustering algorithm (Nalistia, 2008). Text of documents was arranged in order from occurences using sequence of words as representation of words in a sentence. This representation is much better than bag of words which only view document as a set of words and ignore the order of word occurrence in a sentence. In this study, sequential pattern is extracted from the document in preprocessing phase. Preprocessing transforms data structures into sequences form. Then sequence patterns are projected into transformation space with feature set dimension. Then, K-means algorithm clusters transformed sequences into vector space. By integrating sequential pattern in preprocessing, performance of clustering accuracy was increased.

Sequential pattern on text documents were also used to identify which sentence was wrong or to identify erroneous / correct sentences [29]. Erroneous detected were include errors in grammar, sentence structure and lexical. In this study, pattern discovery is combined with supervised learning models. Sequential patterns were in Labeled Sequential Patterns (LSP) format containing the sequence information and class labels. LSP were obtained by performing mining using the minimum support threshold and minimum confidence constraints. LSP formed binary feature as input for subsequent classification process. Performance measurement of LSP uses precision, recall and F-score metrics shows it delivers good results.

Sequential patterns was also utilized for keyword extraction in text documents [30]. Sequential pattern mining SPAM was used in preprocessing to obtain sequential patterns. After sequential patterns were obtained, statistical features and pattern features were used to form the keyword extraction model. Then, decision tree classification algorithm was used to get the keyword extraction.

Performance measurement of keyword extraction uses precision, recall, and F-1 evaluation metrics. Comparison of performance of keyword extraction method is done by comparing the impact of using different feature sets. The use of pattern features as a result of the sequential pattern mining proven to increase performance evaluation metrics.

Pattern discovery approach [31] for text mining was adopted in 2 stages to obtain closed sequential patterns. Sequential patterns represent the most informative content. Patterns in the form of phrases were then used to extract feature for text mining.

C.   Sequential Pattern For Preprocessing Protein Data

Protein dataset is composed of a series of protein data by a particular sequence. Protein codes and sequences of codes contains a specific meaning. Extracting sequential pattern in preprocessing stage will improve the subsequent data mining process.

For protein dataset, sequential patterns in preprocessing were used to get the longest protein patterns. The patterns were found based on support, certain items & gap constraint [32]. Number and average length of frequent patterns features were used to process Bayesian classification. The combination of sequential patterns in preprocessing and Bayesian classifier gives a good performance. Prediction rate of the classification process is above 90% and only requires lower memory compared Probabilistic Suffix Trees (PST) and Sparse Markov Transducers (SMT).

D.   Sequential Pattern For Preprocessing Web Mining

Rapid development of web technology impacts on increasing number of web access frequency. It is interesting to be able to analyze web usage through web usage mining, web content. Sequential pattern mining in web usage will produce sequence of web usage data. Sequential pattern in preprocessing of web usage data can be used to further assist data mining process.

In the context of web personalization, sequential pattern mining in preprocessing has also been applied in web usage mining to predict possible next move in browsing sessions [33]. Web access sequences were processed at the preprocessing stage and its sequence results were mined with tree-based mining algorithm, PLWAP-tree (Pre-Order Linked WAP-Tree). Subsequent data mining process was clustering with dynamic clustering-based Markov model based on support values.

PLWAP-tree in preprocessing is very useful to reduce the amount of unessential web pages that will be processed by the Markov model. PLWAP-tree will produce only the essential web pages as input to the clustering process with the Markov model. This results in reduced time and memory requirements for clustering process.

E.   Sequential Pattern For Preprocessing Data Stream

The data stream is a stream of data with high flow of speed. This data can come from various sources, such as measurement tools etc. The process of data stream mining has to meet some challenges that is limitation of storage data and requirement of high speed data processing. For that reason, sequential pattern mining in preprocessing for data stream is very helpful to get proper sequence data to be used in the subsequent data mining process.

Sequential pattern in preprocessing has also been applied to mine data stream of the game user survey with multiple input modalities [34]. The dataset contained gameplay logs and physiological recording of players (blood volume pulse and skin conductance). The algorithm used to obtain sequential patterns was GSP (Generalized Sequential Patterns). Sequential patterns obtained were used to perform feature selection via Genetic Feature Selection algorithm (GFS). Accuracy result from the combination between GSP and the GFS was better than the statistical features on some multimodal features. It also shows that the user experience across modalities is important information in user experience and play role in the prediction of affective self-reports.

4 CONCLUSIONS

Sequential pattern mining is very useful for getting sequential patterns from sequence database. Sequential patterns should be sought based on predefined constraints from users and met the non-trivial nature. For sequential pattern search of the multidimensional database, multiple alignment algorithms can be used to improve effectiveness and efficiency.

In sequence database, sequential pattern mining can be applied to sort data into sequential patterns that is useful & meaningful and also to eliminate patterns that does not give meaning to subsequent data mining process. Sequential pattern on preprocessing can improve the effectiveness of main task because main task will only process clean & ordered data according to the given user constraints to increase overall data mining time performance.

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IMPLEMENTATION OF COMPUTATIONAL TECHNOLOGY OF APPLICATION PERFORMANCE MONITORING AND EVALUATION FOR PERFORMANCE ACHIEVEMENTS AND PERFORMANCE SUMMARY THE WORKING UNITS OF PALEMBANG CITY GOVERNMENT

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Abstract. *Local governments in implementing community development services to the exact required, quickly and accurately in accordance with applicable legislation and regulations. In order to provide an overview of physical and financial progress of the construction area then developed application performance monitoring and evaluation, and an overview of the performance of each Unit electronically (emonev). Problems reporting period is often a barrier for local policy makers in making decisions. The existence of computing technology has the full support of the development of information systems is one of the best alternative solution for local governments to develop applications that run emonev internet-based technology. By using prototyping system development methods produced an application that can achieve this goal in a relatively short time with the effective use of resources so that the system of local government work becomes more efficient because policy makers can obtain the desired information correctly and on time.*

1.   INTRODUCTION

President of the Republic of Indonesia has issued instruction [1] on the "Acceleration of the State Financial Accountability Quality Improvement" in which the first point states to improve the quality of financial accountability of the state through effective financial management, efficient, transparent, and accountable and more effective internal controls in each environment.

Achievement reporting and performance overview of working units (SKPD) particularly for capital expenditures made all SKPD within the city government of Palembang, and compiled by the secretariat of the local development of the city of Palembang each month is one source of information to the Mayor of Palembang field development activities, that illustrate the development of physical and financial progress of the percentage achieved by any SKPD. With reporting information system monitoring and evaluation of relevant development for policy makers in the city of Palembang, can provide support for structuring a set of priorities, allocate funds, giving the facility modification and refinement program structure and activities, and provide signals rearrangement of available personnel and resources. In

fact, progress reports and an overview of the SKPD performance, prepared and delivered by SKPD in the Palembang city government has not been able to present timely information to the Mayor of Palembang which caused delays in delivery reports manually to The Secretariat Building Palembang. Development of Computerized Systems for Performance and Achievement Report Overview Performance SKPD is to provide information electronically physical and financial progress of capital expenditures in each SKPD accurate and timely information to the Mayor of Palembang.

Successful firms have an overriding business strategy that drives both organizational strategy and IS strategy. The decisions made regarding the structure, hiring practices, and other components of the organizational strategy, as well as decisions regarding applications, hardware, and other IS components, are all driven by the firm's business objectives, strategies, and tactics. IS strategy always involves consequences—intended or not—within business and organizational strategies. Avoiding harmful unintended consequences means remembering to consider business and organizational strategies when designing IS deployment. For example, placing computers on employee desktops without an accompanying set of changes to job descriptions, process design, compensation plans, and business tactics will fail to produce the anticipated productivity improvements. Success can only be achieved by specifically designing all three components of the strategy triangle. [2]

Definition of IS herein is a system within an organization that brings the daily transaction processing needs, which are managerial support operations and activities of an organization's strategy and provide outsiders with a certain required reports. IS can also be defined as a framework that coordinates the resources (human and computer) to transform inputs (input) into outputs (information) in order to achieve organizational goals. Information data requirements for the application of information systems performance achievement and performance overview SKPD Palembang is depicted in Fig (2).

Monitoring and evaluation of the implementation of development requires data and information that is timely, accurate, relevant and complete. Monitoring activities required to record the progress of developing the condition of the implementation, monitor the process and implementation progress of the policy on an ongoing basis, identify emerging problems and irregularities, formulate solutions, and then deliver regular progress reports in a short period. With the rapid development of technology today, the presentation of information can be displayed based on statistics that policy makers can follow the development of physical and financial progress at any time necessary to easily and interactively. Development of Computerized System Performance Achievement Reports and Performance Overview SKPD to provide information electronically physical and financial progress of capital expenditures in each SKPD accurate and timely information to the Mayor of Palembang, is the best alternative solutions need to be implemented.

Figure-2. Data and Information requirements

To be able to optimize its resources so as to obtain quality management accountable, information systems supported by information technology and developed on an ongoing basis is the best way. it has responded positively by the mayor of Palembang, which is the information system development plan for the

achievement of the performance reporting and performance overview of each working units.

The main objective of this study was to the following :

- Provide an overview of the physical and financial progress of capital expenditures for development activities SKPD.
- Designing a database system that can make it easier to make the storage, retrieval, editing, deletion and reporting of data / documents that have been processed.
- Develop software applications, which can provide information on the achievement of physical and financial progress in percentages and statistics, quickly and accurately.

With these objectives, expected to provide benefits to the organization and the community especially the passage of management functions at the level of control or supervision, accountability for performance, and more convincing for the parties concerned, as well as to support the determination of measures relating to development activities in the Palembang.

2. SYSTEM DEVELOPMENT PROCESS

Pressman [3] stated that "effective software project management focuses on the four P's: people, product, process, and project." The order is not arbitrary. The manager who forgets that software engineering work is an intensely human endeavor will never have success in project management. A manager who fails to encourage comprehensive customer communication early in the evolution of a project risks building an elegant solution for the wrong problem. The manager who pays little attention to the process runs the risk of inserting competent technical methods and tools into a vacuum. The manager who embark without a solid project plan jeopardizes the success of the product. In order to develop a project schedule, a task set must be distributed on the project time line. the task set will vary depending upon the project type and the degree of rigor. Each of the project types may be approached using a process model that is linear sequential, iterative (e.g., the prototyping or incremental models), or evolutionary (e.g., the spiral model). In some cases, one project type flows smoothly into the next.

The development process means the system can build a new system or replacing an old system as a whole, or to improve existing systems. Cause the old system needs to be repaired / replaced there are a few things, including:

1. The old system is problematic, the problem may be irregularities, even the growth of the organization,
2. To seize the opportunities.
3. The existence of the instructions (from the head or the desire of the organization).

With the new system, it is expected to be an increase in terms of:

a) System performance, can be measured by throughput and response time. Throughput is the amount of work that can be done a certain moment. While the response time is the average time-delay between transactions.

b) Information, improving the quality of information presented.

c) Economical, increase in benefits or cost reductions occur, economically related to the amount of resources used.

d) Controls, improvements to the controls to detect and correct errors that will occur.

e) Efficiency, improvements to operational efficiency, efficiency relates to how resources are used.

f) Services, improvements to the services provided by the system.

Analysis should be conducted regardless of the software engineering paradigm that is applied. However, the form that analysis takes will vary. In some cases it is possible to apply operational analysis principles and derive a model of software from which a design can be developed. In other situations, requirements elicitation is conducted, analysis principles are applied, and a model of the software to be built, called a prototype, is constructed for customer and developer assessment. Finally, some circumstances require the construction of a prototype at the beginning of analysis, since the model is the only means through which requirements can be effectively derived.

Approach to the prototyping model is a technique to collect certain information about users' information needs quickly. Stages of the process are:

a) The initial reaction of users, starting with running the prototype system information, then see the reaction of the users who work with the prototype to determine features of the prototype system has been in accordance with their needs. These reactions are collected in a sheet observations, interviews and questionnaires.

b) User feedback, suggestions are the result of user interaction with a prototype (user evaluation) which becomes the input for the repair, alteration, or 'replace' the prototype in order to meet users' needs better.

c) Innovation, new system capabilities that do not exist when users interact with the prototype. Successful innovation prototype system will be part of the result.

d) Revised plans, prototypes describe the system in the future. Revised plan to help identify the priorities that will be the next prototype.

3. METHODOLOGY

The initial phase is to conduct library research to study the documents relating to the design and modeling of information systems. Then do a field study conducted by several stages, which is to determine the issues to be discussed from several options, continued study the process of monitoring and evaluation reporting ongoing development in Palembang for analysis and also conducted interviews directly to obtain information, references and opinions of the officials concerned. Proceed with the development stages: planning, requirements analysis system, system design and implementation models by adopting prototyping techniques to the development of information systems.

3.1. Requirements Identification

At this stage of the development team (team leader and systems analyst), together with the construction section of the Regional Secretariat of Palembang, identify system requirements for Generate specifications. Development team defines the identification results into the diagram as a model to be easily learned and understood by using a data flow diagram (DFD). The activities at this stage are expected to be found early picture of how the system will work.

3.2. Build A Protoype

The development team made the system specification into the prototype application software. The final part of this stage, the construction section of the Regional Secretariat of Palembang as the user is able to know how the system works. Furthermore together members of the development team and the user study carefully the prototype system.

3.3. Evaluation of Prototype

Together, the development team and users evaluating the prototype that have been learned. The evaluation was conducted on the effectiveness and efficiency of the application interface, application modules, and the linkages with the Database. Users also evaluate the suitability of the application with the needs and formulate some other needs that have not been included within the limits of the work on the prototype software. If there are changes and / or additions to, the development team will make specification changes to be made next stage prototype.

3.4. Coding System

Once the prototype application was evaluated and no more changing needs, the development team together to make coding a prototype into a complete application system. At this stage also added several modules such as user management and user access rights (system authentification), relational table data on the database (Database Management System), and interface improvements. At this stage, the development team created use of the application guidelines, as well as document preparation system.

3.5. System Testing

The development team, perform application testing system that has been enhanced with several testing approaches. Testing began by testing the application without notice process (black-box testing), followed by testing of the modules separately. Tests with other techniques such as glass-box testing and architectural systems implemented after it was confirmed that all of the modules has aligned with the needs of the user (the construction section of the Regional Secretariat of Palembang). At the end of this phase, the development team preparing the test report as a whole document to serve as a complete document system. To be able to adjust the time of completion of the system development process, at this stage as well as an evaluation system that is run jointly by a team of developers with users.

3.6. Using the system

Once the evaluation process is no longer encountered problems that have not been included within the limits of the problem, and the application of the system was already completed, the development team preparing for training modules for the system operator. Furthermore, the use of the system implemented training for operators as well as a real data entry stage, so that when launching the system has become a useful application of information systems in accordance with the intent and purpose of the application development process.

4. RESULTS AND DISCUSSION

The results obtained in accordance with the stages of the software application development process of information systems of performance achievement and performance overview for the work units in the city of Palembang.

4.1 Initial Architecture

The design of the information system monitoring and evaluation reporting, will be developed with web-based, using a modeling process that will be measured by the successful development of the system. Modeling process is a formal way to describe the activities undertaken and shows how data moves between these activities by using Data Flow Diagrams. Fig. (3) below is a context diagram to describe the initial architecture of Information Systems:
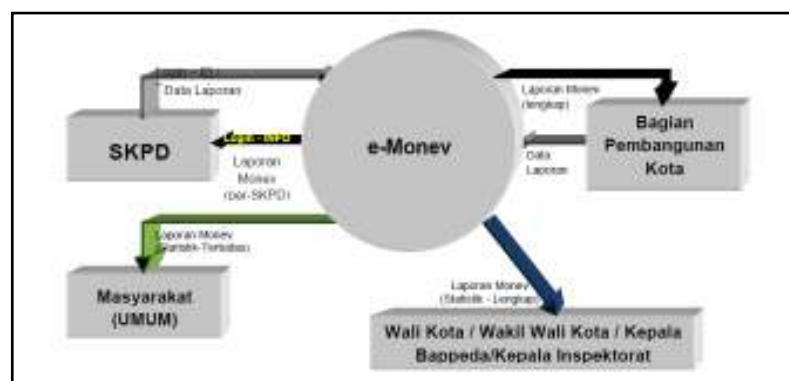
Figure 3. Initial architecture (Contex Diagram)

by Fig. (3) can be known entity and users are connected directly to the system, that are :

1) Elements of leadership and policy-makers in Palembang :
   a) Mayor
   b) Deputy mayor
   c) Regional Secretary
   d) Head of Planning and Regional Development Palembang (BAPPEDA)
   e) Chief Inspectorate Palembang
2) Pubkic / Community
3) Regional Work Units (SKPD), consisting of :
   a) Budget users / user proxy budget (PA / KPA)
   b) PPK
   c) Operators
4) Construction section of the Regional Secretariat of Palembang, consisting of :

a) Head of the Construction Section of Regional Secretariat of Palembang as well as a system administrator
b) KPA
c) PPK
d) e-Monev Operator

Rules in the system is :

1) Each user has their own access codes (Access Code) is a combination of user-ID and password to be provided by the System Administrator or designated operator.
2) Each user gets access rights to view, modify, and delete data shown with limitations defined system, provided the following settings :
   a. Each (KPA, PPK and Operator SKPD) can only operate SKPD data for themselves, and can't see another SKPD report data to its capacity. Especially for the operation Editing and deleting report data can only be done by the Operator SKPD after getting approval from the system administrator
   b. Users with the criteria of leadership / policy makers obtain permissions for operation display and print data reports all SKPD. But can't perform alter and delete data reports.
   c. Users with Operator e-Monev criteria only for operators in the Construction section of the Regional Secretariat of Palembang, with the right of access to the operating view, modify and delete data in the report of this section and add function to print the report data.
   d. Users with Administrator system criteria is head of Construction section of the Regional secretariat of Palembang with permissions granted to all operations on every user. In addition, the system administrator has access rights to provide or replace the Access Code assigned to each operator. Head of Construction section of the Regional secretariat of Palembang may authorize a person as an Administrator user to use the system is specifically trained.
3) Society (public) are not given a special access code, just get permissions to view the report up to date overview of the user's access only.
4) The data that flows into the system and in the system, is the capital expenditure reports SKPD in the city of Palembang, which uses the budget. While the information generated by the system is a recapitulation SKPD reporting and performance overview SKPD in statistical form (Graphics and Table)
5) Report data includes reports of the activities and achievements of its use of capital spending, also covers issues that hinder the process.
6) The monitoring and evaluation (monev) report is the statistical information SKPD performance in charts and tables.
   Results in an expression derived from the analysis phase of the system requirements identified by the specification as follows :

1) Basic Needs:
   a. The system can run on any type of computer.
   b. Internet-based data access
   c. Able to display statistics and charts based information.

    d.   The application architecture is built with the n-tier technology.

    e.   Open source Database. (in this case set using MySQL Database)

2)   Special Needs:

    a)   Each SKPD have operator

    b)   There are limits on the right of access to data and information

    c)   Each user has an ID (Identification) and Password

    d)   Any officer (Mayor, Deputy Mayor, Regional Secretary, Chief Inspector, Head BAPPEDA, Head of the Constructional section of Regional Secretariat) of Palembang, including Authorized Budget (PA / KPA) and the Committing Officer (PPK) granted permissions self-itself with a different ID and password.

    e)   The system administrator is the operator that is part of the Constructional section of Regional Secretariat of Palembang.

4.2 System Process Architecture

Using the same modeling scheme, the system process architecture is illustrated by the data flow diagram (DFD) in Fig. (4).
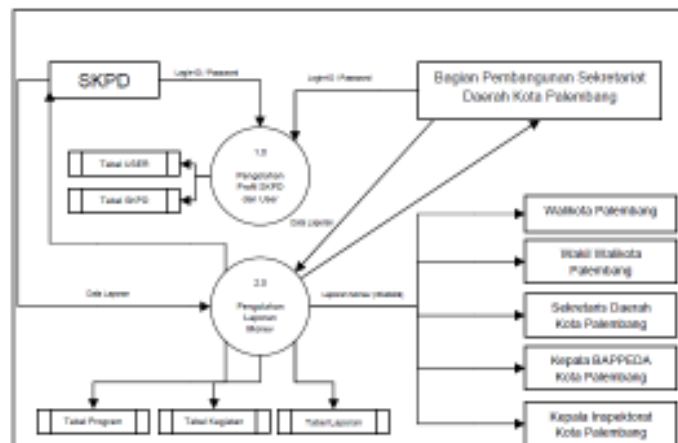
Figure 4 System Process Architecture

Rules in the system has been described previously, as an explanation for Fig. (3). The architecture of the system with structured systems approach where the system is modeled using Data Flow Diagrams (DFD) and Entity Relationship Diagram (ERD) as the modeling tool. Fig. (5) is the structure of the database system that has been built :

Figure 5. Database Structure Table

There are 11 tables in the database system, each data table are related to the nature of the relationship which is regulated through the application of programming techniques scripting PHP (PHP Hypertext Preprocessor) as an interpreter-based servers are deployed on the Apache 2 Web Server.

4.3 The Application

After experiencing some protoyping stage process during development, the system has been implemented according to the needs of the user. Application has been installed as a sub-domain of Palembang City Government's official website has

been tested and obtained the expected results, located at http://emonev.palembang.go.id.

Fig. (6) through Fig.(9), are some of the Graphical User Interface (GUI) of the application are displayed in sequence with the permissions used are server operators in the Construction section of the regional Secretariat of Palembang :

Figure 6. Frontpage of Application system

Figure 7. Authentication Page

Figure 8. Main menu (User homepage)

Figure 9. Capital expenditure account master data

5. CONCLUSIONS

This application can speed up and simplify the process of delivering and receiving usage monitoring and evaluation of capital expenditure, maximizing accuracy and reporting as a means of access to information to the public in the city of Palembang. These applications can improve the quality control of the implementation of the monitoring of sustainable development by the City of Palembang and to support policy makers in taking policy measures development in the city of Palembang.

In general, the application is not connected directly with the local financial system. In the future, after going through the stages of database systems integration and development process by leveraging cloud technology and mobility systems will create an intelligence system for local government.

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GATHERING REQUIREMENTS FOR CREDIT TRANSFER AND CREDIT EXEMPTION SYSTEM USING FOCUS GROUPS

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Abstract. *Credit transfer and credit exemption (CTCE) are one of the critical processes in institution of higher learning (IHL). For many institutions, these processes are processed manually, time consuming, having unorganized data filing, and not standardized in terms of process flow among all faculties. Therefore the process need to be improved in order for the IHL to be more efficient and organized. A focus group approach that has been used in completing the requirement elicitation process is explored in this paper. Requirements elicitation is an important activity in requirements engineering process and it consists of discovering needs, capturing and gathering software requirements from the stakeholders. In this study, 21 stakeholders from various departments (Faculties, Bursar's Office, ICT Centre and Registrar Office) were involved in completing the requirement elicitation exercise. This approach is aimed to improve the requirements elicitation process, enhances the software requirements specification (SRS), and feasibly produce much better design of online application and approval, and the monitoring of CTCE. (www.iciba.binadarma.ac.id).*

1 INTRODUCTION

One of the key notions of usability of a system is to broaden the empirical scope of system design [1]. Thus, user involvement in the design process became an important element. In general, two types of practice can be distinguished: user-driven design and user-informed design. User-driven design is a direct involvement of potential users in the design process and it requires considerable user involvement over a long period of time. While user-informed design involves inquiries into the context of use by field studies or group interviews.

Focus groups are popular method of obtaining design-relevant information, such as

specifications about workflows and the context of use [2]. It is a gathering of people who are the representative of the users or customers of a product to get feedback. The feedback can be gathered about needs, opportunities or problems to identify requirements, or can be gathered to validate and refine the elicited requirements. Previous study by [3], described it as "a qualitative tool for collecting information in

which a number of respondents simultaneously discuss a given topic under the guidance of a moderator".

According to [2] in his study, the strengths of the focus groups lie in the initiation of a creative process during the session and influence the whole design process with ideas, suggestions, and forward-looking perceptions, which often extend beyond the resources and possibilities for realization that cannot be gained with individual interviews. For that reason, a credit transfer and credit exemption system development project in one of IHL in Malaysia chooses focus group as method to complete their requirement elicitation process.

This paper describes how focus groups can be set up to gather requirements for a credit transfer and credit exemption system (CTCE) and to report the results obtained: an automated CTCE process flow; and complete system architecture of CTCE.

2 PROJECT: CTCE

According to [4], one of the basic building blocks of academic administration for higher learning institution is to have complete automation systems that cater the administrative part of academic processes. Credit transfer and credit exemption are one of the crucial processes in higher learning institution. It is often done using manual system which is time consuming and involved unorganized data filing [4]. Therefore, to improve the process to be more efficient, an automated system is recommended especially to enlighten the manual and consuming time process. The proposed automated system, called CTCE is proposed to assist the application approval process in one of IHL in Malaysia. In this paper, the IHL is referred as University A.

University credits earned at other regionally accredited institutions are acceptable for transfer based upon the followings [5]:
1. The course must be comparable in content, goals and level to the institutions' course or content area for which credit is sought;
2. The course must have been completed at a college or university that is accredited by an appropriate regional or national accrediting agency (generally those recognized by the Department of Education, if a national accrediting agency, it must be part of a program approved and documented by the faculty and dean of the appropriate college at new institution, but in the case of institutions' outside Malaysia, the appropriate state (or its equivalent) or national accreditation is required;
3. The course must have equivalent number of credits as the institutions' course;
4. Students must have earned a grade of "C" or better for any course submitted; and
5. Official transcripts are required for transfer credit to be considered.

Recently in University A, students applying credit transfer and credit exemption manually, are required to fill in an application form and provide the supporting documents (result/transcript from previous higher learning institution and syllabus for particular subjects). The Programme Coordinator or Head of Programme (HOP) will

gather all the filled-in application form, supporting documents and then process the application based on criteria and regulation stipulated by the university. The proposed system will terminate the manual process, which will enable student to make an online application and the application will be processed by the system.

The normal manual practices of credit transfer and credit exemption at University A, takes four to six weeks to get an approval. When a student is granted with credit exemption, their study plan will have to change. This change requires input from the faculty as to provide students with new subjects for replacement. However, this long-taking period process had caused problems to both students and the university administrative as it involves both parties in adjusting the students' study plan. More than often the process had resulted into students have to settle with less credit hour than they are expected to carry as the period of adding new subject is over. For some, they need to pay certain amount of fine for having the subject replacements after the stipulated time frame. The worst case is when they show up in the newly enrolled class after the third of fourth week and the class has had their first quiz or assignment.

Hence, this project is to develop an automated CTCE to assist the application and approval process in University A. There were three users; students, HOP and one Administrator identified for the system. The proposed system will allow the first semester students to apply for credit transfer or exemption, meanwhile HOP and Administrator will be allowed to approve result through system, print report, manage users and update equivalent history.

3 REQUIREMENT GATHERING

This project will undergo comprehensive steps. An interview was conducted to get user requirements. The observation was conducted at four out of ten faculties and a formal focus group session that involved all faculties representative was organized by Registrar Office. From the session, a standardized process flow was produced and from the requirement gathered, an automated CTCE process flow; and complete system architecture of CTCE was designed and developed. All the requirements and design was documented using IEEE format.
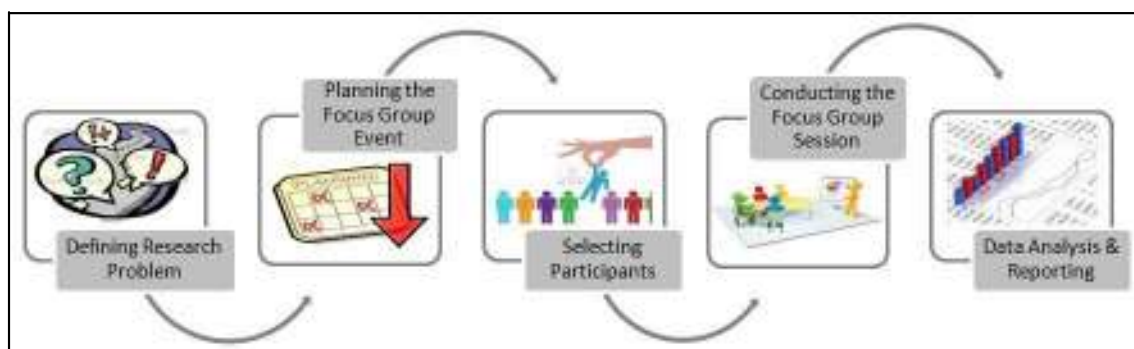

Fig. 1: Requirement Gathering Process

As in Figure 1, there are 5 steps adopted based on several sources on focus group [6-7]. The summary of the main steps involved are as followings:

Defining the research problem: The aim of this focus group study was to gather requirement about CTCE process flow among 10 faculties in University A. This requirement was to be used in developing an automated CTCE process flow and later to design complete system architecture of CTCE. The second and third authors of this paper acted as the moderator of the focus group session. This focus group study allows the researcher to get to know the context of use and to provide the technical specification with in depth information about the workflow.

Planning the focus group event: There are four focus group sessions that consist of two different groups; Group 1 and Group 2. The first session was a pilot session that primarily intended to practice the focus group process and evaluate the questions during the discussion. Each session is expected to lasts two to three hours and has a predefined schedule and structure. Each session was designed to have a dedicated topic and participants as in Table 1.

Table 1: Focus Group Session

SESSION	TOPIC	PARTICIPANTS
Session 1	Pilot Session	*Combined Session*: Group 1 and Group 2
Session 2	CTCE Standardization	*Combined Session*: Group 1 and Group 2
Session 3	Verification: Test Case	*Separate Parallel Session*: Group 1 and Group 2
Session 4	Develop Automated CTCE	*Combined Session*: Group 1 and Group 2

Selecting the participants: The focus groups are carefully planned discussions, designed to obtain the perceptions of the group members on a defined area of interest. In this study, there are 2 groups which consist between 10 to 11 participants for each group as in Table 2. The members are selected based on their involvement in CTCE process from different department as related to the session topic or so-called purposive sampling. Four sessions of a focus group discussion were conducted within 3 days, guided and facilitated by different moderators for each session. These moderators follow a predefined structure so that the discussion stays focused.

Table 2: Focus Group Participants

STAFF INVOLVED	DEPARTMENT	PARTICIPANTS NUMBERS	GROUP 1	GROUP 2
Registrar	Registrar Office	1	1	-
Deputy Dean	Faculties	5	2	3
Head of Programme	Faculties	3	1	2
Assistant Registrar	Faculties	6	3	3
Assistant Registrar	Exam Unit	2	1	1
Assistant Registrar	Academic Record Unit	1	1	-
Finance Officer	Bursar's Office	1	1	-
IT Officer	ICT Centre	2	1	1
	TOTAL	21	11	10

Conducting the focus group session: The moderator acts as a chair and facilitates the discussion of each sub-topic that is presented one after another. In Session 2 and 4, the session involves brainstorming techniques, while in Session 3, it uses a teamwork methods to perform the test case to the standardize CTCE. During the session, there are observers taking notes by keying the requirements direct to the notebook, and produce the artifacts that can be viewed through LCD projector.

4 RESULTS AND DISCUSSION

Figure 2 shows the overall results of the requirement gathering using focus group session conducted in University A.
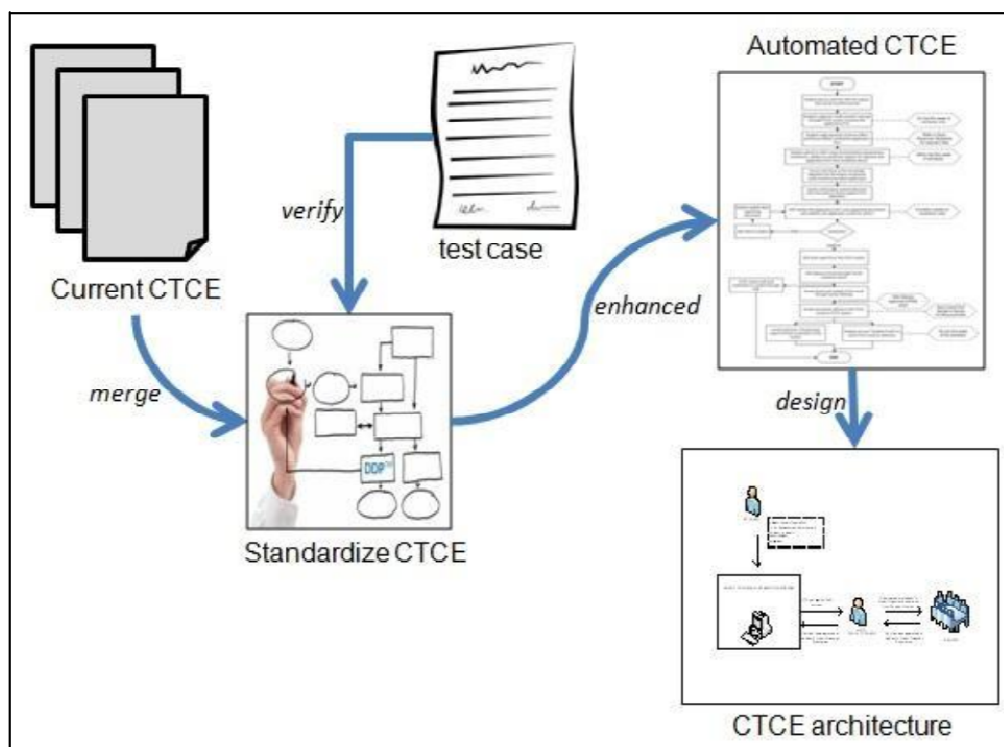

Fig. 2: Research Output Flow

4.1 Current CTCE Flow

The current CTCE process flow is time consuming, having unorganized data filing, and not standardized in terms of process flow among all faculties. Based on the initial study shown in Table 3, from ten faculties it revealed that 3 different CTCE process flows have been applied. The first CTCE process flow only illustrates the core process that involve between students and faculty administration. Compared to the second CTCE process flow, it provides more explanation on processing fee and also it explains the specific action that need to be taken by respective unit or department. Meanwhile, the third CTCE process flow demonstrates more details explanation where it provides the due date for critical processes and also steps that need to be done if the application has been rejected.

Table 3: CTCE process flow based on faculties

FACULTY	CTCE PROCESS FLOW 1	CTCE PROCESS FLOW 2	CTCE PROCESS FLOW 3
Applied Sciences and Mathematics		√	
Art and Design			√
Biomedical	√		
Biotechnology		√	
Business		√	
Communication and Media	√		
Education		√	
Engineering			√
Information Technology		√	
Social Science	√		

4.2 Standardized CTCE Flow

All 3 different CTCE process flow have been evaluated during focus group session that involved 21 stakeholders from various departments (Faculties, Bursar's Office, ICT Centre and Registrar Office). From the session, a standardized CTCE process flow was produced. Four real test cases applied from different actual scenarios that shown in Table 4 have been tested to verify the proposed standardized CTCE process flow. The results indicate that all the processes have been successfully verified.

Table 4: Test Case Verification

TEST CASE	TEST RESULT
1. Lack of documents (e.g. Course syllabus, examination result, and processing fee receipt)	Process verified
2. Application that exceed total credit hours limit	Process verified
3. Incomplete application form	Process verified
4. Complete application form with all documents needed.	Process verified

4.3 Automated CTCE Flow
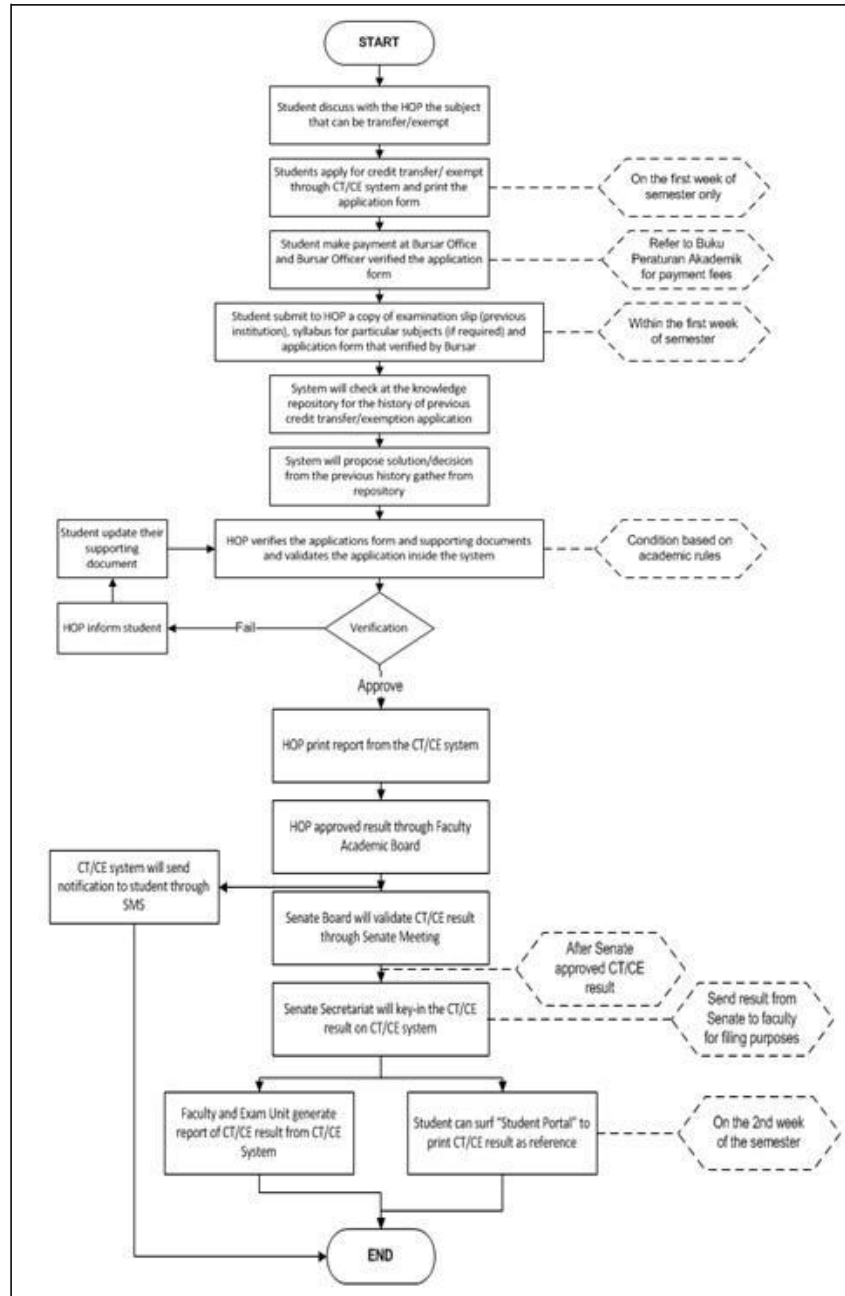
Fig. 3: Automated CTCE Process Flow

The standardized CTCE process flow been improvised and considered the automated system and notifications through short messaging service (SMS). This automated CTCE system also is expected to be completed within the first two weeks of each semester. There are a few improvements made on the automated CTCE system: the automated system have a knowledge repository where system will check/compare the documents from the history of previous CTCE applications; and the new system will propose solution/decision from the previous history gathered from knowledge repository.

4.4 System Architecture

The proposed automated system will assist the faculty in managing and monitoring CTCE application. The system allows students to apply and check their application status online and enables uploading of supporting documents such as examination results and payment receipts. HOP and faculty administration staff could monitor the application status and complete the approval process immediately. Other than that, it will organize CTCE record digitally and implement the paperless based system. This automated system will also reduce human error on the document and application by providing a proper record management during CTCE process.

Figure 4 below shows the overall architecture diagram to present the overview of the system.
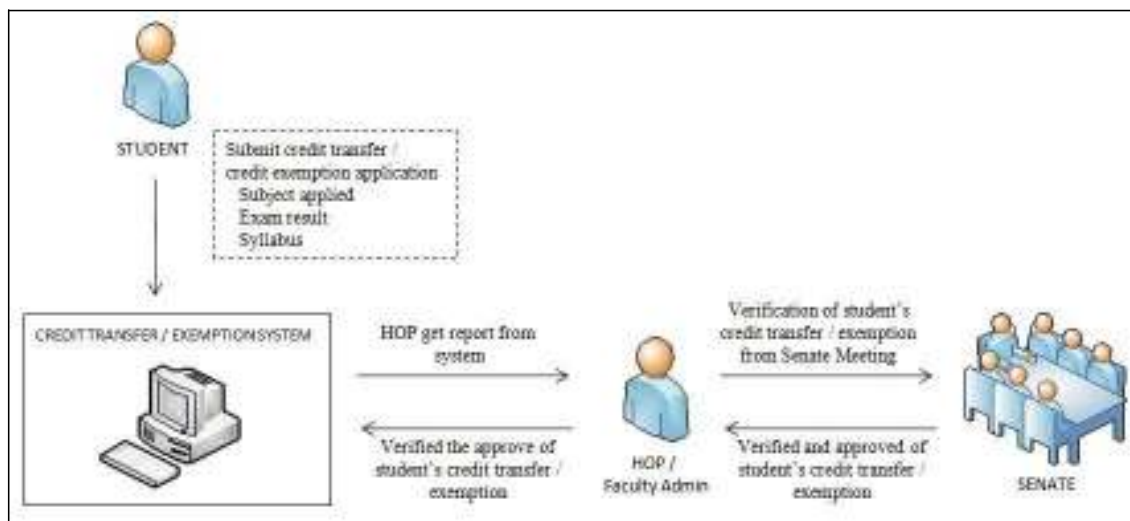
Fig. 4: CTCE System Architecture

5 CONCLUSION

As shown in this article, gathering requirements with focus groups guarantees a user-informed design process. In the case study presented, with the help of focus group sessions, a considerable amount of data concerning usability functions and their validation can be elicited. In addition to that, we support [2] opinions where the intense exchange of ideas and experiences among the participants leads to an integrative result of representative opinions within the respective interest group.

For the researchers the focus groups method is a cost-efficient way of getting the policy maker (university's academic unit) and user (faculty's staffs) as several subjects can be "interviewed" at the same time. In addition to that, through focus group discussions, it allows in-depth exploration of the reasons why the participants think the way they do. For instance questionnaire results reveal usually only what people think, not why.

However the method should be used properly and the sessions should be planned and executed well. We hope that the method could be established as a reliable requirement elicitation method in the field.

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THE SECURITY MODEL FOR DATA EXCHANGE USING XML ENCRYPTION AND SECURITY TOKEN IN WEB SERVICE

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Abstract. *Nowadays, security being the important issue in information and technology era, especially when it use the internet. The web service who has XML technology on their exchange data is implement the use of public-key cryptographic techniques as well as the insertion of username tokens to the authenticity of the sender as a means of securing data. Implementation has been done using the security library will facilitate in building a web service security. XML Encryption that uses RSA algorithm with a key length of 1024 bits is able to provide protection against the transmission of data between the client and the web server to the database service. Username token role in providing the authenticity of the message is to use RSA-SHA1 cryptography. The results obtained are SOAP request message is encrypted and decrypted properly afford and integrity, authenticity, and security of data is maintained.*

1 INTRODUCTION

Nowadays, the importance of security data in data exchange being bolder especially in internet era. The web service is becoming popular in enterprise because of its ability to integrate the applications from different platform using XML document. XML (eXtensible Mark-up Language) is a standard for defining data in simple and flexible form. Even web service support the communication and integration using XML and web, the security factor between the client to the server web service on this communication channel not fully guaranteed. It is proven by the many factors that cause the cracks threats to web services such as was done by previous research.

A message which was sent by the web service is still a XML data, so this led to the possibility of the original data is not received by the recipient. Although the message is encrypted using an algorithm that does not mean that the message received by the recipient really pristine, because it could be that the structure of the message has been changed when a message is sent or when it is received.

For web service security issues, in previous cases, most of the research conducted in only one model of security or safety standards on a single web service only. So in these cases, the security system still perceived less in providing a maximum protection against security

threats web service, both for the client to the server service and vice versa. Although in general, the condition is considered to have been able to meet safety standards. The constraints encountered when discussing about the web service is still some doubt as to implement the web service. Especially to those who use the Internet on their transactions. These uncertainties arise from the security level of web service technology itself. Security aspects become very important to keep that data or information is not misused or accessed arbitrarily [1]. WS-Security also arranges how to insert security tokens in SOAP messages in plaintext form or in binary form, such as X.509 certificates [3].Therefore, this study will try to present a model of prototype security in the exchange of data on the web service. Using means to encrypt and insert a security token in the SOAP request and response message using XML Encryption.

2. LITERATURE REVIEW

Some researchers have been conducted regarding the web service's security, such as the specification of web services security specifications and how to deal with threats to the security of web services. Several studies also have focused on web security service which is still immature such as CORBA and RMI [3].

Furthermore, on how to address the challenges in Web services security is to present an integrated security framework or framework based on use of authentication, authorization, confidentiality, and integrity mechanisms on the web service. Framework serves to integrate and implement these security mechanisms in order to attack a powerful web service [2]. Previous research also discusses the presentation of a comprehensive method for a guarantee of security services in SOA, where the proposed method defines three stages of security analysis, security architecture and the identification of WS-Security standard [4].

In addition, research on web security service has also been done on the integration of data reporting crime scene detective unit equipped with internal security mechanisms. That is done in this case is the implementation of a mechanism to add security functions to the tool NuSOAP. This tool is used as authentication and confidentiality of SOAP messages that use cryptographic AES 128 [5]. Furthermore, the implementation of the user authentication for an XML document using the username token also been carried out. The trick is to do a proof of the XML document and perform validation testing of XML documents [1]. It aims to implement an XML Signature XML documents in order to obtain a secure, especially in the case of online transcript. Transcripts obtained will have a type XML digital signature contained. [6].

The next step is to implement the RSA algorithm for public key pairing and private keys for encryption and decryption process. RSA also play shows the range of data that can be processed further. Next is to implement message digest hash function SHA-1 is used for signing the XML document [7]. In other studies we can learn about the XML data that is encrypted using RSA public key algorithm with the results of its implementation in the form of two computer programs, namely findkey.exe and crypto.exe created using the C programming language [8].

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3 METHODE

3.1 System Analysis

In general, the system to be built in this research is the security of data on the web service by using XML Encryption and RSA cryptography. In cryptography, RSA utilize XMLSEC library for making public key pair. Furthermore, to generate the username token also use RSA-SHA1 algorithm. This study also analyzes the system needs to be implemented, the use of functional requirements. In implementation, the web service will be divided into two parts, namely:

a. Generate web service client request, this phase deals with the processes performed by the client to make the request to the web service.

b. The server authenticates the client and returns the response. This stage describes some of the processes performed by the web service after receiving a SOAP Request from the client. Processes that occur include ensuring the integrity of the message, use the username token to authenticate users, encrypt and decrypt xml data xml data using XML encryption.

3.2 System Designing

Application system will be built have general security architecture shown in Figure 1. As every client request will be made authentication and confidentiality. Authentication is performed when the client successfully login and be granted access to resources in accordance with the right of access, confidentiality while in use in the process of encryption and decryption.
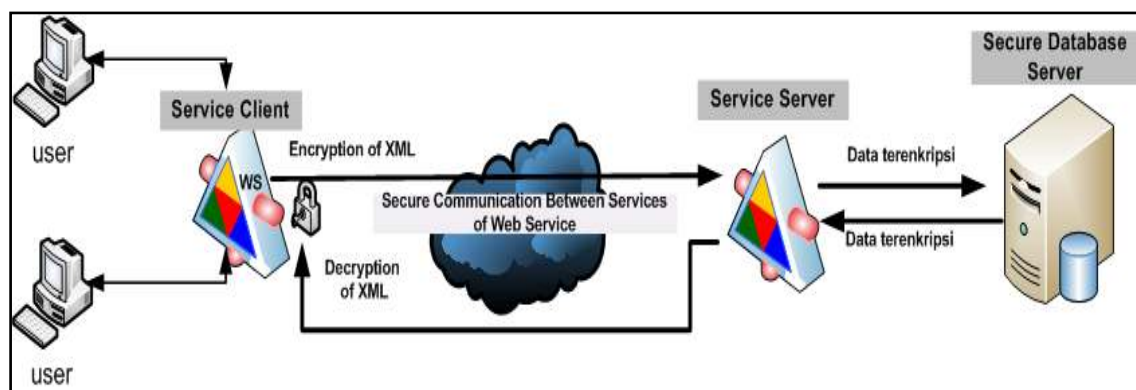
Figure 1. Model Security Service between Client and Server service from a Web Service

Figure 1 shows a model of web service security between client service and server service. Where an overview of the security system starts sending data from the user using a protocol http to client service, at this stage the data will be encrypted using the private key that belong to each user and public key, thus the xml data flowing on the communication between the client service with the web service server service from

the next in a safe (encrypted). Then the encrypted result data will be saved in a secure database with XML data formats. Decryption process itself will be performed when data is requested by another user using the user's private key and the public each key.

Designing data security mechanism is intended to provide an overview of data privacy in the process of encryption and decryption processes involving RSA public key algorithm. Encryption occurs between client service, and a server service which aims to secure the transmission line to the web service itself. This design can be shown in Figure 2.
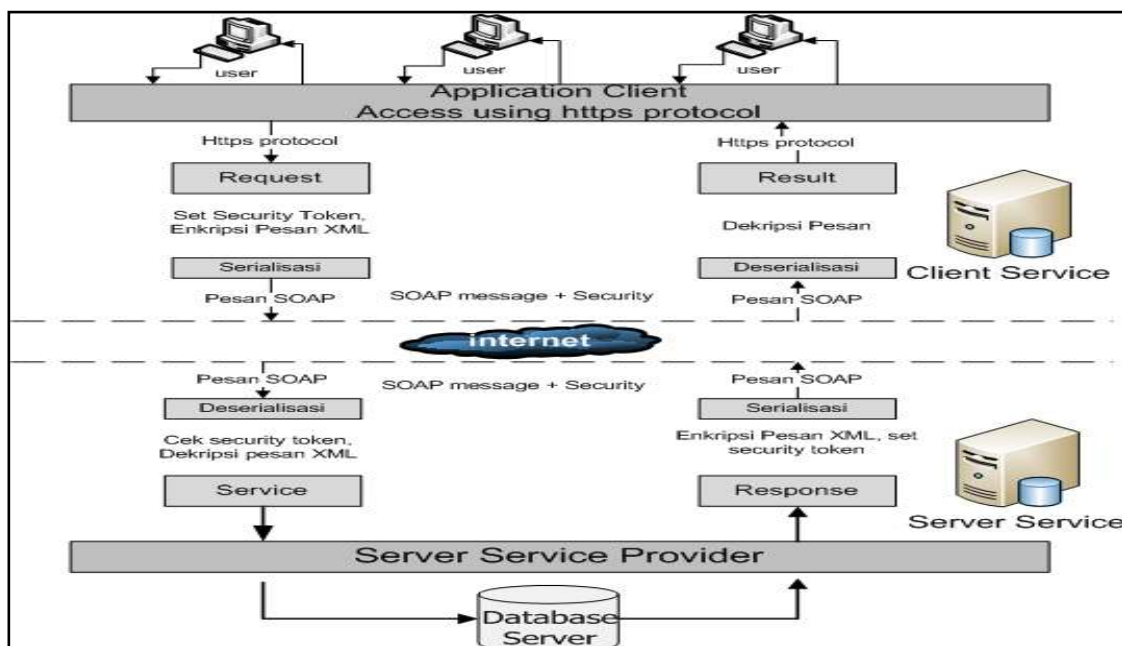
Figure 2. User Data seacret mechanism plan in web service

The implementation of the SOAP message security architecture design will be adapted to NuSOAP framework mechanism by adding a library that contains several functions that are used to support web service security in the transport path. In addition to be able to achieve the goal of security will be carried out modifications to the routine of the functions in the class library NuSOAP and regular additions of other programs for the purposes of web security service.The addition of regular programs and security functions are intended to achievement of the desired level of security messages, which in turn can do the following:

1. The ability to be able to secure the data transmission path to the web service by using a security token that is included in the SOAP Header request, the aim is to authenticate the identity of users who request service and access control to determine whether the user is served or not.
2. Ability to maintain confidentiality and authenticity of data in a SOAP request and SOAP message response. This capability is supported by the addition of a few library

of XMLSEC for encryption, decryption, and digital signature which algorithm utilize cryptography RSA 1024-bit key length.

3.3 System Implementation

Once the system design is done, the next step is to make the implementation of the security system in the Web Service. For the implementation of web service security, it designed architecture and the specific scenario in the groove as shown in Figure 3.
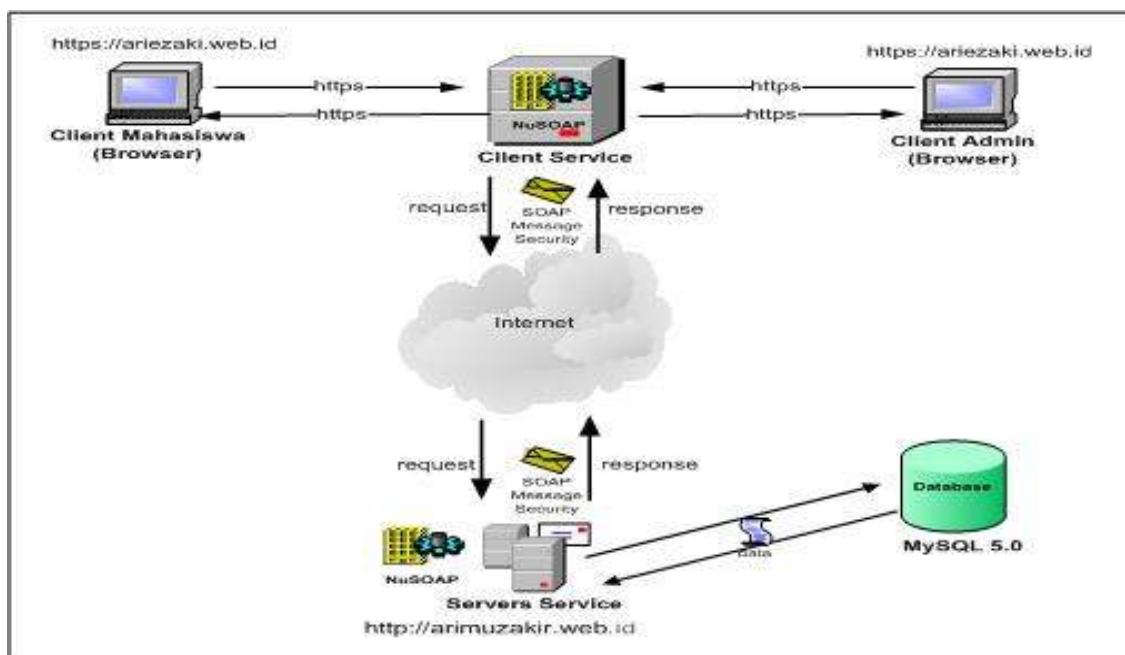
Figure 3. Implementation of web service security architecture scenario

4. RESULT AND DISCUSSION

System testing is a critical element in the development of a software tool (software) because it represents the end result of the application requirements specification, design and implementation. The main purpose of the testing system is to ensure that the relationship between the application module meets the requirements specification and according to the scenarios that have been described previously. Implementation is shown in Figure 4 in the form of application data values in data security systems XML web service, in which the figure shows that the user needs to enter his own private key and a public key to encrypt the data to be transmitted.

Figure 4. Trial Web Security service in the data value

The results obtained in Figure 4 is the xml data security in web services are tested on student data values. The results of the testing focused on confidentiality and data integrity. In the testing phase of this confidentiality, client service will encrypt the SOAP message to be sent is the data to be sent by calling the encryption on the server and use the public key of the client, the process of encryption using the RSA algorithm with a key length of 1024 bits. While the decryption process is done on the server service by using the private key. Furthermore, to see the results of this request SOAP message that contains encrypted data using XML Encryption method shown in Figure 5 below.

Figure 5. The soap request Results Message Using XML Encryption Security Model

The result of Figure 5 above is: all data is encrypted by the client service to ensure the confidentiality of data on transmission lines to the web server service. Then when the data is sent, the client will call the security functions in the client service named library class_wss.php, then when the data is sent from a client service, then the data will be encrypted SOAP.

While the client to the server authentication using security tokens expressed in a SOAP message request. If the username token in client service with username token in the server service, the client service can be allowed to access the service in accordance with the value of the parameter that has been inserted in the header. Username token itself is encrypted using the SHA1 algorithm; the results are as shown in Figure 6.

```
<SOAP- ENV:Header>
<wsse:Security xmlns:wsse="http://schemas.xmlsoap.org/ws/2003/06/secext">
        <wsse:UsernameToken">
          <wsse:Username>8a9a3d2ab453f7a407d97db5e16d6c0274e92f</wsse:Username>
          <wsse:Password
Type="wsse:PasswordDigest">05f19383099ed3304153baeb08a8bd9ffd8a0</wsse:Password>
          </wsse:UsernameToken>
</wsse:Security>
</SOAP-ENV:Header>
```

Figure 6. Soap request result with Token username

Besides authentication can also be done by checking the authenticity of a SOAP message (verification) that is sent in the form of digital signatures, the results obtained are valid and invalid. Figure 7 shows the appearance of the authentication process by checking the username token and verify the authenticity of the received data on the web server service. The results of the authentication and verification of this will be written to a file called "logverifikasi.txt".

```
14-01-2012 12:20:46
otentikasi sukses
verifikasi sukses
14-01-2012 12:27:51
otentikasi sukses
verifikasi sukses
14-01-2012 13:41:07
otentikasi sukses
verifikasi sukses
```

Figure 7. Log Results Authentication Security Token Checking

5 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

1. The design and implementation of modules that have been done using the security and support of the library as a library supporter XMLSEC library and library built class_wss able to address the security issues in the delivery of a security authentication, authorization, and confidentiality of SOAP request message generated.
2. Results of the implementation indicate that confidentiality can be solved by applying the concept of security based on the security of XML Encryption library. The results of the SOAP message request in the delivery process can

meet the standards of web security service, where the data as it is transmitted in an encrypted using class_wss library has been built.

3. Tests were done on web service by applying a model library as a library security class_wss web service that is built gives good results, ie SOAP request messages when sent in an encrypted form and be able to be decrypted..

5.2 RECOMMENDATIONS

Key exchange in this study was limited prototype so for the future need a more secure key exchange, such as the server key is stored in a separate repository database server in order to more gate.

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PARTICIPATION METHODS
ON SEVERAL E-PARTICIPATION PROJECTS

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Abstract. *Changing social and political conditions and the trend towards a democratization of public decision-making enforce the role of participation in planning. The growth of Information Technology and Communication (ICT) has revolutionized methods not only in business but also in the social and political life. Therefore this trend pressures governments to open up their decision-making processes for citizens to participate over the Internet, in so-called e-participation. This paper discusses several methods that can be applied in e-Participation implementation, based on various literature surveys. In addition to this, ICTs also provide platforms to engage more citizens in democratic processes than using conventional methods, more speed to share to inform others, reduced cost; in order to deliver services and direct communication with stakeholders.*

1 INTRODUCTION

ICTs have a role to play in such tool building. For example, by exploiting technological opportunities and applying ICT, the problem of 'engaging and collecting citizen decision' that often appears in political decision making can be addressed. Currently, e-Participation projects and tools are increasing since the effort of governments to actively engage citizens in democratic processes is also getting more attention. Despite this situation, however, it is recognized that the research field in e-Participation tool is still highly fragmented.

As the initiatives and projects concerning e-Participation are expected to develop and grow mature, an assessment to find out and evaluate e-Participation methods and tools become necessary. Thus, it is important to assess relevant methods and tools in order to understand better the field of e-Participation. For example, as citizens, representatives and government become more confident about e-participation, its contents and methods will need to be continually assessed [16].

The main objective of this paper is to investigate methods and tools on several e-Participation projects. Therefore, practitioners can select the right method and tool according to their specific objectives as well as time and budget restrictions are important parameters in order to succeed [10]. This paper is organized as follows.

Section 2 presents e-Participation key dimensions, section 3 presents e-Participation's objectives, section 4 discusses literature surveys on e-Participation methods and tools. Finally, section 5 presents our conclusion and future work.

2   E-PARTICIPATION KEY DIMENSIONS

This section discusses several key dimensions on e-Participation. Understanding of e-participation key dimensions is very important to explore what kind of participation method can be applied using ICT. Moreover, given this expanding knowledge base of e-Participation practices; relate to the use of technology to *enable*, *engage* and *empower* civil society will increase. There are several key dimensions to implement e-Participation [9], i.e.:

1. **Level of participation.** This is including level participation: information (enabling), consultation (engaging), and active participation (empowering).

2. **Stage in decision-making.** This explains time to engage in various stages, i.e.: (1) Agenda setting; (2) Analysis; (3) Creating the policy; (4) Implementing the policy; (5) Monitoring the policy.

3. **Actors.** This key dimension considers *who* should be engaged and by *whom*. It should specifically identify the stakeholders and their respective roles and the target audience. These stakeholders have a number of tasks to do during the e-participation which include:

    • developing precise participation e-content
    • managing and controlling the participation process
    • providing and agreeing background information/material
    • helping to promote the initiative
    • analyzing and evaluating of results
    • incorporating results into policy
    • disseminating results

4. **Technologies.** This key dimension considers *how* and *with what* to engage citizens and support participation. Technologies used in e-Participation depend on defined level participation, e.g. e-enabling, e-engaging, e-empowering. For example: with regard to e-enabling, this has generally involved the text-based provision of information either delivered passively or actively on demand. The more innovative styles of this involve the underlying technologies of avatars, natural language processing (NLP) and speech technology.

5. **Rules of engagement.** This key dimensions considers *what personal information* will be needed/collected, how it be used by the system, and also *what citizens can and cannot do* during the e-participation.

6. **Duration and sustainability.** This key dimension considers for what period of *time* the initiative lasted. This key dimension can be viewed from two perspectives. Firstly we need to understand whether the e-participation initiative was a one-off pilot, part of a series of experimental studies, a regular participation exercise or an on-going well-established initiative. Secondly, we need to understand exactly how long each engagement lasted, such as: days, weeks or months.

7. **Accessibility.** This key dimension considers *how many* citizens participated and from *where*. This key dimension involves variety of channels, e.g.: PCs, both in

the home and in pubic locations, mobile phones, and interactive digital TV. In this key dimension we wish to identify both the channel and the locality, for example whether it is from a cyber café, public library, town hall or other location.

8. **Resources and Promotion.** This key dimension relate to how the e-Participation project will be funded and promoted throughout publics.

9. **Evaluation and Outcomes.** This key dimension is concerned with how the initiative was evaluated (presuming that it was), the results of the evaluation and also the overall results from the initiative.

10. **Critical factors for success.** This key dimension has purpose to ensure success of e-Participation projects from any political, legal, cultural, economic, or technological factor.

Table 1 below, summarize those key dimensions discussed above.

Table 1: e-Participation key dimension [9]

Dimension	Description
1. Level of participation	*what level* of detail, or *how far* to engage citizens
2. Stage in decision-making	*when* to engage
3. Actors	*who* should be engaged and by *whom*
4. Technologies used	*how* and *with what* to engage citizens
5.Rules of engagement	*what personal information* will be needed/collected
6. Duration & sustainability	for what period of *time*
7 Accessibility	*how many* citizens participated and from *where*
8. Resources and Promotion	*how much* did it cost and *how wide* was it advertised
9. Evaluation and Outcomes	methodological approach and results;
10. Critical factors for success	political, legal, cultural, economic, technological factors

3   E-PARTICIPATION OBJECTIVES

In order to investigate methods used in e-Participation, we have to investigate various e-Participation objectives. Macintosh in [9] and Phang in [12] discuss four objectives. Macintosh mentions the overarching objectives of e-participation [9], i.e.:

1. Reach a wider audience to enable broader participation.
2. Support participation through a range of technologies to cater for the diverse technical and communicative skills of citizens.
3. Provide relevant information in a format that is both more accessible and more understandable to the target audience to enable more informed contributions

4. Engage with a wider audience to enable deeper contributions and support deliberative debate. The technology should also be harnessed to analyze contributions and provide relevant and appropriate feedback to citizens to ensure openness and transparency in the decision-making process.

While Phang and Kankanhalli in [12] mentions four general objectives of citizen participation:
1. Information exchange. E-Participation efforts with the information exchange objective aim to bring government planners and citizens together for open sharing of ideas and concerns.
2. Education and support-building. E-Participation efforts with education and support-building objectives aim to inform citizens about the why and how of government's policy plans, and create a favorable climate for execution of these plans.
3. Decision-making supplement. E-Participation efforts with the decision-making supplement objective aim to extract specific information from citizens, such as, citizens' preferences on the use of an empty plot of land in the city.`
4. Input probing. E-Participation efforts with the input probing objective aim to obtain citizens' views on relatively under-explored policy issues.

Table 2 describes various samples of e-Participation techniques and features based on different objectives.

4 METHODS AND TOOLS IN E-PARTICIPATION

This paper relates the method used in e-Participation with its level and objectives. As discussed earlier that there are three kinds of e-Participation level (i.e. enabling, engaging, empowering). For example, Typically e-engagement is based on discussion forum technology and has taken one of two forms [9]:
- Issue-based forums, i.e. organised around policy issues that have been formulated by policy-makers, interest groups or 'experts', and presented as the heading of one or more discussion 'threads'. Responses are sought in order to gauge opinion or solicit ideas. Position statements, links to topicrelated websites and other background information may also be presented.
- Policy-based forums, i.e. organised around themes/issues that relate directly to a draft policy that is meant to address these, and where discussion threads are intended to solicit responses from those affected. Participants might be encouraged to submit alternative ideas and suggestions but the format implies that what is being sought is an indication of how far the participants agree (or not) with the proposals, and why.

Tambouris et al in [15] categorise participation method in three categories, i.e.:
- Traditional participation method (without any ICT support), such as: citizens' juries, citizens' panels, focus groups, consensus conferences, public hearings, deliberative polls.
- Participation method using ICT supports, such as: e-consultation or e-referenda and the underlying technology, e.g. NLP, speech technology. There is also a

need to state whether it was an in-house development, collaborative development with external agencies or commercially available of the shelf software.

- Participation method which combining traditional and ICT support (combination).

Participation method evolution from traditional way to ICT shows that ICT has potency to implement traditional participation methods using ICT tools and technologies. This paper classifies several literatures into three kinds of methods as mention above and presents in table 3. Regarding the tools that can be used in e-Participation projects, Tambouris et al. in [15] mention these ICT tools, e.g.: Weblogs, Web Portals, Search Engines, Webcasting / Podcasting, Mailing Lists / Newsgroups, Chat Rooms, Wikis, Online Survey Tools, Deliberative Survey Tools, Content Analysis Tools, Content Management Tools, Collaborative Management Tools, Computer Supported Cooperative Work (CSCW), Collaborative Environments, Consultation Platforms, Argument Visualization Tools, Natural Language Interfaces. However, not all tools have same maturity level, some tools are more mature than others. This is due to e-Participation is a recent emerging area that still evolve and develop, while technology increase faster than e-Participation area itself.

In terms of technology for supporting e-Participation, there are several technologies that can be used, i.e.: E-mail, Instant Messaging, File Sharing, RSS Syndication, Streaming Media Technologies, Computer Supported Collaborative Work (CSCW / Groupware), Semantic Web Technology, Web Services, Extensible Markup Language (XML), Security Protocols (misal: SSL), Agent Technologies, Data Mining, Ontological Engineering, Computational Linguistics, Natural Language Processing (NLP), Identity Management, Filtering Technologies (termasuk: profile filtering, collaborative atau social filtering, psychographic filtering dan adaptive filtering). Such combination of several technologies could refer to a specific tool, in order to create innovative solution to support e-Participation. For example, CSCW could be combined with agent technologies to participatory support decision making processes.

The main characteristics that we need to appreciate here are the application of the technology should provide activities such as: information provision, consultation, public deliberation, public collaboration, and public empowerment.

Table 2: e-Participation objectives [12]

E-Participation Initiatives				
	E-Participation Objectives			
	Information exchange	Education and Support-building	Decision-making supplement	Input Probing
Features Desired	Avenue for citizens to participate freely. Opportunity for two-way open exchange of information	Formal selection and engagement of participants from target demographic population. Maintenance of contact with participants over time	Control of participation processes. Mechanisms to obtain specific set of information useful for decision making (e.g., ranked preferences) from relevant group	Mechanisms for systematic collection and analysis of citizens' input. Collection of citizens' opinion that is neither biased nor influenced by others
Example(s) of Best-fitting Participatory Techniques	Drop-in center. Public hearing	Citizen advisory committee. Citizen panel	Nominal Group Process. Value analysis	Citizen survey
Characteristics* — Restriction on number and target of participants	**No**	**Yes**	Yes	Depends on sample size needed and resources available
Characteristics* — Control of participation processes	No	No	**Yes**	No
Characteristics* — Maintenance of long-term contact	No	**Yes**	No	No
Characteristics* — Interaction among planners and participants	**Yes**	Yes	Limited (mainly one direction)	**No**
Characteristics* — Mechanisms for data collection	No	No	**Yes**	**Yes**
Characteristics* — Statistical analysis of data	No	No	No	**Yes**
ICT Tools that Provide the Features Desired	Web portal with Online discussion forum. Online chat	Electronic profiling. Online chat. Discussion forum with login feature. Teleconferencing. Videoconferencing. E-mail	Group support systems with process restrictiveness feature. Online pair-wise structured survey. Visualization tools	Online survey questionnaire. Web comment form. Data analysis tools
Example of E-Participation Initiatives	Denmark's Democracy on the Web. Singapore's REACH Portal	UK's Askbristol E-Panel. Canadian's Youth Connection Forum	Netherlands' Almere Co-Production of Interactive Policy and Technological Policy Solution for Societal Problems	Sweden's Kalix Consultation

Table 3: e-Participation methods on several projects

Empirical			
Classification	Examples	Method	Reference
Field Study	Web 2.0 in US (Obama administration)	ICT	[8]
	PD & IS in India, South Africa, Mozambiq	conventional	[13]
	e-PB in North Cumbria, UK	combination	[18]
	e-Par model in US, UK, Singapore, Canada, UEA, Brazil, South Africa	ICT	[1]
	e-PB in Brazil	combination	[11]
	19 e-Par project in EU	ICT	[15]
	e-Voting UK Pilot Project	ICT	[17]
	Web 2.0 in New Zealand	ICT	[14]
Sample survey	30 e-Par pilot projects	ICT	[2]
	e-Gov usage assessment in US	conventional	[3]
	e-Gov usage assessment in US	conventional	[4]
System development	e-administration & e-politics	ICT	[7]
	Formal technique to build e-Governance	ICT	[5]
Field Experiment	Web based city map in Milan	ICT	[6]

5 CONCLUSIONS

In this paper we have shortly presented some methods and tools to support e-Participation objectives and level achievement. These features are thought to increase citizens' participation in online deliberative processes. The feedbacks by users during the current field experiments will provide input for further improvements. The most prominent of these recent developments has been the emergence of the Internet and e-technologies - which in turn have been instrumental in developing new and creative ways in which we operate and communicate within both the private and the public sectors. As public interest in the application of technologies continues to grow, there is an increasing expectation that they will be utilized in order to facilitate e-Participation within national and local governments. This reflects a growing acceptance that achieving excellence in customer service is just as critical for the public sector as it is for private companies and finally accomplished intended e-participation level and objectives.

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ICT INNOVATION STRATEGY IN MALAYSIA PUBLIC RESEARCH INSTITUTES

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Keywords: *ICT Innovation, Research Institutes, ICT in Research Institutes, innovation, promoting innovation*

Abstract. *Information and Communication Technology (ICT) play important roles within the rapid growth of innovation environment. The roles include as a change agent, enhancing e-business requirements, promoting globalization and innovation, contributing to productivity growth, strengthening competitiveness, improving business processes along the whole value chain, determining future business strategies and generating profits for business. Previous studies have shown that by adopting ICT, the organization will attain positive impacts of innovation especially in product innovation, process innovation and competitive advantage. This indicates that ICT has significantly contributed towards promoting innovation in the organization. This paper presents the results of the study of ICT innovation in Malaysian Public Research Institute and Government Agencies (IPA). The study focuses on existing ICT strategies that promote innovation in IPA. Data was collected through questionnaires which were distributed to the selected Heads of IT in IPA. The findings of the study shows ICT innovation helped IPA in areas of creativity, product development, capacity development and strategic. This research also shows that IPA produced several ICT strategic applications for promoting innovation derived from ICT Strategic Plan (ICTSP). This research will help other research institutes to learn from each other and practice innovation in their organization.*

1   INTRODUCTION

Importance of all organization to place innovation grows rapidly with the continuous development of ICT technology. Today with android and smart phones, business connected globally and without boundary. ICT also benefit the citizens by providing government services online that saves a lot of time and increase government effectiveness. The growing importance of ICT enhance ICT roles; as a change agents, promotes e-business, promotes globalization, promotes innovation, contribute to productivity growth, strengthen competitiveness, improve business processes along the whole value chain, plays a key role in

determining future business strategies and generate profits for business [1][2][3][4]. Previous studies also have shown ICT can promote organization innovation especially in product innovation, process innovation and competitive advantage [5][6][7][3][8].

Malaysia"s Prime Minister, Dato" Najib Tun Razak has emphasized the important of all organizations to place innovation and creativity element in research and development process to improve national productivity and excellence based on the New Economic Model. This is reflected in Malaysia"s National Transformation Agenda where one of the focuses is on innovative citizen-centric model of public service delivery. This agenda require changes in the role of ICT to enable effective utilisation and application of information and communications technology (ICT) across multi-faceted service delivery and internal government operations. This is because the next wave of ICT is believe to be focused more on collaborative and co-operative arrangement of open consultation, open data, shared knowledge and expertise, consolidation of shared services and enhanced horizontal application. [9].

In general, innovation is a new method or a new material useful and practical aim to bring major changes to the aspect of thinking, products, processes and organizations in order to provide better service and be able to solve the problem with a better way [10][11][12]. Innovation can be categorized into four main areas, namely the field of creativity, product development, process or capability and strategic areas [13]. The following are the objectives of the innovation area:

- creativity area
  :The objective is to build creativity and innovation in organizational teams

- product development area
  :The objective is to create and coordinate synergies across the global community

- process or capability area
  :The objective is to produce performance metrics and better processes and systems

- strategic area
  :The objective is to exploiting change to shape and create new markets

Innovation also can be viewed on the aspect of innovation value chain. There are several researches that study on innovation value chain. Hansen and Birkinshaw propose that innovation can be viewed as a value chain which comprises of three phases: idea generation, conversion, and diffusion. Within these, there are six linking tasks which are performed across those phases: internal, external, and cross-unit collaboration; idea selection and development; and spread of developed ideas[14]. Roper et. al suggest that the innovation value chain comprises of three main links. It begins with firms" attempts to assemble the bundle of knowledge necessary for innovation. Then, the next link in the innovation value chain is the transformation of knowledge into physical innovation. The final link in the innovation value chain relates to the exploitation of firms" innovations [15]. Likewise for a consultant, Management Centre believed that the innovation value chain phase can be divided into seven phase; idea generation, integration cross-pollination, information sourcing from external, identify and select ideas, develop ideas, diffusion and finally learning what can be improved [16]. As a conclusion, innovation value chain can be divides into three main phases; first phase-knowledge sourcing activity for idea generation, second phase-transform knowledge into strategic ideas and knowledge diffusion, third phase- implementation and exploitation.

According to Masahudu Gunu, innovation starts with idea generating and brainstorming between the subject experts. An example of how ICT can help in idea generation and problem solving is as ahown in the key innovation systems within P&G, AskMe Enterprise Innovation System[17]. This system is used as a medium to share knowledge within organization and produce innovation in their product and services so that they will become more competitive. Besides this, Mc Nurlin highlights that ICT innovation in Microsoft, Shell Oil and Skandia Futures Centres occurred when they use sense and respond approach [18]. For Microsoft, internet strategy involves in acquisitions and alliances with companies, moves into a variety of technologies (e.g., handheld operating systems, Xbox gaming platform and service) and diversification in a number of related sectors. While, at Skandia Future Centres developed a „knowledge cafe' to discuss the future and accelerate innovation. Meanwhile, at Shell Oil, they initiated the concept of action labs, whereby front-line gas station employees could propose strategic projects for their gas stations. As a result, new „guerrilla leaders" emerged and initiated innovative experiments. This indicates that ICT is being used to the great extend for the company to be the leader in product and service innovation.

Anderson and Markides research provide various of ICT innovation examples in Edward Jones, Progressive Insurance, CEMEX, Enterprise-Rent-A-Car and Smart Inc [3]. They emphasized ICT enables strategic innovation in firms to:

- reach consumers that most competitors cannot serve profitably;
- offer radically new value propositions to consumers that other firms cannot deliver in a cost-efficient way; and
- put in place value chains that no other firm could do efficiently.
- ICT also allows strategic innovators to scale up their business models quickly and so protect themselves from competitive attacks.

The analysis of the ICT Innovation practice examples can be viewed in the Table (1).

Keywords: C=Creativity Area, PD=Product Development Area, PC=Process and Capability Area, S=Strategic Area, SR=reach consumers that most competitors cannot serve profitably, SV=offer radically new value propositions to consumers that other firms cannot deliver in a cost-efficient way, SVC=put in place value chains that no other firm could do efficiently, SI=allows strategic innovators to scale up their business models quickly and so protect themselves from competitive attacks.

Table 1: Analysis Of The ICT Innovation Practice Examples

Product/ Company Name	ICT Innovation Examples	Innovation Area						
		C	PD	PC	S			
					SR	SV	SVC	SI
Microsoft [18]	-acquisitions and alliances with companies -moves into a variety of technologies (e.g., handheld operating systems, Xbox gaming platform and service) -diversification in a number of related sectors.	/	/				/	

Product/ Company Name	ICT Innovation Examples	Innovation Area						
		C	PD	PC	S			
					SR	SV	SVC	SI
Skandia Future Centres [18]	-developed a „knowledge cafe' to discuss the future and accelerate innovation	/		/				
Shell Oil [18]	-initiated the concept of action labs, whereby front-line gas station employees could propose strategic projects for their gas stations. -New „guerrilla leaders" emerged and initiated innovative experiments.		/					/
P & G Askme Enterprise [17]	-AskMe Enterprise Innovation System -a medium to share knowledge within organization and produce innovation in their product and services so that they will become more competitive.	/	/	/				
Edward Jones [3]	-using hub and spoke satellite system to access real time data and video presentation that enhance communication of HQ and also at rural broker office.				/		/	/
Progressive Insurance [3]	-by targeting high risk drivers, it installed a proprietary software platform on the laptop of every claims representative that enable the representative to perform 20 separate transaction while in accident scene.				/			
CEMEX[3]	a new value proposition-total cost to the customer-the cost of cement and other costs that the customer has to incur from the moment of ordering cement till it is delivered to the construction site. It deliver just in time cement, enable same day service, free unlimited order changes, 20 minutes scheduled delivery time.					/		
Enterprise-Rent-A-Car[3]	-Automated Rental Mgmt Systems (ARMS) that enables insurances claim agents log into ARMS and automatically place a rental reservation to the customer. Auto repair shops also can send regular updates on the status of the car repaired to customer and insurance company					/	/	/
Product/ Company Name	ICT Innovation Examples	Innovation Area						
		C	PD	PC	S			
					SR	SV	SVC	SI

Smart Inc.[3]	-SMART LOAD create a demand response stocking system for prepaid airtime that has special retailer SIM that enable the retailer to open or close their retail handset via sms and enabled them to sell their service outside a physical location and outside regular store hours.		/
Cisco Systems[3]	A single online point-of entry for the company's global sales force and support staff to plan, track, develop and measure their skills and knowledge. The intranet system had links to over 400 learning resources, online and leader led training resources, assessment exams, and learning roadmaps for the company's account managers and systems engineers.		/
IdeaScale [19]	-Idea Management Systems	/	
Innovation Central[20]	Idea Management Systems	/	

2   RESEARCH INSTITUTES AND INNOVATION

Research Institutes had been described as an organization that had a creative, innovative, productive, dynamic and continuous environment [21][22][23]. The main role of research institutes are to plan, administer, and executing research and development [21]. Usually, the research and development effort in research institutes do not have consistent planning. This is because the environment of new technology evolves quickly and dynamically. The organization needs to be alert all the time and must have the capability to capture and exploit the emerging opportunities.

In this new era, research institutes had developed a new role that is to produce radical innovation that can impact the whole industries segment. With the development of ICT technologies, research institutes also had build new group relationship across border. According to Nobelius, research institutes that succeed at commercializing new technology in a rapid and precise manner, will achieve the possibilities of accomplishing a greater market share, produce more revenue and produce dominance design that will leading the organization to much sharper competitive edge[21]. Hence, the use of ICT is to promote innovation in research institutes had been highlighted in German Research Institutes [24].

Nobelius had summarized R&D process into five generations of R&D Process[21] that he had develop and adapted from previous researcher [25][26][27][28]. The strategy of the R&D generation are as following:

a)   In the First Generation(1950s-1960s), R&D having little or no interaction with the rest of the company or overall strategy.
b)   In the second Generation(mid-1960s to early 1970s), R&D strategy driven from the business side, all under the umbrella of project management and the internal customer concept.
c)   In the Third   Generation(mid-1970s to mid-1980s), R&D have linkages to both business and corporate strategies.

d)   In the Fourth Generation(early 1980s to mid-1990s), R&D strategy is to learn from and with customers . It had moving away from a product focus to a total concept focus, where activities are conducted in parallel by cross-functional teams.

e)   In the Fifth Generation(mid-1990s to 2000), R&D strategy focusing on collaboration within a wider system and are involving competitors, suppliers, distributors, etc.

Nobelius also discussed about the sixth generation of R&D processes and stated that the sixth generation R&D   need to return to the roots, i.e. back to the purpose of the first generations corporate research labs, one pursuing more radical innovation through research in R&D. The main aim is to increase the likelihood of recognizing, joining, and developing breakthroughs affecting whole industry segments [21]. The strategic choices are related, for example, to the R&D intensity of the firm, the industry context, and the business strategies. To deliver these kinds of products, new alliances and cooperation need to be established cross borders and based on functions instead of technology so that this will increasing the demands on companies combinatory capabilities.

Research institutes in Malaysia can be categorizes to public and private research institutes. Public Research Institutes in Malaysia can be divides to Government Agencies and Public Research Institutes (IPA) and Research Institutes in Institutes of Higher Learning. Roles of IPA is to carry out R&D, technical and consultancy services, provide diagnostic services, business joint-venture and licensing. According to MASTIC, there are 33 Government Agencies and Public Research Institutes[29]. Malaysian Public Research Institute and Government Agencies (IPA) is an organization under the public sector category.

Public Research institutes (IPA) play a critical role in forging the interface between science and industry. Malaysia"s IPA perform mainly downstream or applied research in order to be relevant to their target customers or they are focused in undertaking activities that satisfy their departmental remits. Their core research areas range from primary commodities, industry and engineering to national healthcare. The 2008 National Survey of R&D in Malaysia revealed that, in the case of IPA, agricultural sciences dominated the top national R&D expenditure by field of research [30] .Other main areas of research focus include forestry sciences, material sciences, engineering science and biotechnology. Also, most of the research conducted is applied research, rather than basic   or experimental development research. IPA account for almost 5% of the nation"s total R&D expenditure and about 25% of the country"s total number of research personnel [30].

The IPA in Malaysia have different governance structures. There are those that are statutory bodies with a governing board reporting to sectoral ministries, two are cess funded with a governing board responsible to sectoral ministries, and the remainders are departments or institutes of ministries. Most of these institutions have a sectoral focus and the Ministry of Science, Technology and Innovation (MOSTI) has no authority in directing their research agendas. As public sector agencies, the ICTSP development and implementation in IPA must be referred to Administration Modernisation and Management Planning Unit (MAMPU). MAMPU is the monitoring agency that is responsible to monitor the ICTSP implementation in public sector.

As IPA is a research institutes, it should be creative, innovative, and productive and dynamic in nature where the organization is continuously evolve within its environment (See Refs 21-22 for more details).   Malaysia had been developing support system to support research and innovation in the country, Malaysia through National Innovation Systems

(Research and Innovation Support Department ITIDA) [31]. In this innovation effort, ICT play important roles. In Malaysia, several agencies that focus on using ICT to promote innovation are Technology Park Malaysia (IT), MSC Malaysia National ICT Initiatives, MIMOS and MIGHT.

As innovation growing importance to Global Innovation Index, these study objectives are to identify the innovation importance in Malaysian Public Research Institute and Government Agencies (IPA) and identify existing ICT strategies that promote innovation in IPA. The innovation area that supported by ICT strategic application are also identified.

3   RESEARCH METHODOLOGY

A survey to study the ICT innovation strategy was conducted in 32 Public Research Institutes and Government Agencies (IPA). The source of the IPA list is from Malaysia Science and Technology Information Centre (MASTIC). Out of this, 27 IPA's responded to the questionnaire distributed and returned the forms. The method for this survey is exploratory in nature. One of this survey aims is to find out whether the ICT strategy generated from ICTSP contributed to innovation in the research institutes and what are the ICT strategies that can promote innovation in IPA.

The instrument used in this survey is an open-ended questionnaire. The questionnaire was designed this way to allow the respondents describe and elaborate how ICT is used to promote innovation in the organization. In order to get the information needed, a purposive sampling technique was used. The selection of the Head of ICT Division as the respondent is based on the rationale that the Head of ICT Division is usually the person most knowledgeable about ICT Strategic Planning process that will generate ICT strategies within organization and describe how the ICT strategies contribute to innovation in organization. The questionnaires were distributed to Head of ICT in 32 research institutes.

Data was analyzed using descriptive statistical methods and qualitative analysis techniques. The qualitative analysis techniques used are the constant comparative method and the 'content analysis' method. The findings of the study were sent to the respondent for verification.

4   SURVEY RESULTS AND DISCUSSION

Analysis of this study was based on 27 responses from 32 IPA respondents. The percentage of respondents who gave feedback is 84 percent. Based on literature review, a sufficient amount of feedback was evaluated. The evaluation is based on the type of cases or subjects studied and methods of data collection. The type of subject under study was based on individual or organizational studies unit of analysis. The study of the organization usually has a response rate of less than the study of the individual, where the rate responses 15 percent were accepted to study organizational [32][33]. Because the study organization are usually sent to work, factors such as busy at work, privacy, regulations and organizational policies may cause the rate of questionnaire responses to degraded [34].

As ICT innovation strategy produced from the implementation of ICT Strategic Planning, the importance of innovation in IPA is study in the point of view of innovation importance in ICT strategic planning. About 74.1 percent of the 27 IPA stated that one of their ICTSP aims is to produce ICTSP e that can promote innovation in organization, refer to

Fig. (1). This shows IPA expected the ICT strategies produced from ICTSP can enhance innovation in organization.
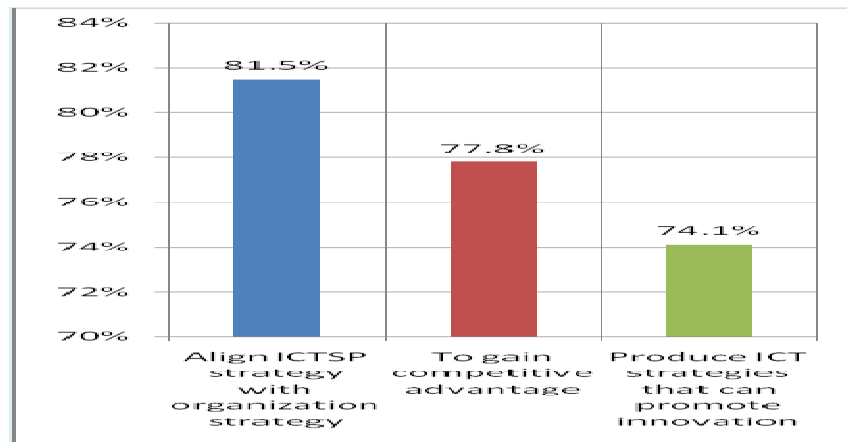
Figure 1: The aim of ICTSP development in IPA

Based on analysis of four innovations area, ICT strategies is commonly used to promote creativity in innovation (72.4 percent). This followed by using ICT for product development innovation, 48.1 percent and capability development innovation, 40.7 percent. ICT strategies in IPA is least used to promote strategic innovation with only 29.6 percent of IPA, refer Fig. (2).
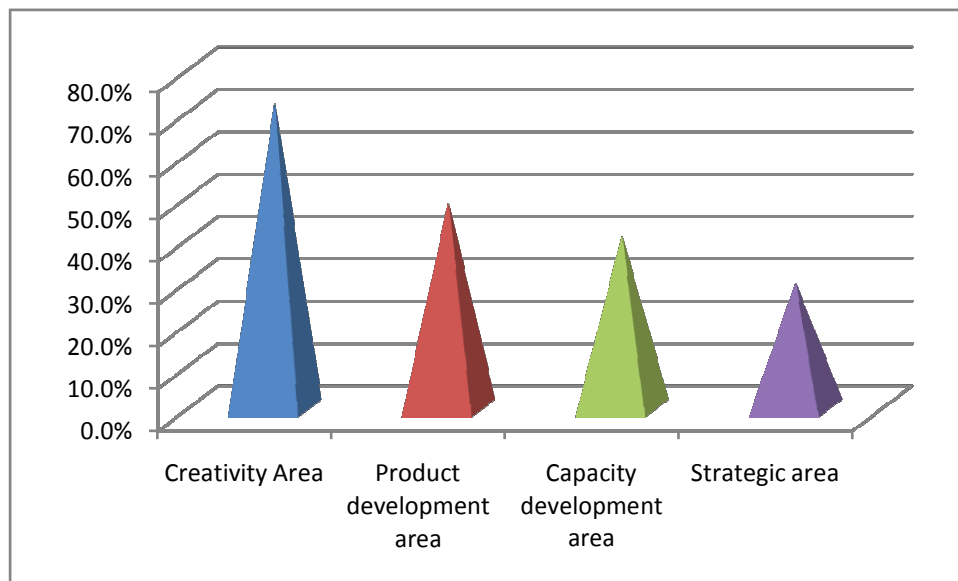
Figure 2: The usage of ICT strategies to promote innovation area

One of the factors why ICT strategy is used for creativity innovation is because IPA used ICT to generate innovative ideas. ICT strategies are also used for innovation in area of product development. This is because IPA used ICT strategies to produce synergies and collaboration across border in order to generate innovative products. Only 40.7 percent or 11 IPA used ICT strategies to identify main innovation capability. ICT strategies are least used in IPA to achieve competitive advantage. This might be because some of the IPA feels that they have no competitors or because of budget and expertise constraints.

For ICT strategies that are used for promoting innovations initiatives, 40.7 percent or 11 IPA used ICT strategies for offering new opportunities that bring value for customers, *that other organization cannot manage the* cost efficiently. About 40.7 percent or 11 IPA also used ICT strategies to reach the customers sector that is not addressed by most competitors. Only 22.2% or 6 IPA used ICT strategies for allow 'Strategic Innovator' to develop organizational models quickly and protect them from attacks by competitive rivalry. About 22.2 percent or 6 IPA used ICT strategies for promoting innovation by implementing organizational value chain activity that other organization cannot implemented effectively (eg: BPR, change mgmt) , refer Fig. (3).

Figure 3: The usage of ICT strategies to promote innovation initiatives

This study shows ICT strategies are more often used for offering new opportunities that bring value to customers that other organization cannot manage the cost efficiently. Besides that ICT strategies in IPA also often used to reach customer"s sector that is not addressed by most competitors. IPA also places an important focus on customer services efficiency by providing value added services to customers and organization. One of the factors IPA less focus on competitive advantage is because they feel they do not have any competitors. Most IPA who felt that they have competitors compares their technology with research institutes overseas. The factors that might affect the low use of ICT strategy to generate unique value chain might be because of budgets and expertise constraints. The analysis of the ICT Innovation practice in Malaysia IPA can be viewed in Table 2.

Keywords: C=Creativity Area, PD=Product Development Area, PC=Process and Capability Area, S=Strategic Area, SR=reach consumers that most competitors cannot serve profitably, SV=offer radically new value propositions to consumers that other firms cannot deliver in a cost-efficient way, SVC=put in place value chains that no other firm could do efficiently, SI=allows strategic innovators to scale up their business models quickly and so protect themselves from competitive attacks

Table 2: Analysis of the ICT Innovation practice in Malaysia IPA

IPA area	ICT Innovation Examples	Innovation Area						
		C	PD	PC	S			
					SR	SV	SVC	SI

IPA area	ICT Innovation Examples	C	PD	PC	SR	SV	SVC	SI
Agriculture	-ASIS-Agriculture Statistic Information System	/				/		
	-PMUMS-Plant Machinery and Vehicle Monitoring Systems	/						
	-Corporate Operational Monitoring System	/		/				
	-E-licensing, e-submission, e-registration				/			
Technology development	-Web 20.0-Microsoft sharepoint platform InnoXchange product development	/						
	-ICT trend awareness, improve workflow and sharing		/					
	-Patent search	/						
	-Development Management Systems, VOIP Systems, Backup and intranet sharing folder				/			
	-innovation team collaboration and integrated systems		/					
	-Portal GSIAC for group collaboration project with New York Academy of Science members.		/					
	-CRM-customer relationship management system				/			
Veterinar	-DAVETSA system-collect up-to-date data statewide which will form the core of the Veterinary Databank (DAVETSA) that enables data mining which assists in better decision-making based on the most current information	/	/	/	/	/	/	/
	-Web Portal	/						

IPA area	ICT Innovation Examples	Innovation Area						
		C	PD	PC	S			
					SR	SV	SVC	SI

IPA area	ICT Innovation Examples	C	PD	PC			S
Meteorology	-HPC (High Performance Computing) servers is used for generating Numerical Weather Prediction Model that provide data for MMS and WRF model that help to detect unusual weather.	/	/				
	-Application regarding data transmission from station instrument station, from satelite and radar, tsunami and earthquake model generation provide detail and diversified forecasting model and measure incident happened on land and sea.			/	/		
	-source code WAM, Wavewatch III	/					
	-Ocean General Circuation Mode (MITacm) models	/					
	-Generate map and chart figure from the database that can be customized to customer application for insurance company and police investigation and shipping company cruise planning.					/	
Irrigation	-SMART System	/	/	/			
	-Infoportal JPS, , Info Banjir,	/	/	/	/	/	/
	-ArcGIS Data Center	/					
	-Sistem DID1Geo Info	/	/	/	/	/	/
	-Sistem Prestasi	/		/	/	/	
	-eAduan			/	/	/	
	-Sistem Tender Online			/	/	/	
Environment	-Techonology-microprocessor dimasukkan kepada portable devices	/					
	-EIA Report		/				
	-EHS: Environmentally Hazardous Substances		/				
	-MDMR: Monthly Discharge Monitoring Report		/				
	-ECN: E-Consigment Note		/				

IPA area	ICT Innovation Examples	Innovation Area			
		C	PD	PC	S

					SR	SV	SVC	SI
Meteorology	-Emition monitoring systems- monitor air pollution equipment					/		
	Self –regulation						/	
	Strategic innovator							/
Fisheries	Automatic food controller	/						

Based on the Table 2 analysis, the ICT strategic applications in IPA mostly promotes creativity innovation. This follow by ICT strategic application produce for product innovation and strategic innovation. More effort should be geared to produce ICT strategic application that can promote process and capability innovation. ICT innovation examples vary from ICT strategic application, portal, innovation practice and strategic innovator lead. This shows that during ICT strategic planning for innovation, this aspect should be look deeper into. The ICT strategic application for strategic innovation mainly focus for reach consumers that most competitors cannot serve profitably and offer radically new value propositions to consumers that other firms cannot deliver in a cost-efficient way. This is because Malaysia Public Research Institutes and Government Agencies focus on innovative-centric model of public service delivery.

5   CONCLUSIONS

The study shows ICT strategic applications from ICTSP promote innovations in Malaysia Public Research Institutes and Government Agencies. ICT applications generated are used to produce new ideas, form synergy and collaboration for product development, used to identify organization capability, and produce innovation competitive strategies. The efforts geared out by Malaysia Public Research Institutes and Government Agencies are aligned with Malaysia National Transformation Agenda. This agenda focus towards public sector services model that is innovative and citizen-oriented. Malaysian Administration Modernisation and Management Planning Unit (MAMPU) had produced ICT Strategic Planning for Public Sector Agencies (ISP) that place innovation as one of public sector strategic direction. However current ICT Strategic Planning methodology need to be look deeper so that it will promote greater innovation and maximize the impact of innovation in IPA and fulfil Malaysia National Transformation Agenda.

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CRITICAL SUCCESS FACTORS IN IT PROJECT OUTSOURCING: A CASE STUDY AT GOVERNMENT LINKED COMPANY (GLC) ORGANIZATION

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Abstract. *Information Technology outsourcing is a viable option for organizations to maintain competitiveness and acquire ability to focus on core competences. Nowadays, a large number of companies outsource their Information Technology project to third parties in order to reduce or control costs, gain access to Information Technology resources unavailable internally, free up internal resources and improve business or customer focus. To ensure the success gained from this outsourcing, the level of satisfaction with benefits from each stakeholder in organization is very important to determine. This study identifies key areas of Information Technology outsourcing performance by applying the critical success factors methodology developed by Software Engineering Institute. A survey was conducted and data gathered from Project Leaders, Project Managers, Program Managers and Project Team Leaders that had experienced success in leading Information Technology project outsourcing at government-linked companies. Ten critical success factors that influenced Information Technology outsourcing at government-linked company have been identified: service level agreement contents specific and precise; effective communication; provider understand client objectives; stakeholders commitment; clear project scope and defined deliverable; client adaptable in project requirement; experienced provider; client experience in outsource project; trust in working relationships; and technology transfer.*

1. INTRODUCTION

Over the last decade, one of the more widespread developments in meeting an organization IT needs is the practice of outsourcing. Many companies now have several years of outsourcing experience and have honed their skills in setting strategy, selecting vendors, implementing governance policies, managing relationships, negotiating contracts, and defining the business value of their efforts. Outsourcing is a contractual agreement between the customer and one or more suppliers to provide services or processes that the customer is currently providing internally. Outsourcing can also be defined as "procuring of services or products from an outside supplier or manufacturer in order to cut costs" [1].

Information Technology Outsourcing (ITO) is defined as the process of procuring services or products from sources that are external to the organization [2]. Another

definition of Information Technology Outsourcing (ITO) is "the organizational arrangement instituted for obtaining IT services and the management of resources and activities required for producing these services" [3]. IT services refer to the manner in which IT products are delivered and the provision of IT functions. Organizational arrangement refers to the formal structure of the responsibility and delegation of tasks within the IT function [4]. Information Technology Outsourcing is an effective strategy for gaining and maintaining competitive advantage when it is executed as part of an overall program to build a high performance IT organization [2].

2. RESEARCH BACKGROUND

In Malaysia most of IT project outsourcing are running successfully and in some condition it fails to complete. The most significant reason organization failed to realize the full potential of their outsourcing initiatives are lack of senior executive support, issue of cost, inadequately managing the outsourcing project and how outsourcing initiative was poorly scoped and also core organizational competence as quoted by Asia Pacific Centre for Continuing and Professional Development in May 2009. In order to achieve a successful ITO, certain practices known as Critical Success Factors should be included. CSF defines critical areas where satisfactory performance is required for the organization in order to achieve its goal [5]. CSF defines any activity, task or requirement, where its correct performance contributes to meet the objectives of successful ITO projects. Many activities might be considered as CSF depends on the area and perspective involved. However, efforts invested in this research are aimed at five identifying CSF group variables which are client, provider, service, ITO arrangement and partnership capability. As outsourcing is gaining momentum in Malaysia it is only appropriate that research be conducted in the area of Government Linked Organization (GLC) organization.

Outsourcing is contracting with another company or person to do a particular function. Currently outsourcing can be categorized in several forms which are information technology outsourcing (ITO) and business process outsourcing (BPO) (sourcingmag.com). Global Services Location Indexes reported in 2004 and 2005

Malaysia is the top three locations for shared services and outsourcing project behind India and China and just ahead of Singapore. It shows Malaysia is hardly new to the outsourcing activities. GLCs are government-owned company or linked entities that operate in business alongside private companies and has a direct controlling stake.

Controlling stake refers to the Government"s ability and it is not just a percentage ownership to appoint Body of Director (BOD) members or Senior Management to make major decisions. Example as contract awards, strategy, restructuring and financing, acquisitions and divestments for GLCs directly. In between the high ranking GLC in Malaysia are Telekom Malaysia, Tenaga Nasional Berhad and Petronas. Mostly they outsourced their project to third party and as an example, recently at Telekom Malaysia they outsource the High Speed Broadband to China firm, Alcatel-Lucent France firm and Fiberhome Technologies Group with MYR11.3 MIL values. As a group, the GLCs have the potential, resources and capabilities to create a much greater impact on the economy in terms of generating employment and income. In early 2004, a set of measures were introduced to enhance the management and performance of GLC"s project. These included the use of Key Performance Indicators or KPI"s, performance contracts, performance-linked compensation and changes in board and senior management composition,

to name a few. Even though there are few performance indicator was introduced in GLC still the failures project rate becoming 60 percent over hundred percent. Based on interview with a few Project Leaders at GLC organization, mostly they give the reason they do not have the expertise in the group of project. In order to identify the successful factors in project IT outsourcing, the method in CSF is used to identify the successful targets factors and to be reached and maintained in project outsourcing.

The purposes of this study are:

1. To identify successful factors that influence information technology project outsourcing at government-linked company; and
2. To map and index ten critical success factors in information technology project outsourcing at GLC in Malaysia.

3. LITERATURE REVIEW

3.1 Outsourcing

There are researchers who define outsourcing as "The process of retaining resources external to the procuring organization to conduct software development and related activities." The reason for this definition is as follows: It places no restrictions on the size or number of resources external to the procuring organization. The resources could be another company or an individual consultant. It places no restrictions on the location of the external resources in relation to the procuring organization; in other words, the resource can be located a long distance from the procuring organization or down the street, it places no restrictions on the number of organizations involved. This means that the procuring organization may hire a number of different companies or consultants, working either in a parallel or in a serial fashion. In other words, one contractor develops the system, and another contractor deploys and maintains the system after it is in production, it does not preclude the procuring organization from performing some of the work itself and outsourcing only a portion of a project to an external organization. Outsourcing also known as contracting out that has been recognized and established successfully [6]. Hence, it could not be regarded as a new idea in management. It is a process of externalizing tasks and service previously performed in-house, to outside vendors [7].

Various IT researchers and academic scholars came up with diverse definitions of IT outsourcing in their works. As defined in [8], ITO is an organizational arrangement instituted for obtaining IS services and the management of resources and activities required for producing the services. Another study by [9] stated that IT outsourcing involves transferring IT assets, leases, staff and management responsibility for delivery of services from internal IT functions to third-party vendors. The first major success in ITO is with Eastman Kodak [10] when they outsourced the bulk of their IT functions in 1989. Since then ITO has been widely practice. Never before had such a well nown organization (where IS/T was considered to be a strategic asset) turned over their IT functions to a third party providers [11]. Since then both large and small companies have found it acceptable, indeed fashionable, to transfer their IS assets, leases and staff to outsourcing vendors [12]. Kodak appears to have legitimized outsourcing, leading to what some have called "the Kodak effect" [13].

3.2 Outsourcing in Malaysia

ITO is growing in Malaysia as Malaysia is seen as an attractive location for offshore outsourcing contracts due to our strong infrastructure and our multilingual skills (IDC Malaysia, 2003). Bank Bumiputra-Commerce Bank (BCB) has become the first bank in Malaysia to outsource its IT functions to Electronic Data Systems (EDS) with a

USD250 million 10-year contract. This is the largest outsourcing deal in Malaysia [14]. Meanwhile, Malayan Banking Berhad (Maybank) has outsourced their IT tasks to CSC, an American company with headquarters in Virginia, in a 10-year deal valued at MYR342 million. CSC would take over management of the bank's mainframe, mid- range, desktop, help desk and network infrastructure in Malaysia and Singapore. It will provide the services mostly via its affiliates Computer Systems Advisers (CSA) Berhad and CSA Automated. CSC and its affiliates would absorb about 320 bank employees [15]. In addition, Maybank data center has been outsourced to Hewlett-Packard [16]. The overall outsourcing market in Malaysia remains strong and many companies are outsourcing their IT operations. EDS leads the pack in the outsourcing revenue ranked in 2003 with approximately USD50 million (RM190 million); a far second is HeiTech Padu Berhad with approximately USD14 million (RM53.2 million) while third is Hewlett-Packard with approximately USD10.5 million (RM39.9 million) [16]. In addition, Accenture Malaysia is optimistic in securing three to four outsourcing contracts from local financial institutions valued from USD260 million to USD400 million [17]. Incidentally, EDS has been taken over by Hewlett-Packard in 2008.

3.3 Critical Success Factors

Critical success factors are the features of projects which have been identified as necessary to be achieved in order to create excellent results. If the critical success factors are not present or taken into consideration, one can largely expect that problems will be experienced which act as barriers to overall successful outcomes [18]. [19] defines CSF as critical areas where satisfactory performance is required for the organization in order to achieve its goal.

CSF is defined as any activity, task or requirement, where its correct performance contributes to meet the objectives of successful ITO projects. Such factors may be considered as critical to the extent their no compliance divert parties from meeting their expectations. Many activities might be considered as CSF is depending on the area and perspective involved. Project management, given the unique nature of each individual project, is an area seen as benefiting from focusing management"s attention on such critical success factors. [20] have with them their project implementation profile made a valuable contribution to the field of project management in so far as they have demonstrated how to use critical success factors to diagnose a project"s status. They used the listed task follow as critical success factors: project mission (clarity of goals and general direction), top management support, project schedule or plans, client consultation, personnel tasks (recruitment, selection, and training), technical tasks (availability of the required technology and expertise), client acceptance, monitoring and feedback, communication, and trouble shooting (ability to handle unexpected crises and deviations from plan).

3.4 Critical Success Factors and IT Outsourcing

IT outsourcing success has always been a salient justification to information systems outsourcing research [21]. Outsourcing success is defined as the satisfaction with benefits from outsourcing gained by an organization as a result of deploying an outsourcing strategy [22]. [23] judged the outsourcing is successful when "the outcome of IT outsourcing decisions met the expectations". [24] defined the outsourcing success as "the level of fitness between the service receiver requirements and outsourcing outcomes delivered by the service provider".

4.   RESEARCH DESIGN

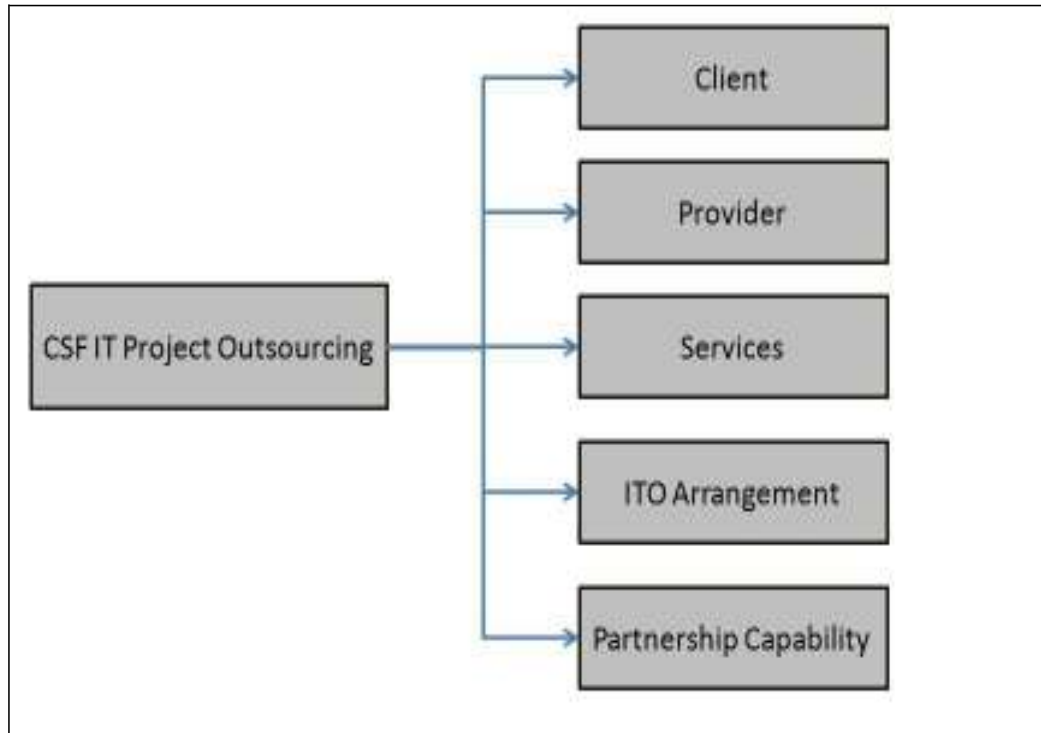The research framework is shown in Figure 1.

Figure 1: Research Framework

Scope of this research is limited to the Project Leader who was successful in leading a complete IT project outsourcing in Government-linked Company (GLC) organization. Two organizations were selected as a sample. The organizations were selected based on top ranking in GLC organization (http://skorcareer.com.my). For further research, the author can take all the GLC employees as a respondent.

The researcher used the CSF methodology SEI Technical Report [25] as a guideline to meet the objective: to evaluate and index ten critical success factors in information technology project outsourcing at government-linked company. The reason the author did the survey in government-linked company is because there is no research carried out at any government-linked company. Instead the author decided to do a survey on GLC assuming that they would have an experience with IT project outsourcing in application and software development [26]. A hundred questionnaires were distributed by hand and the author received back forty five from respondents. To describe the CSF method, the author used the five basic activities that have been identified by SEI Technical Report [25] as in Figure 2.
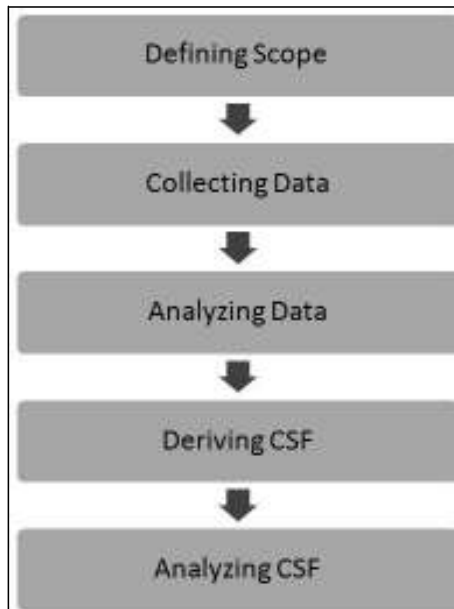
Figure 2: CSF Methodology [25]

Primary data collection method used was a survey where questionnaire is divided into eight sections. Section 1 gathers data on demographic profile such as gender, age, number of years experience handling IT project outsource and formal training in Project Management certificate. Section 2 collects information pertaining with project profile such as number of years companies outsource IT project, IT outsourcing budget and type of IT project outsource. The rest of section is question based on success factors in project outsourcing. There are thirty three (33) questions in this section.

A 5-point Likert Scale was used for responses ranging from 1, denoting strongly disagree, to 5, denoting strongly agree to investigate each factors of success in every category of variable which are client, provider, service, IT outsourcing arrangement and partnership capability. Finally respondents are required to state their other factors and reasons for successful project outsourcing in Section H.

5. FINDINGS

5.1 Reliability Test

Reliability is the degree to which a scale or instrument consistently measures whatever it measures. Reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient the more reliable is the instrument. Cronbach‟s alpha is the most common measure of internal consistency especially for attitudinal measures like those used in this data. Cronbach‟s alpha estimates internal consistency by determining how all items on a test relates to all other items and to the total test-internal coherence of data. If the value exceeds 0.6, then the scale is said to have internal consistency, hence a set of items considered reliable. The Cronbach‟s alpha coefficient computed for the 33 items was 0.766 indicating reliability of the items for the study as in Table 1.

Table 1: Reliability Test Result

Cronbach's Alpha	N of Items
.766	33

.

5.2 Demographic Profile

The average age of the respondents are between 41-50 years and had 3- to 5-year experience in handling IT project outsourcing valued between MYR500K to RM 1 MIL. Findings also reported that almost 46% of the respondent attended formal training in IT project management and certified from Project Management Institute. In addition to that, ERP and CRM are most type of IT outsourcing managed by them.

5.3 General Findings

Data was analyzed using descriptive statistics: frequencies and crosstabs apply both graphical and numerical techniques.

Meeting objective 1: To identify successful factors that influence information technology project outsourcing at government-linked company. Descriptive analysis frequencies used for determine which successful factors between each others in every category on client, provider, service, ITO arrangement and partnership capability. Based on frequencies finding at above each factors was identified group by category as in Table 2.

Table 2: Factors that influence in IT project outsourcing at GLC.

Category	Label	List of Success Factors in IT Project Outsourcing at GLC organization	Total marks (Agree & Strongly Agree)
Client	C1	Client adaptable in project requirement	36
	C2	Client customize solution	33
	C3	Client committed to project	36
	C4	Client make decision in project issues	34
Provider	D1	Provider understand client objectives	38
	D2	Experienced provider	36
	D4	Provider ability to make decision	34
Service	E1	Company frequently use outside supplier in areas such as HRM,IT services and financial accounting services	35
	E4	Client experience in outsource project	36
	E7	Clear project scope and defined deliverable	37
	E8	Supplier/contractor/service provider/vendor explain the project and where the	36
	E9	Provider establish in providing physical facilities, hardware and software	33
ITO Arrangement	F1	Service Level Agreement contents specific and precise	39
Partnership Capability	G1	Stakeholders commitment	38
	G2	Trust in working relationships	35
	G3	We and supplier contractor/service provider/vendor help out each other in	36
	G5	Effective communication	39
	G7	Technology transfer	34

Meeting objective 2: To map and index ten critical success factors in information technology project outsourcing at government-linked company. The author gets the average point from eighteen successful factors listed and index as Table 3.

Table 3: 10 CSFs in IT Project Outsourcing at GLC

Rank	Critical Success Factors	Index point from marks Agree and Strongly Agree
1	Service Level Agreement contents specific and precise	39
2	Effective communication	39
3	Provider understand client objectives	38
4	Stakeholders commitment	38
5	Clear project scope and defined deliverable	37
6	Client adaptable in project requirement	36
7	Experienced provider	36
8	Client experience in outsource project	36
9	Trust in working relationships	35
10	Technology transfer	34

5.4 CSF1: SLA Contents Specific and Precise

From the finding it is not impossible when the SLA tend to be the most important CSF in ITO project. It is because the basis for the successful outsourcing vendor and client relationship begins with the formulation of the contract. In order to lower a client"s operating costs, allow them to free up resources, and concentrate on their core business. Outsourcers must ensure that their arrangement with their client is carefully constructed and well-managed from the beginning (Los Angeles Times, 2002). The contract should address, of course, the specific products and services to be delivered, how and when they will be delivered, the terms of payment, and what you, the vendor, will provide if you fail to live up to the contract. It is also recommended that we and the client stipulate in the contract that in the outsourcing firm has access to what information, which has the authority, and how conflicts will be resolved. Also, make sure that the contract details the specific targets that must be met by the outsourcer and establishes a system for monitoring these targets throughout the relationship [27]. The contract must include clauses that refer to its evolution, reversibility, termination and penalization. Evolution- related clauses will help technology, price and contract scope evolve over time. Reversibility clauses have to do with both material and human reversibility [28].

5.5 CSF2: Effective Communication

The effectiveness of communication in this aspect is determined through the ability of the communication process to reduce risks in information flow and enhance trust building. Since human relationship is the basis for communication, the focal point is

narrowed down to how communication choices can be made during outsourcing so that knowledge creation, sharing, and re- use are optimal. In so doing, it is hoped that lessons learnt as well as best practices from the field may be codified in the form of a framework for communications between vendors and clients [29].

5.6 CSF3: Provider Understand Client Objective

It is important to make sure the client knows what is sought through outsourcing; it must also be guaranteed that the provider knows that client's objectives. Client-provider relationship management should basically focus on the provider's managing to achieve clients' aims [30]. Suppliers that have a good understanding and an interest in the outsourcing firm's business will be better positioned to help define mutually beneficial goals [31] that turn out to be essential for the middle or long term continuity of an outsourcing relationship.

5.7 CSF4: Stakeholders Commitment

The process of building total stakeholder commitment is challenging. Findings on intra- project communication and project commitment showed that the intra-project communication indicates the level of communication that takes place in projects. This is supported by [32] who asserts that in order to have employees committed to the project work, the project manager has to avail all the important information on the assignments of the project and what the project is all about. Findings on extra-project communication and project commitment showed that clients for the projects need to be aware of what is taking place in projects order not to be left behind and demotivated. So project managers have to ensure that they communicate the project information that is required at the different stages of the project inform of reports to the clients. This reduces resistances and stoppage in the provision of resources by the clients. This is supported by [33] who asserts that clients will be committed to provide more support to projects as long as the project communication environment is favorable and the project manager provides the relevant information to the project clients.

5.8 CSF5: Clear Project Scope and Defined Deliverable

If we are outsourcing a project to a third-party company, it is meaning that we are also outsourcing the day-to-day project management responsibilities. However, company still needs to have some level of involvement to validate that the project is going well and that the outsourcer will deliver within the expectations. This requires the outsourcer to provide meaningful and active feedback on the status of the project. It also requires the company to be comfortable with the overall processes that the vendor is using to manage the project.

5.9 CSF6: Client Adaptable in Project Requirement

Managing ITO project is more than a service to the client and their organization. A project leadership that can work with the client and other constituents to derive requirements will ultimately lead to the ITO project success. As a solution, partnering with a client to devise the right solution, thereby establishing an active partnership relationship rather than a passive "request and delivery" exchange will help the client adapt easily into the project.

5.10 CSF7: Experienced Provider

The success or failure of the outsourcing agreement can depend on this choice [28]. For this reason, prior to contract signature, a detailed evaluation and selection of potential vendors must be carried out. The provider must be chosen from a wide range of IT vendors [34]; to locate a potential outsourcing provider, an organization should investigate current outsourcing partnerships in the same sector as well as in related industries [35]. It is advisable to analyse the stability, quality and reputation of the provider chosen. After all, technology or business conditions may change during the contract's validity period, which means it is necessary to count on his stability and quality [36] along with his reputation [28] to make sure the provider will be a suitable one. The provider's stability and vocation for the future must materialize in the design of a long-range business plan; quality and reputation will be based on staff composition and the range of technological resources.

5.11 CSF8: Client Experienced in Outsource Project

Earlier research demonstrated that sophisticated clients those having built project before and specialized clients had a better chance of success with their projects than novices [37]. Other aspects of the client, such as the nature of client whether they are from public or private sector, they have an experience in project they can clarity of project mission, competence in terms of ability to brief, make decision, define roles, adaptable in project changes have been shown to influence the quality and success of a project. [38-41].

5.12 CSF9: Trust in Working Relationships

[42] identify the following factors as being measures of the relational success of an outsourcing arrangement. In their model these factors are assumed to be caused by the variables below:

Trust: In most cases the client and vendor are located in different countries, so there"s plenty of scope for (negative) opportunistic behavior on both sides. Given this, it is important that the two parties trust each other. As such, the degree of trust developed is a good measure of the relational success of a project.

Commitment: This refers to the effort that each side is willing to put in to maintaining the relationship. Very often this entails going beyond the contract. The ideal situation as far as commitment is concerned is when both parties have an exclusive arrangement to work with each other. Clearly, the degree of commitment is another measure of relational success. However, it isn"t clear to me that it is an independent factor because commitment depends on trust.

Conflict: All relationships are prone to conflict, outsourcing arrangements are no exception. However, working through and resolving conflicts in a mutually acceptable manner can strengthen the relationship. Conflict can be quantified (sort of) via the overall level of disagreement between the two parties over matters such as goals, procedures, timelines etc. Clearly, the level of conflict is also a good measure of the relational success of the off shoring arrangement.

Again, these three success factors are chosen without justification, omitting other possibly significant ones. For example, longevity of the relationship might also be a good indicator of the success of the relationship. Further, the causal connection between variables and success factors is far from clear; the authors" hypothesis a cause-effect relationship between the six relational dimensions and the three measures, but there is no justification offered.

5.13 CSF10: Technology Transfer

Outsourcing is motivated by the promise of strategic, economic and technological benefits. Strategic benefit is defined as „the ability of a firm to focus on its core business by outsourcing routine IT activities" [43]. Economic benefit is „the ability of a firm to use expertise and economies of scale in human and technological resources of the service provider and to manage its cost structure through unambiguous contractual arrangement" [44-45]. Finally, technological benefit is referred to as „the ability of a firm to gain access to leading-edge IT and to avoid the risk of technological obsolescence that results from dynamic changes in IT" [43, 46-47].

6. CONCLUSIONS

This research project aims to identify successful factors that influence information technology project outsourcing at government-linked company and to evaluate and index ten critical success factors in information technology project outsourcing at government-linked company. IT project outsourcing success is a major concern as it represents one of the most attractive IT acquisition approach by many business organizations. In the analysis of Project Leader perception on overall IT outsourcing success, the findings revealed 10 important critical success factors : Service Level Agreement contents specific and precise, Effective communication, Provider understand client objectives, Stakeholders commitment, Clear project scope and defined deliverable, Client adaptable in project requirement, Experienced provider, Client experience in outsource project, Trust in working relationships and Technology transfer. When the SLA is in first rank it shows that perception on SLA is very significant predictor to the success of outsourcing. Support by researcher that the successful outsourcing vendor and client relationship begins with the formulation of the contract. Secondly ERP and CRM is type of IT service that most handle by Project Leader at GLC. Through CSF, only ten factors are indexing as a most critical and the others factor can be applied to other organization. The defined CSFs are a strong indicator of the possibilities of success of an ITO project. However, to ensure efficient use of these CSFs for project monitoring and related decision-making processes, all answers need to be converted into measurable information.

This study is not ended. While information from Project Leader should provide a high level of confidence in the success of IT project outsourcing, biases could still exist due relying in group variables. Finally, results of this study may not be completely generalized and may have to be carefully interpreted since the setting was restricted to two GLC organizations. The future work maybe the author or others could investigates

IT outsourcing trends in GLC, or investigates the CSF in terms of technology savvy practices in IT outsourcing at GLC.

7. ACKNOWLEDGEMENTS

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USING GAMIFICATION in DESIGN OF APPLICATION S/W   FOR FINAL PROJECT COURSE MANAGEMENT CASE STUDY AT INFORMATIC ENGINEERING PASUNDAN UNVERSITY

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Keywords: Gamification, SAPS, Final Project Course, Game Design

Abstract. This paper describe idea of game design element in application software final project management system at informatics engineering Pasundan University. The idea base on SAPS model (Status, Accesss, Power, and Stuff). This gaming is goal oriented, which is the goal is indicated by the Red Badge. It means that student have passed of all step of final project core activity. The gaming idea intend for improve cognitive engagement and behaviour engagement. Cognitife engagement will increase knowledge level about final project process that have contribution for improve internal motivation. Eventually they improve behaviour engagement for final project process completion. For cognitive engagement, gaming is implemented through learn activity for gain knowledge level status. This status will unlock work as tutor activity to collect point. The point is needed for unlock stuff ("golden ticket") for get special service about core activity or player power. Knowledge level is needed for unlock core activity, which is steps to achieve the goal. Improvement behaviour engagement be pursued through using appointment game mechanic for maintain supervising attendance and ownership for attract students desire to add regularly the component of final project report book. Supervisor approval is needed for judge the progress of final project report book and for the attendance. Level of attendance and level of progress is required to unlock some core activity. Rule of game be declared in "Access" as and-or graph. Node represent the activity and edge represent status – value. Each activity have impact to value of the status as decrement or increment process.

1 INTRODUCTION

Final project or thesis is a subject that has specificic requirement, those are 1) Individual learning (opposite of classical learning) 2) endless like research activity, needs deeply to define the scope of the problem, purpose, and finalizes it at allocated level or time. 3) Role of administration process which consists of registration process, conducting research, preparing reports, and evaluations procedure.

One consequence of the nature of the individual learning is to only understand that she/he is ready to apply regulations of final project and take thier responsiblity, honesty, confidence, hardworking as students by having good interpersonal skills for communication with supervisors.

Helping from final project"s manager will be done if there is complain from student or supervisor or after evaluation process. Meanwhile evaluations conducted classical and is usually done in a relatively loose milestones, ie once a semester. So, the manager cannot know what the student"s problem quickly. Here, it was complete solitude for the student.

Systemic Impact of those was the average final project's completion time of 2 - 3 semesters (but usually target is 1 semester only). The individual impact related is is most of them The individual impact related with substantive material is most of them overwelmed by stress, fear, anxiety, loneliness, stuck in a situation, and then frustration, by loosing their motivation. The other case, because seldom go to campuss, they often not applying about administrative procedures and schedules. The last ones problem sometimes have significant impact on their study.

In this paper will be described design concept of application software for support final project management system with gamification approach. This approach be intended for overcome those problems. First, encouraging students face problem in the completion of their final project with highly motivation. Second, forced them met with their supervisor regularly. Hopefully   from the interaction they will get guidance and enlightenment for overcoming their problems. Third, final project's (FP) manager can monitor progress of students final project easily. The outcome is evaluation and action plan to solve problem or improve the process can be taken quickly. Fourth, making all of the activity can be done by fun. Ilustration of this s/w requirement based on system requirement is described at figure 1.
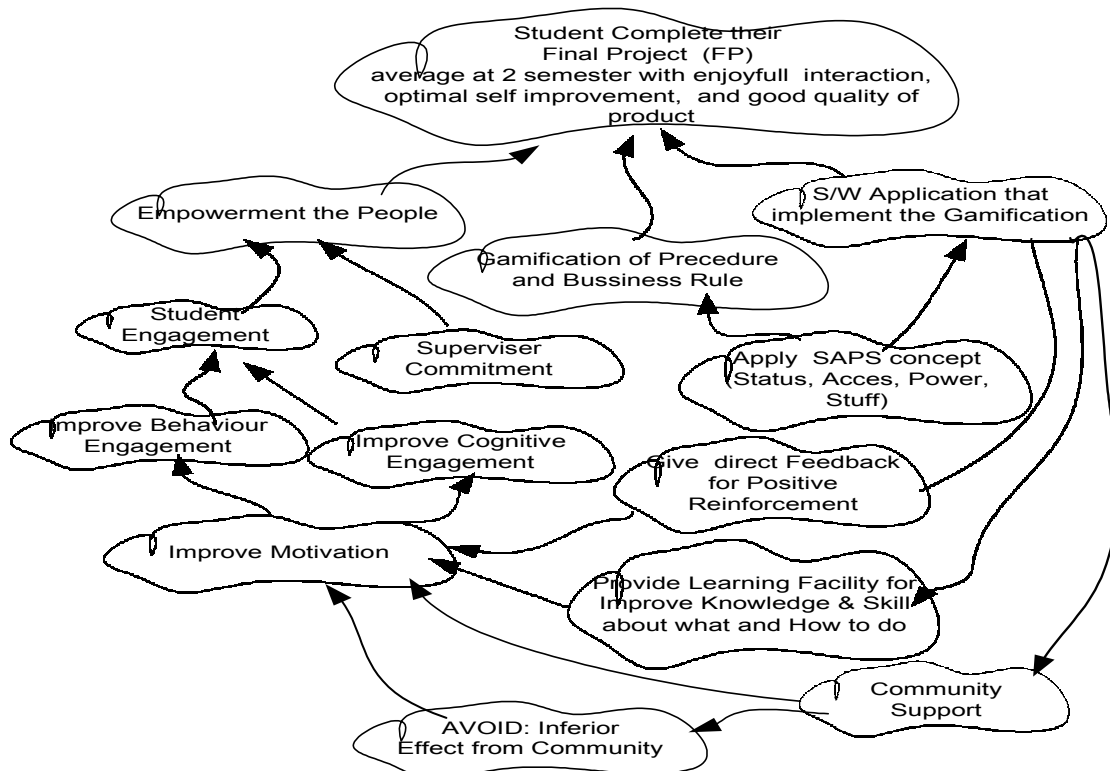

Figure 1 System Requirement for "More Fun Final Project Process" [5]

Gamification is the use of game design elements in non-gaming contexts that promise to improve user engagement and acquisition of knowledge by user through simulated model of the real world. In this paper will be elaborated the idea of game concept in application software for final project"s management system. Implementation of gamification starts from the analysis of business processes final project, literature review about game design element, especially about game mechanic, description of the basic idea of the game in the final project management system using the SAPS (status, acces, power, stuff) model , detailed descriptions of the game design elements, ends with describing of system use case.

2 LITERATURE REVIEW

Gamification is mean using game design element in non-game context [1]. Element of game design is represented in five abstraction levels. There are game Interface design patterns, game design patterns or game mechanics, design principles and heuristics or „lenses" , conceptual models of game design units, game design methods and design processes. Leaderboard, badge, progress are game design elemen in game interface level . Achievement , appointment, cascading Information theory are are game design elemen in game design pattern level. SAPS is one of game design pattern level.
SAPS (Status, Access, Power, Stuff) is a concept to make fun, engaging, and motivating game. SAPS is proposed by Gabe Zicherman [3]. Status represent player position relative to the standard or to the other player. Status is used to recognize user effort or performance, so it must sticky and least expensive. Access is the rule that defines the rights of players to perform various activities and use a variety of services in the game. Power granted to players who have a certain status in order to facilitate the other players are involved in the same game. Stuff is something or free facilities granted to the player as a reward for achievement of their performance
The purpose of using Gamification is to improve user engagement and user experience [2]. Engagement is great deal   connection between user with something like product or service or person or some idea [3]. In the context of website or mobile application s/w, there is an idea to quantity the engagement. The quantification is built by interrelationship of some metrics. The metrics are   frequency, recency, duration, virality, and ratings.   Frequency is about how many users make conection with the object (product, service, person, idea). Duration is about how long, users spend time in each their connection. Recency is about how much shorter the time gap between the last visit to the present. Virality is about how many the others users who are are influenced by a user to be engaged in the object.

3 BUSSINES PROCESS OF FINAL PROJECT COURSE MANAGEMENT

Primary activity in the final project course management system are supervising process and evaluation process. Evaluation process consists of three sequentially stage, there are proposal, seminar and siding(final evalutioan). The secondary activity include socialization final project procedure   and   research area, registration, supervising assignments, and monitoring and evaluation.

The outcome from the monitoring and evaluation process is used to determine whether or not to do a special program for the acceleration of final project for students belonging to a particular problem. In addition to, the final out come of the results must be re-checked again in order to evaluate the performance of the supervisors. By according each activity, the manager of final project will determine if the meeting will on or off by the time allocated, waiting the last annoncement from committee of final project. Illustration of the system can be seen use case diagram in Figure 2
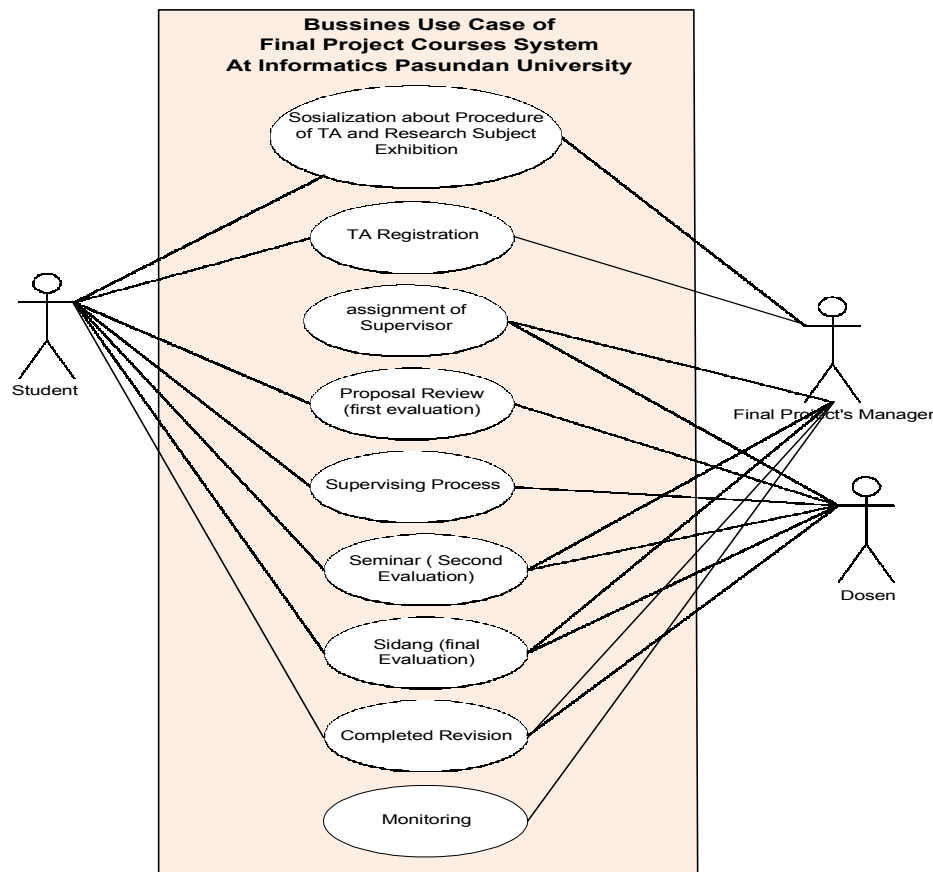
Figure 2 Bussiness Use Case of Final Project Course Management at Informatics
Engineering Pasundan University

Business process that have been described has a sequence that can be seen in Figure 3. The Sequence can be run on more than one semester, maximum in 10. Registration must be done at each early semester, as requirement to get all of the services in final project information system.
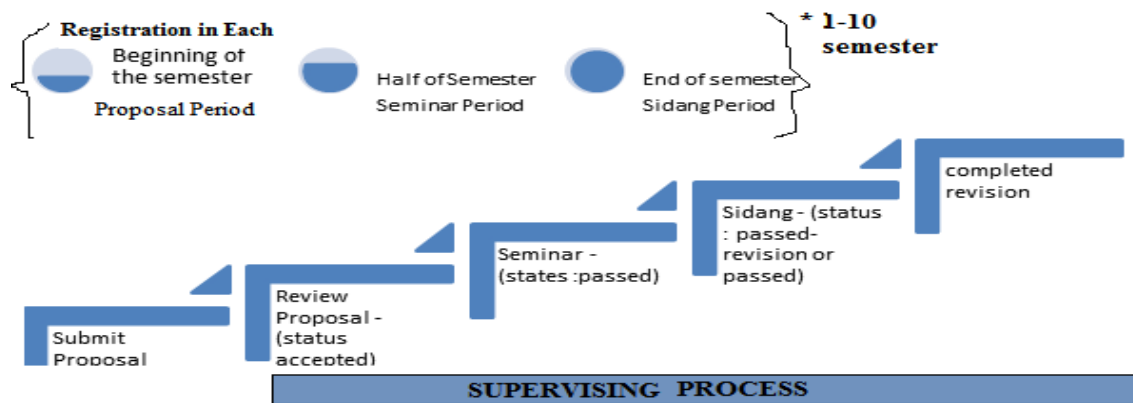
Figure 3 time sphere of final project business-process

4 THE GAME DESIGN CONCEPT

The heart of idea is inferenced from requirement at picture 1and SAPS model. These are about coginitif engagement, behaviour engagement , and funny.

Cognitive engagement, aimed to make students master about what it is and how to do FP. The impact is if the students understand well about the "what" and "how" then they will become clear goal. According to expert opinion, goal clarity is very influential on motivation. Here is necessary to the process of socialization FP gamification. The idea is to provide a feature applied learning center and then worked as a tutor on FP for dummy student or fellow participants. Requirements to be a tutor, must have a certificate from the learning center. Points are collected from the work is a prerequisite for administrative services. If the point exceeds a certain threshold, can be exchanged for gold ticket. Work became tutor intended to enhance students' understanding of FP detail. Here taken the concept that learning by teaching was very effective.

Behaviour engagement, intended to shape the behavior of students to be diligent and consistent in doing the supervision. From this it is expected that completion of the FP is guaranteed. In the designed system, the student must meet with a supervisor at least once a week. The quality of the mentoring process is reflected in the progress of FP books and other artifacts according to plan. Gamification is applied can be seen in table 1

Table 1 Game Mechanic [4]

Behaviour Engagement Aspect	Game Mechanic	Note	Status
Frequency of supervising	Appointment	Supervising is in each week 1 semester: 14 times	Supervising (blue, green, yellow, red) If staus is Blue or Green Then get FreeLunch
Quality of supervising activity	Ownership of FP"s Artifac Progress in each artifac	Artifac consist of Refference Proposal Literature Review	Progress of Artifact that have been collected Badges

	Achievement with spesical badges for each step (figure 3)	Problem Analysis Design of solution Etc, can be defined by user as goal The progress is filled by Supervisor Badges is given by system	

Game design concepts that be used in this proposed application s/w is the "SAPS" (status, acces, power, and stuff). The ide of the gamification can be seen in figure 4. The goals in this game is <u>black badge</u>. The badge is mean student have completed revision of their final project"s book dan they must get graduation certificate. The goal can be achieved through core activities but need execution of non core activities at first. Each core activity will have prerequisites, that is a particular combination specific value of the "status". Each activity can have an impact i.e updates or adding elements of status.

The change value of status is required to unlock another activity . It can be seen that relation inter-activity form the prerequisite graph based on the spesific value of status.

Rules regarding the connectivity shall be incorporated in the "access". "Power" and "Stuff" is gaming aspect to give rewards of the player (student) achivement. In the design of this game, "stuff" implemented by "gold ticket ". This Ticket can be used for getting special services . Player can exchange a certain number of the points have been collected with the "stuff". "Power" is applied by giving freedom to the player to give their golden ticket or a point to the other players / students.
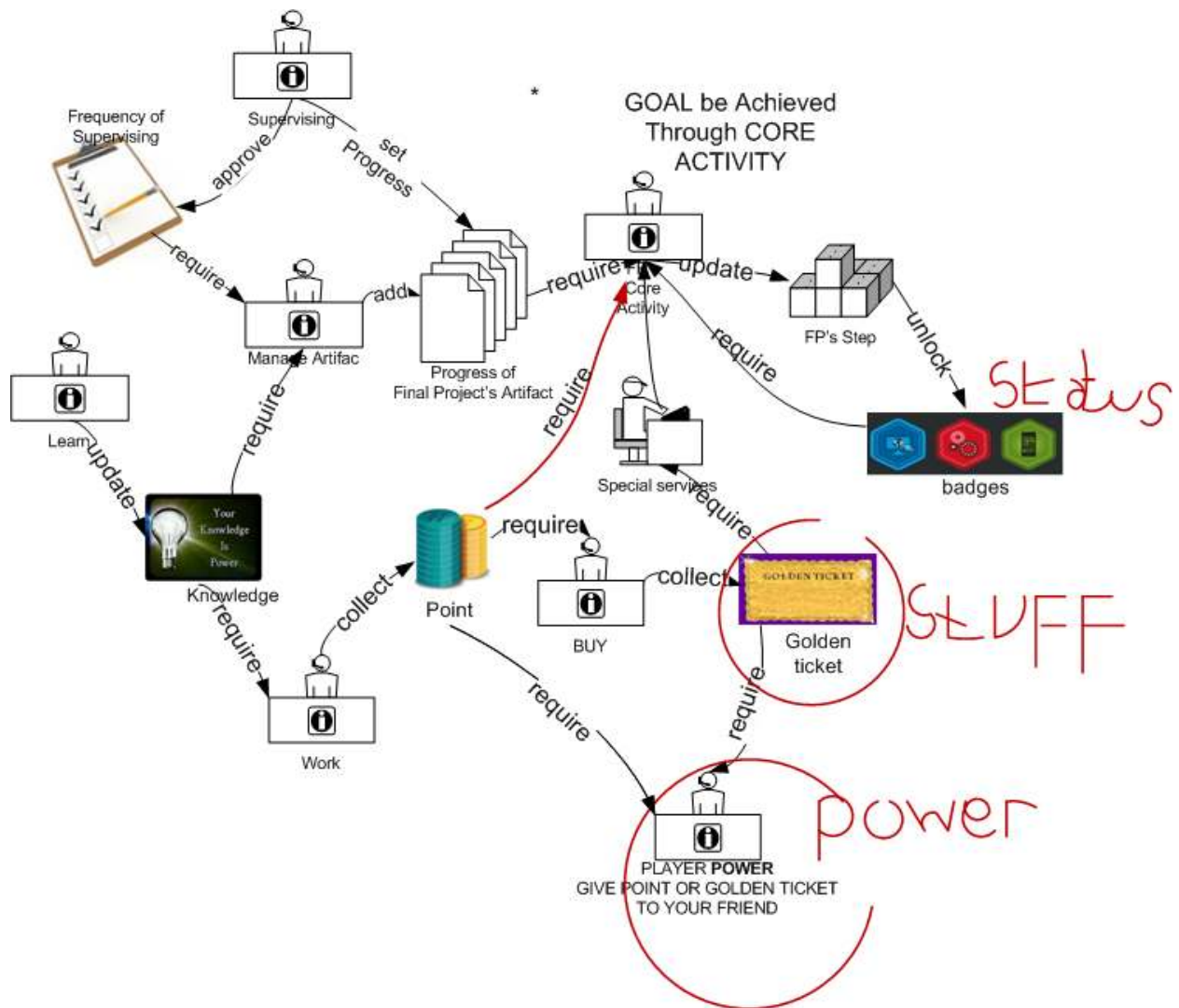
Figure 4 The Game Design Concept

4 DETAIL OF GAME DESIGN ELEMENT

4.1 Status

There were 7 kinds of status are used to represent the performance of a student in final project course, ie (1) registration, (2) knowledge levels of, (3) frequency of Supervising activity, (4) badge, (5) the final project formal step (6) poin, (7) progress of the artifact (final project book). Knowledge levels and point are used to encourage cognitive engagement. The rest are giving benefit to encourage behavior engagement. If the frequency of supervising activity is high and the levels of knowledge is high too then the progress of the artifacts FP should be high. Level of knowledge will result in increased opportunities to collect points from working as a tutor. While working as a tutor will also indirectly increase the knowledge. List of status detail described at tabel 2.

Table 2 list of status

No	Status Name	Domain	note
1	Registration	None, Expire,Active	
2	Knowledge Level	1,2,3,4,5	
3	Supervising Activity	0-100%)	(calculated by once a week , 14 times in a semester
4	Badge	white, yellow, orange, red	white= proposal is accepted . Yellow=seminar is passed, orange = sidang is passed, red= revision of final project completed
5	Core Activity Step		
5.a	Step-proposal	none,submitted,scheduled,revision, accepted	
5.b	Step-seminar	none,submitted,scheduled,revision, passed	
5.c	step-sidang	none,submitted,scheduled,revision, passed	
5.d	step-revision	none,completed,printed,signed	
6	POINT	1-10000	collected from work
7	Artifact Final Project		Total weight of 7.a until 7.g must be 100%
7.a	Bibliografy(Bibl)	weight=1%-100%, progress =1%..100%	Progress is set by supervisor
7.b	Literature Review(Lire)	weight=1%-100%, progress =1%..100%	
7.c	Problem Analysys(ProbA)	weight=1%-100%, progress =1%..100%	
7.d	Designed Solution(Dsol)	weight=1%-100%, progress =1%..100%	
7.e	Developed Solution(Vsol)	weight=1%-100%, progress =1%..100%	
7.f	Analysis of Solution(Asol)	weight=1%-100%, progress =1%..100%	
7.g	Conclusion(Colu)	weight=1%-100%, progress =1%..100%	

Measuring levels of knowledge is based on mastery of the topics. Topics are classified into five types, FP artifact content, methods and tools that was required to complete the FP, non-technical aspects such as soft skills, FP administrative procedure, and academic rules. Each category is classified into the knowledge of WHAT and HOW. HOW Knowledge is more depth and detail than the WHAT. The number of topics may vary and evolve, but were used as a reference to determine the levels of of knowledge is a percentage. Table 3 and 4 provides an illustration of how the classification and leveling of the knowledge was made. Examples of learning topic can be seen in Table 4.

Table 3 Leveling of Knowledge.

Know ledge Level	CONDITION				
	FP's Artif	supported tools and method	Administr ation Procedure	Academic Rule	Non Technic Factor
1	10%		5%	5%	5%
2	20%		10%	10%	10%
3	30%	5%	15%	15%	20%
4	35%	10%	15%	15%	20%
5	30%	20%	15%	15%	20%

Table 4 Classification and Calculating Knowledge Level

classification	FP's Artifact	supported tools and method	Administrati on Procedure	Academic Rule	Non-technics factor	Total
What	X1	X2	X3	X4	X5	N1%
How	Y1	Y2	Y3	Y4	Y5	N2%
	30%	20%	15%	15%	20%	100%

Table 5 Example Subjects Of Knowledge about Final Project

Knowledge	Classification	
Journey of Final Project	Brief	
Structure of Final Project Report and Writing	Artifact	WHAT
Content of Proposal	Artifact	WHAT
Content of Literatur Studi	Artifact	WHAT
Content of System Analysis	Artifact	WHAT
Content of Desain Solution	Artifact	WHAT
Content of Develop Solution	Artifact	WHAT
Conten of quality analysis of solution	Artifact	WHAT
How to write Abstract	Artifact	HOW
How to extract FP's Report to Jurnal	Artifact	HOW
Lesson Learned about maintain communication with Supervisor	Non-Technics	HOW
How if I am in the dark	Non-Technics	HOW
How if I am stuck in programming problem	Tools & Method	HOW
How if My report always doesn't match with my supervisor's requirement	Tools & Method	HOW
How if I am stuck in statistik analysis problem	Tools & Method	
How if I am late for registration	Administration	HOW
How if I am in the 14 th semester (last semester)	Academic Rule	HOW
How if I want to graduate this semester	Administration	HOW
Procedure for registration	Administration	WHAT
Procedure for proposal review	Administration	WHAT

4.2 Access

Access is relation between the status of the activity, in which every action may be done if a combination of value-status meets certain conditions, and after the action is executed he will update one or more status to the specified value. Access then modeled as a name-precondition-postcondition.

```
ActionName(parameter)
PreConditon
      {Status= Value | Status =
          function(Value)}
PostCondition
          {Action( status,Value)}
```

Name of action is defined with specific name parameter. Table 6 described detail kind of action.

Table 6 Action list

Num	Activity	Parameter	Example
1	Registration	semester,date	registration(20122,"1/1/2013")
2	learn	topic	learn("content of proposal")
3	work	position	work("level1")
4	work-forfriend	position	work-forfriend(ID of friend)
5	apply	step of core activity, kind of services	apply(proposal, reguler)
6	scheduling	step of core activity, kind of services	scheduling(proposal, reguler)
7	done	step of core activity, kind of services	done(proposal,overschedule)
8	passed	step of core activity, kind of services	passed(proposal)
9	request-supervisor	name of supervisor	request("adi nugraha")
10	add-artifact	name of artifact	add-artifact(bibliografi)
11	set-artifact	name of artifact , progress value	set-artifact(proposal,100%)
12	add-artifact-content	name, title, number of refered	add-artifact-content(bibliografi, "xxx", 2)
13	Decrement	status, value	decrement(point, 200)
14	Increment	status, value	Increment(goldenticket, 1)

```
Apply(proposal,regular)
PreConditon
   Step.proposal="none"
   Registration="active"
   Knowledgelevel="2"
   Artifac.bibl= greatherthan(30%)
PostCondition
   update(step.proposal,"submitted")


Scheduling(proposal,reguler)
PreConditon
   Step.proposal="submitted"
   Registration="active"
   Knowledgelevel="2"
   Artifac.bibl= greatherthan(30%)
PostCondition

update(step.proposal,"scheduled")
```

```
Done (proposal,overschedule)
PreConditon
   Step.proposal="scheduled"
   Registration="active"
   Knowledge="2"
   Artifac.bibl= greatherthan(30%)
   FreqSupervising = greatherthan(14%)
PostCondition
   update(step.proposal,"revised")
   update(badge,"white")



Passed(proposal)
PreConditon
   Step.proposal="revised"
   Registration="active"
   Knowledge="2"
   Artifac.bibl= greatherthan(30%)
   FreqSupervising = greatherthan(14%)
PostCondition
      update(step.proposal,"accepted")
      update(badge,"white")
```

4.3 Power

In the proposed game design, there is only one type of activity that fall into the "power", which give points or golden ticket to the final project course participants that their registration status is active. For golden ticket transfer, the precondition is ticket giver has more than one. If the point are given, then the requirement is the number of point already owned more of the 500 and the transfer process must leave a minimum of 200 point for the giver.

```
Give("golden ticket",number, <ID of the friend>)

Give("point",number, <ID of the friend>)
```

4.4 Stuff

As mentioned in the previous paragraph that in this gamification, stuff is implemented as a "golden ticket". Furthermore golden ticket may be used to request special services, its kinds are (1) asking for guidanced by a certain lecturer (2) obtain administrative services even though the service has been closed (3) redcarpet service(first class services), no need to queue and all procedures to be carried out physically be assisted by the clerk.

6 . System Use of Application S/W for Final Project Management Using Gamification System Task of this gamification S/W application for Final Project management is described in use case diagram at figure 5. There are many task that is not mentioned in bussines use case of final project management but they can mapped to the bussines use case. Mapping analysis disecribed in tabel 7.

```
Buy("goldenticket")
PreConditon
        Knowledge=greatherthan(2)
        Registration="active"
        Poin= greatherthan(500)
PostCondition
        Increment(goldenticket,1)
        Decrement(poin,500)
```

Figure 5 System Use Case
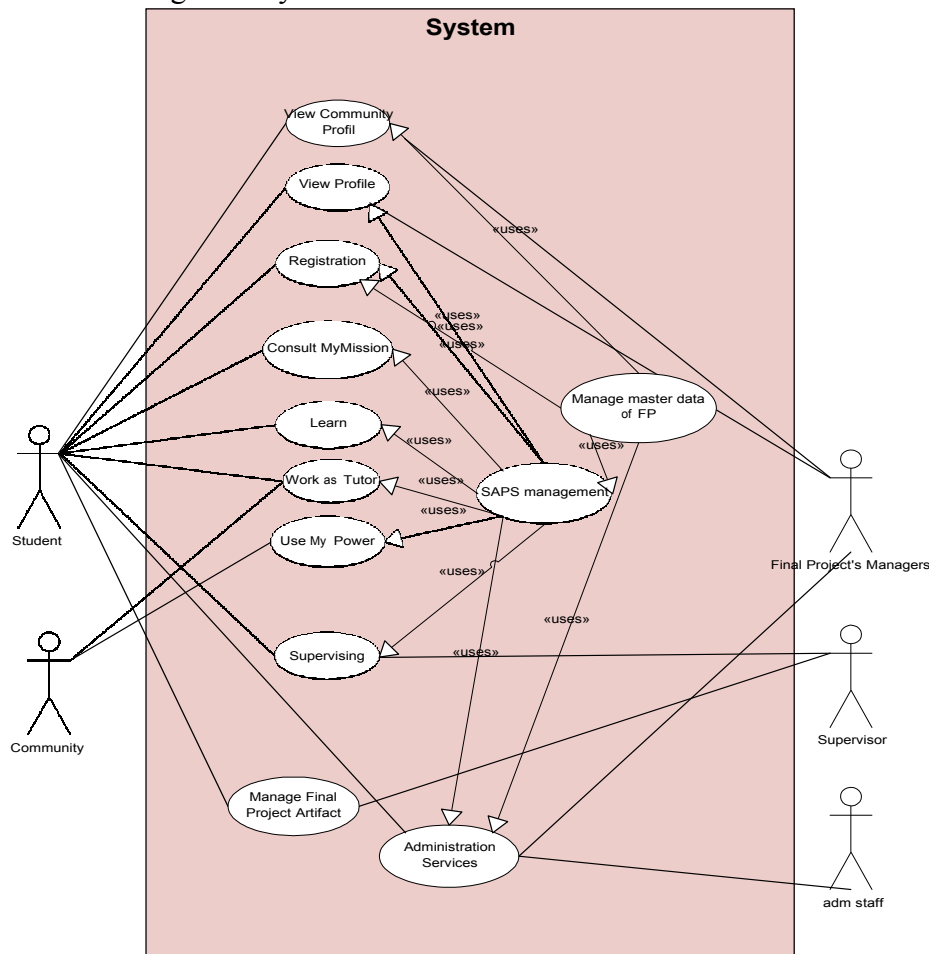
Table 7 Mapping of Current Bussines Use Case v.s System Use Case Using Gamification Concept

Bussines Use Case	System use case of Application Using Gamification Concept	Game Mechanic that can be implemented
Sosialization about Final Project content and Procedure and Research area	Learn	Cascading Information Theory ,Discovery
	Work As Tutor	Cascading Information Theory, EverQuest, Community Colaboration, and Virality
	Consult My Mission	Cascading Information Theory
Registration	Registration	
Assignment of supervisor		Bonus
Proposal Review		
Seminar	Administration Service Management , Manage Master Data of Final Project	
Sidang		
Completed Revision		
Supervising Pocess	Supervising	
-	View Profile	Status
-	View Community Profile	Virality, Community Colaboration
-	SAPS Management	
-	Use My Power	Virality, Community Colaboration
-	Manage Artifact of Final Project	Ownership

7 . CONCLUSION

- MDA a conceptual model of the game defines that there are 3 elements of game design, those are the mechanic, dynamic, and aesthetic. In game design elements that be described in this paper did not include the aesthetic aspect. So to be implemented in real application still requires the development of the aesthetic element. SAPS only accommodate mechanic aspects. Dynamic aspects have been defined in the form of players journey from beginning to reach the goal, based on steps in the business process of final project

- Collaboration between business processes with elements of game design is very interesting to further study. In this paper the business process final project can be combined harmoniously with the rule of the game. Seen from the business process sequence can still be maintained by playing pre-conditions and post-conditions. The socialization process can be implemented even better, because it ensures that every students be forced to understand the material.

- Results from the real work of the one student working on his final project are represented well through final project artifact progress. Which is interesting to examine how the characteristics of systems and business processes are suitable to apply gamification? Or when viewed upside is there a certain system characteristics that indicate that gamification is not suitable to be applied.

- Representation of the "access" that was designed in this paper was inspired by the principle of representation of action in the artificial intelligence by planning, namely PDA (precondition, delete, add). Each sub-sentence in it is expressed in the form of first order predicate calculus.

- The difference is in the planning, post-conditions have only two actions, namely delete and add. While at this gamification, the majority of the post-condition is to update the status. However this needs to be studied further, as it will affect the suitability of the use of planning algorithms in searching the solution, especially when students access the menu about "consult my mission". In this menu, system must give intelligent mechanism

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IMPLEMENTATION AND ANALYSIS STEGANOGRAPHY TECHNIQUE OF LEAST SIGNIFICANT BIT (LSB) ON IMAGE AND AUDIO FILE

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Keywords: *stenography, multimedia, information embedding, LSB*

Abstract. *Rapid evolution of digital media utilization in various aspect makes greater demand of an ensured secure information system delivery. One of many ways is stenography. Stenography is a method for embedding a secret information into another object or medium.*

With stenography, information is hidden in a particular way that makes the secret information invisible, this kind of method is also known as Information Hiding. This method is quite different with cryptography, which encrypt the information and makes it unreadable without the key or password used, but it is still visible and unhide.

This project uses Silent Eye v.0.4.1 software and developed using C++ programming language implementing the method of Least Significant Bit (LSB) stenography to hide information behind a multimedia file. The multimedia file used is an image and audio file as the carrier.

The usage of stenography is expected to improve security in information delivery, in order to protect and hide it in a multimedia file. It can also help the protection process of electronic patents and copyrights.

1 INTRODUCTION

Information security in this digital era a very vital role in various aspects of life, especially for kinds of information that considered more valuable than general information. For instance information related to business deals, national security, or other confidential public matters information. Such as information definitely valuable for certain party. Therefore security information, in this case stenography is needed to ensure the safety and security in information delivery.

Stenography itself is one way to place information behind another information or even visibly a meaningless information, unless for those who comprehend the secret. The technique of stenography uses two different mediums simultaneously, which one of the medium is the secret file and the other acts as the carrier file.

However, it must be noticed although terms of carrier is used there will not be any process of information transmission or reception, the term is given to a file which is inserted the secret file. In this project a software named Silent Eye v0.4.1 is used, it is developed in C++ to implement stenography by using the method of *least significant bit* to hide information in a multimedia file.

The use of stenography is expected not just to increase the security of information delivery but also to help the process of protection of electronic creation patents [1].

By using stenography the secret message is inserted into common and unsuspicious information then delivers it securely with no one's awareness of any secret information existence [2].

2 STEGANOGRAPHY

Stenography is built in two forms, they are the message which will be embedded and the medium of embedding. The medium can be a regular text message, image, voice or video. As for image file acts as the carrier is called cover image.

Message hiding formed as text or image into a digital image will affect the quality of the image. There are three criteria should be noticed in information hiding [3] :

a. Bitrate, is the amount of data which must be proper to be hidden
b. Fidelity, is the quality of the cover image which shouldn't degrade too much
c. Robustness, is the secret information endurance of manipulation that can be done to the image (such as the changes of contrast, sharpness, density, rotation, zooming, cropping, encryption, etc)
d. Recovery, is the recoverability of the hidden data.

Three different aspect in hiding information system is against to each other are: capacity, security, dan robustness. Capacity is based on the amount of information can be hid in a medium, security is to prevent anyone to detect the hidden information, and robustness is the modification of the stego medium to endure from any destructive attacks.

Information hiding is usually related to watermarking and stenography . the main purpose of watermarking is to reach higher level of robustness. It is impossible to skip watermarking process without degrading the object quality. Stenography on the other hand is aiming for capacity and high security, which is often known that hidden information can be easily revealed. Even a slight modification to the stego medium can destroy it. The basic model of embedding is as illustrated in the following figure 1. [4]
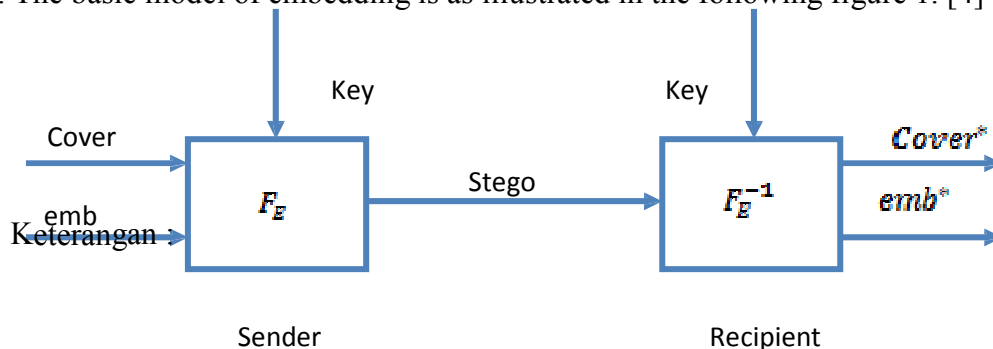
$F_E^{\square}$	Steganography function embedding
F_E^{-1}	Steganography function extracting
Cover	Cover data in which emb will be hidden
Emb	Message to be embedded
Key	Parameter of $F_E^{\square}$
Stego	Cover data which embedded message

Figure 1. Embedded Basic Model

3 LEAST SIGNIFICANT BIT (LSB)

In computing world, Least Significant Bit (LSB) is the bit position in biner integer that gives a value to a unit, as an even or odd value. LSB also considered as the most right bit related to the bit writing which is less useful tend to be placed on the right as showed in below figure 2. [5]

1	0	0	1	0	1	0	1
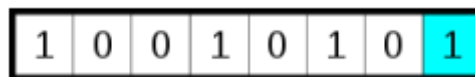
Figure 2. Right-most Digit

LSB has a unique characteristic which is able to transform immediately on any changes. For example if 1 (00000001 in binary) added to 3 (00000011 in binary), the result will be 4 (00000100 in binary) three of the Least Significant Bit will change (011-100) and reversely, the three significant bit will remain (000-000). LSB is often used in *pseudorandom generator, hash function* and *checksum* calculation. LSB study implementation in stenography is the usage on digital image processing. This is done by learning the rainbow pattern on the digital image when RGB bit is changed as shown on figure 3 below.
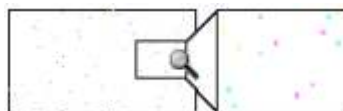
Figure 3. Rainbow Pattern

After the rainbow pattern is fetched then figure 4 will show the next process which will omit the rainbow pattern for the information embedding into it.
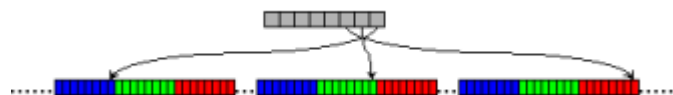
Figure 4. Making Process bits and bytes

These process is done in every byte of information:
a. Fetch a pixel
b. Fetch the first bit of the information byte
c. Fetch one color component of a pixel
d. Fetch the first bit of the color component

e. If the color-bit is different from the information-bit, a set/rest will occur
f. Do the same process for the other seven bits

4 TOOLS

4.1 Programming C/C++

C++ (pronounced "see plus plus") is a statically typed, free-form, multi-paradigm, compiled, general-purpose programming language. It is regarded as an intermediate-level language, as it comprises a combination of both high-level and low-level language features. Developed by Bjarne Stroustrup starting in 1979 at Bell Labs, it adds object oriented features, such as classes, and other enhancements to the C programming language. Originally named C with Classes, the language was renamed C++ in 1983 as a pun involving the increment operator. [6]

C++ is one of the most popular programming languages and is implemented on a wide variety of hardware and operating system platforms. As an efficient compiler to native code, its application domains include systems software, application software, device drivers, embedded software, high-performance server and client applications, and entertainment software such as video games. Several groups provide both free and proprietary C++ compiler software, including the GNU Project, Microsoft, Intel and Embarcadero Technologies. C++ has greatly influenced many other popular programming languages, most notably C# and Java. Other successful languages such as Objective-C use a very different syntax and approach to adding classes to C. [7]

C++ is also used for hardware design, where the design is initially described in C++, then analyzed, architecturally constrained, and scheduled to create a register-transfer level hardware description language via high-level synthesis.

4.2 C-Make

Is an executable application with command-line interface. This application is used to configure C/C++/QT 4 script. Every project which will be compiled using C-Make is adjustable as required. C-Make is a multi platform application that can run on any operation system, which makes it simple and power full. [8].

4.2 Silent Eye

This research uses Silent Eye tool, which is an open source application and can be run on any platform. This application is made by C language and compiled by C-Make. Below is the specification of Silent Eye [9]:

Version	:	0.4.1
Author	:	Anselme Chorein
Contact	:	anselme@chorein.fr

Image and audio file supported by Silent Eye:

Image	Audio
JPG	WAVE
BMP	

The image to be embedded will be processed by using the LSB method. The message converted into binary, will be inserted represents RGB pixel.
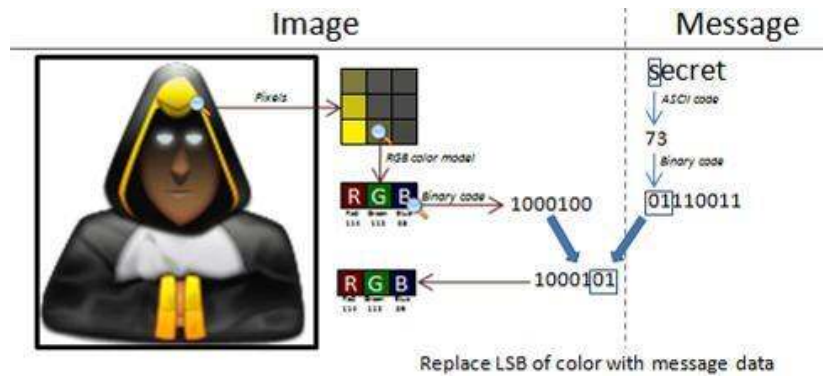

Figure 5. Binary Insertion into RGB

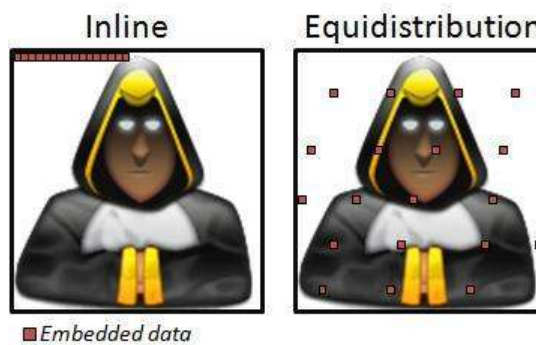The message can be hidden at any position of RGM image.

Figure 6. Place or Location of Binary Insertion into RGB

As for the bits amount to be read and the file size implanted is saved on the header. The header itself has 32 bit length. Below is the header position:

Figure 7. Binary Insertion Information

Main display :

Figure 8. Silent Eye Main Display

5 ANALYSIS AND TESTING

This implementation of stenography with LSB method is for study purpose, therefore the application has the following limitation:

a. The image file used is only in JPG and BMP format. No other image format supported

b. The audio file used is only in WAV format. No other audio format supported

c. The header embedding can be done on either Top, Buttom and signature

Before testing, a scenario is determined in order to evaluate the features of Silent Eye application, but it can be done in short time regarding to many other evaluation should be conducted. The scenario determines the files used in the experiment, showed in table 1

No	File Name	Type	Size
1	Futsal.jpg	Digital Image	591 Kb
2	Sampul.bmp	Digital Image	14 Mb

Table 1. File Used in testing

Beside digital image file, information embedding is also available on WAV audio format but in this research it is not experimented due to time schedule.

The embedded image file is saved in JPG or BMP format depends on the options selected, doesn't matter whether its BMP or JPG, which means if the original file is JPG then the output result of the embedding process can be save in JPG or BMP format and vice versa. The following figure shows the analysis phase in this research:
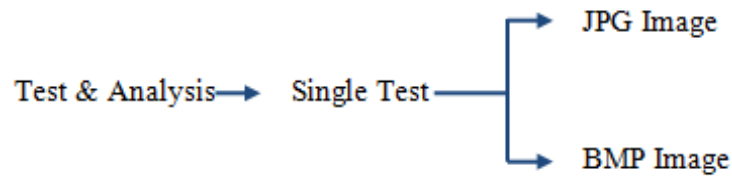
Figure 9. Analysis Step

The first implementation is uses a JPG digital image file.
Embedding data with stenography:

Key	:	Turnamen Futsal
		Tim GSI Business Support Bank Danamon
Message	:	Indonesia
Header Position	:	Top
Luminance Interval	:	10
JPEG Quality	:	100%
Media Encoding	:	JPEG

Before Embedding   After Embedding

Figure 10. Image of JPG Format

Second implementation uses BMP digital image file.
Embedding data with stenography:

Key	:	XA MKom
Message	:	Gadis Sampul XA MKom UBL
Header Position	:	Signature
Use Pixel Color	:	RGB
Image Quality	:	100%
Media Encoding	:	BMP
Data Distribution Mode	:	Equidistribution
Bit(s) per pixel per color	:	1

Before Embedding   After Embedding

Figure 11. Image of BMP Format

In this evaluation the effectiveness of embedding process will be observed by using 010 Editor, an application used to reveal the binary form of the carrier used before and after the embedding.

At this stage, an observation to BMP and JPG file is conducted. Comparison of those two formats is shown in figure 10 and 11. From the comparison of the binary structure below it is seen that the information is spread embedded entirely to the carrier file, not allocated to a specific block which is worried to indicate the hidden information. With this way any unauthorized party is expected to halt their effort to disassemble the information by learning the binary structure of the stego-file.

Stenography has various kinds of program method and implementation. There are some stenography software available for download at *www.1ecs.com* on the stenography tool (hidden message) section.

The use of data embedding with LSB method is done by preparing a bit current, then determine the LSB from the cover base on the value of the second file or the data file will be carried. The distance between two hidden bit in sequence become the amount of sample of this method and controlled by a random value.
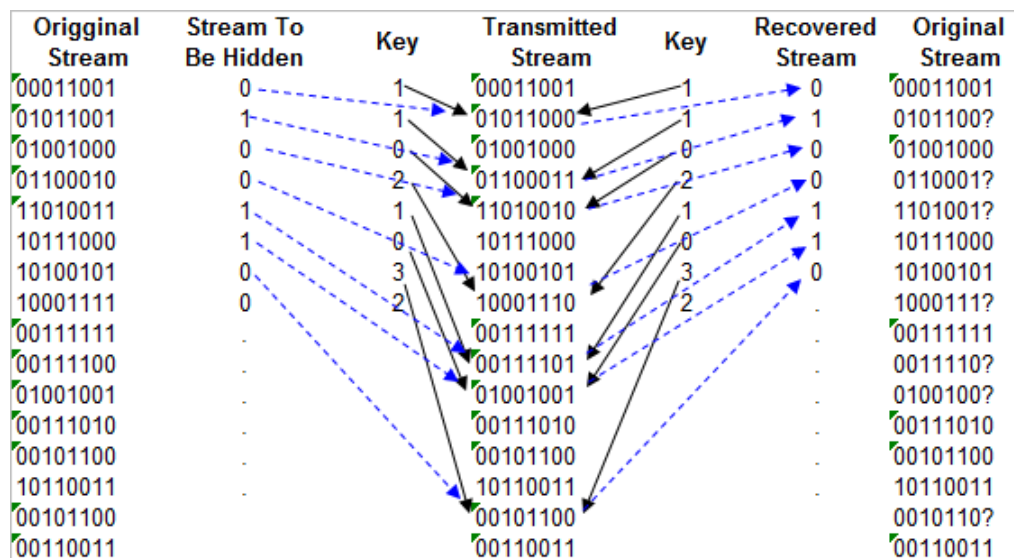
Figure 12. Basic Mecanism Uses LSB.

The sender modify the original current bit with a secret key. With a continuing arrow the position of the hidden bit that will be embedded can be located. The new current bit is obtained from the original current bit, but it is modified according to the value that related to the hidden current bit.

For example, if distance is 2 we let two bytes unmodified and insert secret bit such as LSB of the third byte. If distance is 0, then we modify the first byte by altering LSB and so forth. The receiver returns the hidden bit by using a shared key, that locate the position of the embedding bit and extract it.

Values of distance between the hidden bit in sequence must be in two extreme values. Generally the minimum value is 0, but the maximum value must be properly determined. No issues will occur if the bit length of the image is long enough, otherwise if the length is less than required or it has a short image file then the sender must provide several lengths to assure all hidden bits will fit in the current bit of the image file. Using the current bit is actually the same like having conversation on the phone line, the sender never know when the conversation will end.

In some case, it is not an easy step to do, because if the distance between the hidden bit is not fairly distributed then the statistic character of noise will remains (generally random noise has interval distribution with exponential length)

6 CONCLUSIONS

After conducting a series of tests on apps silent eye and analyzing the results obtained from these tests, it can be concluded as follows:

a. The application is able to paste information without damaging the carrier files or data that has been inserted.
b. This application is also able to extract the file stego file.
c. Insertion of information on audio files can only be done on fomat WAV, and even then with option 1 pcm.

7 ACKNOWLEDGEMENTS

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IMPLEMENTATION OF FET APPLICATION IN GENERATING A UNIVERSITY COURSE AND EXAMINATION TIMETABLING

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Abstract. *Timetabling problems have attracted the continuing interest of researchers mainly because they provide the opportunity of testing combinatorial solution methods in formulations that represent difficult practical problems. In general, the problem is about building an automated system to be used with a very well-known algorithm to generate the time table. There are various software developed to overcome this problem, but only a few software alone can provide accurate results as required by the user. One of the software which give quite accurate output is FET, developed with C language in 2002. FET had a very large palette of constraints, but sadly the evolutionary algorithm was only able to solve easy timetables. Even great efforts during the following years of research, genetic algorithm was never good enough to solve complex timetables. In this paper, we present in detail how the process of adaptation is performed to produce a course and examination timetable that does not have clashing problem among lecturers, students and classrooms. In two years of applying this application, no problems reported and addressed with the correct and accurate input are provided. Therefore, it can be said that FET can provide a new perspective on solving the course and examination time table at the university. In addition, by implementing the FET can maximize the use of the classroom and thus saving resources, energy and the cost of university.*

1 INTRODUCTION

Many universities continue to solve timetabling problems manually even though they are a variety of timetabling systems1 applicable to these problems [1,2]. The often tedious process of initially setting up an automated system and making adjustments for the specific needs of an institution is one of the critical reasons for this. We will discuss an application of the comprehensive timetabling system FET [3,4] at a large college

with 12,000 students. Here the generated timetables were published eight weeks after our first meeting with the schedule manager. The goal is to describe how such a rapid implementation of an automated university course timetabling system can be achieved even for large problems.

Scheduling is an important thing for an academic institution such as the school, college or university [5-8]. It is often one of the key issues for management in managing the academic affairs respectively. With various constraints that exist, some universities face a serious problem. Elements such as the timetable of lecturers, students, classroom lectures, and courses are becoming fundamental in the formation of a table. Normally, academic management often has problems to meet the requirements of lecturers and students who want to ensure that no problems occur clashing [5,6][8]. Therefore, is predicated imperative to build systems that can be working out the timetable constraints available.

Course scheduling problem is not much different from the problem of the examination timetable [5,7]. For the preparation of exams and coursework student conflict can not occur. Similarly, the next exam date should be avoided. With this system it is hoped that the scheduling of the courses taken by the student is not a conflict, if any, it should be kept at a minimum. However, in most situations the preparation of this table, the solution without some conflict between students, lecturers, courses and rare. However, students are given the option to choose between courses that are not contradictory to be registered in each semester [3][9]. But for examination timetable it is important for there is no conflict for two dates or exam courses at any one time. Scheduling the exam is easier because the exam is "one-off" incident while the lecture timetable should be held two to three times a week. In this paper, the use of scheduling systems that use an open system that known as FET will be discussed in detail. The system had been widely used in several universities.

2 OVERVIEW OF THE SYSTEM

FET is free software for automatically scheduling the timetable of a school, high school or university. It uses a fast and efficient timetabling algorithm. It is free software, open source, licensed under GNU/GPL. Liviu Lalescu started his project at the end of the year 2002 as he was working on his diploma. He got his examination in computer programming (software specialization) in June 2003. FET had a very large palette of constraints, but sadly the evolutionary algorithm was only able to solve easy timetables. Even great efforts during the following years in research the genetic algorithm was never good enough to solve complex timetables. In summer 2007 the big breakthrough was done. A new heuristic algorithm (based on recursive swapping of activities) was able to solve difficult timetables in a few minutes. FET is able to automatically care about all groups (classes/courses/students), has a very large palette of constraints and of course nice styleable XHTML timetables.

2.1   Features of FET

Basically, FET has seven menus which are File, Data, Statistics, Advanced, Time Table, Setting and Help. The most important menu is Data where all the input will be inserted

from this menu. Figure 1 shows the main menu of the FET and Figure 2 shows the Data menu. In Data menu, user needs to enter Institution information, Days and hours, Subject, Activity tags, Teacher, Students, Activity and Room. Each of the menus has their own sub-menu.
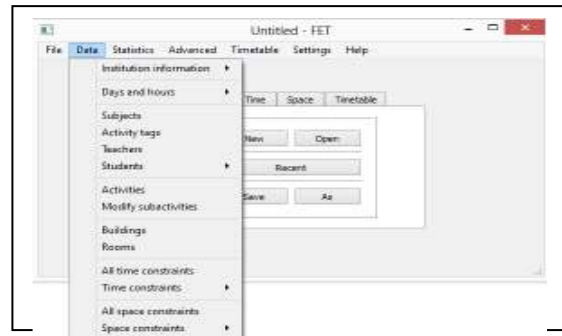

Figure 1: Main Menu   Figure 2: Menu Data

2.2 Work Flow of FET

In general, the work flow of FET can be divided into three parts which are Part 1 is on the data entering, Part 2 is on creating activity and Part 3 is generating the timetable. The basic information such as lecturer's name, student name, intake and program, activity tag, building or room needs to insert first. Then, in Part 2, the activity for each course will be created. Here, each course will be assigned with lecturer, student, activity tags and lecture duration. Then, each activity will be assigned to the suitable room based on the activity tag. Each course will be split between lecturer, tutorial or laboratory session. In this part, the user can also assign a specific time to the respective activity. In Part 3, the user will generate the time table and locked it for the final version. In this process, the error message will be displayed for the mistakes identified and the user needs to fix the errors until the timetable is successfully generated.

3 COURSE TIMETABLE
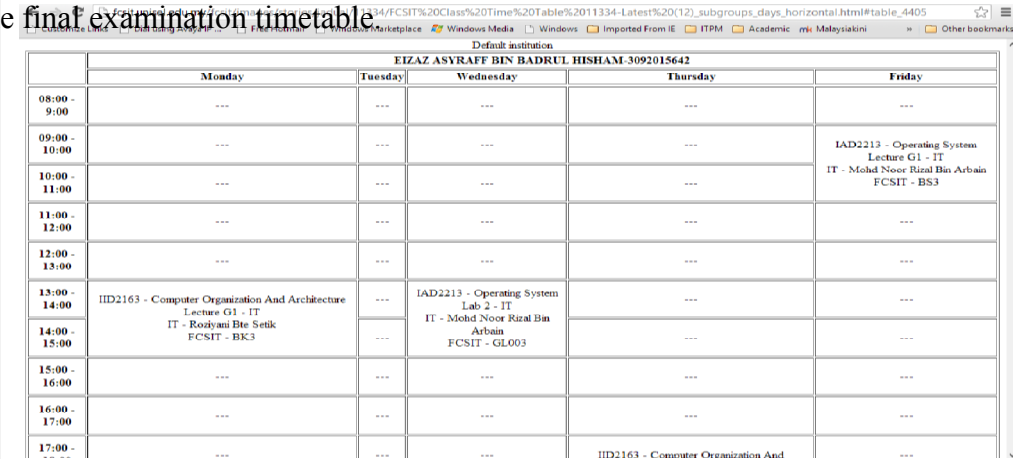
3.1   Problem Overview

The problem of constructing course timetables for academic institutions consists of allocating the set of courses offered by the university to time periods and classrooms in such a way that no teacher, student or room is used more than once per period and that room capacities are not exceeded. The problem addressed here deals with the assignment of each course to a number of time periods (usually hours) for a university undergraduate program with about 10000 students. The timetable covers 60 teaching periods per week (Monday to Friday 8 a.m. to 7 p.m.) Availability of large classrooms is limited and this is the main reason for extending the working hours after 7.00 p.m. and sometimes up to 10.00 p.m.

There are eight faculties in the University. Each of the faculty consists of five to ten programs with more than 10 intakes. The academic year is divided into three

independent semesters each containing completely different courses. The minimum duration of undergraduate studies is eight semesters, and each semester includes some compulsory courses, and a number of optional ones depending on the specialization followed. Some of the courses are common to different programs and specializations. More than 300 courses must be scheduled during each semester. According to the program of studies each course requires two to four hours per week. Students have complete freedom in taking compulsory and optional courses in any semester within their three-year course of studies. The large number of courses offered, together with the increased flexibility in the students' choices, result in a difficult problem with more than 10,000 variables and numerous complicating requirements, a fact that makes the feasibility of the timetable a very difficult if not an impossible task. To facilitate the construction of a fair schedule, the university administration supports the construction of a conflict free schedule only for certain university streams. A university stream is a set of compulsory and optional courses suggested by the administration to be followed by the students in each one of the eight semesters. The major benefits of the system, described in more detail in Section 4, include: improved schedules for students, better room utilization, satisfaction of teacher's preferences, and a quick, easy and flexible way of producing and evaluating changes. All of the test problems were solved easily on a PC or laptop in a Windows environment.

3.2   Problem Formulation.

The data are extracted from the *Bestari* system and the information are from the pre - registration process. The grouping is based on the individual students that from the intake and program. The purpose of individual students based is to make sure there is no clashing among the registered student in any offered course. Figure 3 shows the final view of the final examination timetable.

Figure 3: Individual Student Timetable

4 EXAMINATION TIME TABLE

Basically, examinations in university take place three times a year. At the end of each semester there is a normal three-week examination period where all the courses offered during the semester are examined. Generally, students have complete freedom in taking the exams at any exam period (in which they are scheduled) within their course of studies. In every examination day there are two different periods which are all morning examination will start at 9.00 am till 12.00 pm and noon examination will start at 2.30 p.m. until 5.30 p.m. Generally, all examination duration is 3 hours but there are some courses need only 2 hours. Since students are allowed to have increased flexibility in selecting courses, all the courses offered by a faculty must be examined at different periods. Even in its simplest form this task is not easy. In each program, about 20 courses are offered and therefore at least two examinations per program must be scheduled in each examination day.

The principle in generating timetable are such follow;-

    i.   The student should not take more than one examination at a time.
   ii.   All the examinations are assigned to periods
  iii.   The seating capacity is suitable to the registered students

For examination timetable, the updated list of registered courses is abstracted from *Bestari* system and converted to *csv* file format. Then, the user need to import the data to the FET system. The process is the same with the course timetable but it becomes simpler. Figure 4 shows the view of final examination timetable.

Figure 4: Final Examination (Individual Student)

5 RESULTS

The implemented system has been tested and used by the university since 2009. The system is also used for exploiting ways of allocating rooms to faculties. In most tests the optimal solution was found in less than one minute time. Results showed that the particular problem in practice was not difficult to solve. This is probably due to the fact that constraints were considered. Student conflicts were resolved by using individual student. When the timetable was generated using individual student, we found that 0 (zero) clashing at all with the condition all input are inserted properly. Due to that, lecturer timetable also has no clashing problem. In terms of the venue or classroom, we found that by using a FET, it maximized all the available classroom. We tried to reduce the number of classroom usage and it successfully works.

6 CONCLUSIONS

As a conclusion, FET has all the appropriate facilities for providing valuable help to the decision maker to implement a good course and examination timetable. Interactive tools are available to allow the user to modify solutions. This decision support displays all the appropriate information that helps the user to evaluate the quality of the schedule. The most important things are the student clashing problem can easily solved and it provides satisfaction to the student and university. The FET system is very flexible to modify or make some changes. The time required to generate timetable is very short and minimum. Generally, FET can maximize the use of the classroom and thus saving resources, energy and the cost of university.

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Creating Information Technology Masterplan of Bina Darma University to Support the Realization of Bina Darma 123

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Keywords: Information Technology, Masterplan, SWOT Analisys, TOWS

Abstract : Ria Andryani " Creating Information Technology Masterplan of Bina Darma University to Support the Realisation of Bina Darma 123 " guided by Dedi Rianto Rahadi and Muhammad Akbar. The use of information technology is becoming a very important thing for a company or organization. Even down to the small or medium-scale enterprises also have a lot to feel important application of information technology. This is due to the business environment is changing rapidly, so the ability to get information immediately have a competitive advantage. To achieve a competitive advantage is a company or organization needs to build IT Masterplan that governs all investment policies and implementation of information technology. Bina Darma University is one of the colleges that run the education system by using information technology, in accordance with the vision and mission of a university- international strandar technology in 2025 based. To achieve the vision and mission, it takes a mature concept in the form of IT Masterplan to guide investment and implementation of IT at the University of Bina Darma. IT development Masterplan using SWOT analysis to determine the strength of IT at the Bina Darma University. Research shows need to develop a Masterplan that refers to the information technology business strategy and strategic management IS / IT.

1. INTRODUCTION

Currently, it is important thing for organization or company to use technology. Even it makes effect for minor or middle company until they look that it is important to use information technology. This is affected by business environment which run quick until it is a benefit competitive if there is ability to get information as soon as possible.

In its process, information technology is not only give efficiency, but more then gives kinds of value, such as: improving of effectiveness, internal control repair, creating best competitive, creating image of company or organization, update work process, accelerated decision making, erasing of operational mistake. If it look from educational sector, information technology give positive influence toward educational development. Information technology will

give positive value in learning process. That is related with requirement of information, knowledge, and technology.

Bina Darma University if one of collage in South Sumatera which use education system by using information technology. It is suitable with mison and vision of Bina Darma, namely be international university based on information technology in 2025. Information technology has important role in leaning process, administration, and academic information system. There are many kinds of information technology which is implementationed, such as: *e-learning, website, web mail*, information academic system, wifi area, and so forth.

Implementation of best information technology needs a planning concept which is written in master plan of information technology. Master plan of information technology consist of company stategies in applying information technology. In master plan, there are is manual of information technology such as what the organization or company need. Moreover, master plan of information technology belongs to *business plan* of company.

Master plan of information technology is a middle planning in developing information system in an organization which can read the positive willing form management (*System Owner*), user (*System User*) or the changes in internal or external of organization. By developing of information technology in *short life-cycle,* it is difficult to adapt need of organization without master plan. (Amborowati, Armadyah, 2010).

The main Master plan of information technology consist of organization planning strategies in apply and create information system in organization. In it, there is manual of information system such as what organization need. The important notice that IT master plan belongs to Business Plan. Information technology is implementation as tool to help organization in getting their mission and vision. Therefore, without the clear mission and vision from organization, IT master plan cannot create too. (Zainuddin, 2005).

According to Zainuddin (2012) there are three reasons why in invesment and implementation of organization or company need Master plan of information technology:

1. IT *Masterplan* is basic plan for company in invesment and implementation of information technology.

2. IT *Masterplan* help to erase the risks which come from implementation of information technology.

3. IT *Masterplan* can use as control tool and effective parameter to analysis perform and the success of IT implementation in a organization or company.

Bina Darma 123 is one of concept which is suggested by the writer in master plan of information technology. Bina Darma 123 give explanation about technical of information access at Bina Darma University by using 1 portal, 2 clicks and 3 second, the whole information which

is needed can be got. Therefore, in this research the writer interest to create master plan of information technology in Bina Darma University to support the coming of Bina Darma 123.

Master plan of information technology which will be created is basic planning investation and implementation of information technology at Bina Darma University. Therefore, the problem in this research is how to creat master plan of information technology at Bina Darma University to support Bina Darma 123?. The creating of information technology is aimed to produce IT master plan of Bina Darma University which focus to the computer designing and hardware *platform* of information technology which is used. Moreover, the masterplan of information technology able to produce a manual in decision device specification in implementation of information technology at Bina Darma University.

Creating master plan of information technology at Bina Darma University is started by arrange planning of information strategy system and information technology. (Renstra IS/IT). According to Bryson (1995,4-5) planning of strategy is an knowledge which give decisions and basic acts which form and guide the organization to understand *what an organization is*, *what is does* and *why it does it*.

Fred David thought (1997) expand seven steps of planning strategy:

1. Formulate the mission
2. Rate threat and opportunity which come from environment
3. Make identification the power and weakness of internal organization
4. Determine the goal in long time in which it must have challenge, can be measured, consistent, logic, and the important one it must be clear.
5. Manage the strategy as a way to get the goal in the long term.
6. Make it as annuity policy and purpose annuity which detail of the goal in the long term.
7. Prepare the source
8. Do a research and evaluate the process to make it as response.

To determine strategy of IS/IT which can support the planning of mission and vision in organization, thus it is important to have well understanding in business strategy in organization. The understanding include to explanation toward: Why a business is done, what is the goal and orientation of business, when the goal is goten, how the way to get the goal, and is there the change which is done. Thus, the main issue in develop the planning of IS/IT strategy is adaptation of IS/IT strategy which business strategy of organization. Business strategy is done by management with opinions and analysis toward internal factor (advantages and disadvantages) and external factors of organization (opportunity and threat). It is not easy to make a business, but it must be supported by well structure of administrative, integrity of process or business activities which work in internal or external of organization and it has well competency and skill in SDM.

Competency of information technology is absolute needed to guarantee the harmonization between infrastructure and process of business organization until the business strategy which is used runs well and optimal and it can get the high competitive which is needed. The well IS/IT strategy will support some factors, such as the available of technology and application of information which is suitable with requirement until it can produce the well structure of administrative, improve the competency and fast of information access until get integrity of process in internal or external of organization include to effective or efficient control toward the using of sources, risks, and business activity: improve professionalism of SDM by improving requirement, motivation, training, and make work situation which is support by information system.

Ward and Peppard state that to apply information technology optimally, it is needed a IS/IT strategy which suitable with business strategy of organization. According to (Ward and Peppard, 2002) some researches and fact point out many consequences which get by an organization which has not IS/IT strategy, namely:

1. IT investment does not support to the goal/business purpose.
2. There is lost control toward IS/IT organization.
3. There is duplication of data; the data is not accurate and source of information which bemuse because there is no integration of IS/IT
4. There is no development priority or changing process of IS/IT
5. There is no mechanism to decide the maximal source level and best supply system
6. Information management which weak: there is different understanding between user and agent of IS/IT organization which can bring conflict and disappointment.
7. Strategy of technology which is not good.
8. Invesment of infrastructure which is not suitable with the requirement.
9. Project evaluation of IS/IT which just have basis for financial aspect
10. Invesment of IS/It can be source of conflict in organization
11. Justification of invesment which contradictory with business context; and cycle process of IS/IT which shorter from the requirement. IS/IT strategy can be made in a planning of IS/IT strategy.

Many researches about improving of technology master plan is shown as following explanations:

1. Dhani Gartina and Farid Thalib (2011) do a research about "Analisis dan Rancangan Cetak Biru Pengembangan Infrastruktur Jaringan Teknologi Informasi dan Komunikasi Badang Litbang Pertanian". The condition of infrastructure development TIK networking in Badan Litbang Pertanian is not have clear orientation and goal. Meanwhile vision of Badan Litbang Pertanian will be a international research organization in 2014 demand TIK play role in

making success the vision. Blue print design of development of TIK network infrastructure is one of clear supporting in successes the vision. Some of analysis is started by learn design of network in every unit, readiness of UK/UPT, SDM until to the policy. Furthermore, make evaluation toward competency which is looked from internal or external organization. Based on the evaluation is done SWOT analysis to decide planning of development strategy of TIK network infrastructure (RENSTRA PIJTIK)/blue print of PIJTIK Badan Litbang Pertanian in five period (2011 – 2016). RENSTRA PIJTIK includes of three pillars, namely development of TIK network infrastructure policy; development of TIK network infrastructure program and organizer SDM competency of TIK network program.

2. Veronica S. Moertini (2006) do a research about "Metodologi Perancangan *Masterplan* Pangkalan Data untuk Mendukung Penjaminan Mutu Perguruan Tinggi Studi Kasus UNPAR". Camp of data at this system should consist of complex data, accurate, *up to date* and well classification until it can be functioned as sources of information in evaluate the guarantee components. By having camp of system which integrity to manage complex data and up to data by medium that is allocated by Dikti and software for this. Furthermore, collage can connect the system to national camp of data in the collage (PDPT). Therefore, evaluation toward education process in the collate which is programmed by Dikti can be guarantee.

2. METHODOLOGY OF THE RESEARH

The reference which is developed by Ward and Peppard is the method which is used to creat master plan of information technology at Bina Darma University. This method includes to three income steps and outcome steps (Ward & Peppard, 2002), namely:

1. Analysis of internal business environment which include of aspects of current business strategy, the target, sources, process, and the culture values of business organization.

2. Analysis of external business environment which include of economic aspects, industry, and rivalry of company.

3. Analysis of internal IS/IT environment which include of IS/IT condition from current business perspective, how the *maturity*, how the contribution toward business, skill of SDM and infrastructure of technology include to how portofolio of current IS/IT.

4. Analysis of external IS/IT environment which include to trend of technology and opportunity to use and the using of IS/IT by competitor, customers, and agent.

Meanwhile outcome process is a part which is done to produce IS/IT strategy of planning document, namely:

1. IS business strategy which include how each of unit or business function will use IS/IT to get their target, application of portofolio, and description of information architecture.

2. IT strategy which includes to policy and strategy of technology management and human source of IS/IT.

3. Management strategy of IS/IT which include to general elements that is used by organization, to ensure consistency of IS/IT policy using which is needed.
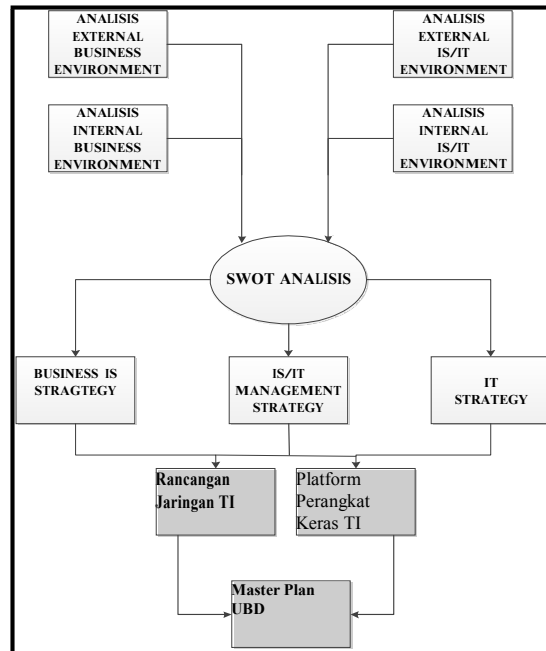

Figure Conceptual Framework with Ward & Peppard Method

3. Finding

3.1.SWOT Analysis

SWOT analysis is arranged by the result of interview toward unit and head of unit of information system and information technology and observation toward supporting documents (secondary data) which is used in UPT-SIM Bina Darma University.

The input of this process is result of interview toward head of unit information system and information technology and observation toward information technology which have by Bina Darma University, therefore it can be got:

1. **Strengths**

   Internal factor which be *Strengths* that it has by Bina Darma Univesity is development of information technology, namely:

   a. Commitment of management, such as the policy to get mission and vision namely be international university based on information technology.

   b. Availability of SDM which master in information technology

   c. Availability of *software/hardware* and TIK network which representative and fill fullness the requirement.

2. **Weakness**

a. There is no orientation in developing information technology of Bina Darma University which can be made as reference and applying information technology in the future by using continuously pola and directed.

b. Socialization and product using and information technology services at Bina Darma University is not optimal.

c. Total *Bandwidth* which available by Bina Darma University is not proportional with the total user in Bina Darma University.

3. *Opportunities*

a. Development of information technology can be functioned as center of campus profit.

b. Market of information technology in education and government is still opened.

c. There are well competitive funds from DIKTI or other fund which can be used to make infrastructure and improving competence of SDM in information technology.

4. *Threats*

a. The overflow of instant application which can give negative effect toward staff motivation in developing application. This condition causes dependence to other people.

b. By improving TIK quality in other institute, thus Bina Darma University should develop themselves in TIK seriously in order they have same position with others.

c. There are much *hackers and crackers* to bother quality of institute and it can cause down acceleration even break of information.

Table   Formulation of SWOT matrix strategy combination

IFAS EFAS	*Strength*	*Weakneses*
Opportunity	Strategi SO = 1.73 + 1,76 = 3,49	Strategi WO = 1,22 + 1,76 = 2,96
Threat	Strategi ST = 1,73 + 1,44 = 3,17	Strategi WT = 1,22 + 1,44 = 2,66

Based on the table above, it can be seen that Bina Darma University need used SO

strategy which has highest value, namely 3,49. Furthermore, it follow by ST strategy as big as 3,17, WO as big as 2,96 and WT as big as 2,66. There is every strategy, namely SO strategy is making education process which has orientation toward the using of TI, make promotion toward academic product in online and develop academic information system and increasing the wide of *bandwith*. ST strategy is relooking function of TI at organization continuously until it is suitable, accurate and go out from virus and hacker, improving of security information technology. WO strategy is making policy of TI implementation to improve internal and external service quality. WT strategy is optimally the improving of stakeholder service, improving infrastructure of software and hardware. Based on the table, the important point to look is WT strategy which has the lowest value.

3.2. Strategi Teknologi Informasi

Computer network which is build and developed is used to service the customer in accessing data and information in fast and easy. The choosing of a system should do accuracy until infrastructures which develop is not useless. The program of development computer network is started by choosing infrastructure condition of computer network which existing. This activity include: topology design, *bandwith* management and network management. There are some strategies which is done to make bandwith management, namely requirement estimation, limitation and planning of management. In determining the choosing, choose the condition firstly. The well network is the network which can give satisfaction toward users and it is still can take in highest charge. After make badwith requirement estimation, then decide the limitation which is use as regulation in bandwith distribution.

To get the business strategy and management strategy of SI/TI above, thus the writer arrange the strategy of TI as following:

1. Improving the total of internet bandwith in Bina Darma University.
2. Increasing of total Internet *Hotspot* and *upgrade access point* to *Wireless Router Linksys* EA4500 series by using the following specifications:
   - *Maximum speed (up to 450 + 450Mbps) for ultra-fast wireless transfer rates*
   - *Gigabit Ethernet ports for speeds up to 10x faster than standard Ethernet*
3. In 2012 – 2013 Upgrade of server technology until support for server virtualization.
4. In 2013 implementation of storage server.
5. In 2013 – 2017 Upgrade Router and Switch to Fiber Obtic and Giga Ethernet technology.
6. In 2013 – 2017 implementation of *redundancy link* at every *backbone* of network infrastructure at Bina Darma University.
7. In 2013 – 2017 implementation of *Spanning Tree Protocol* at *Core Switch* and *Distribution Switch*.

3.3. Suggestion of Design Computer Network Development at Bina Darma University

Design of best network in a infrastructure system of computer network is a basis for the success of computer system which will be build. The aim in network design is bringing down the stoppage and improving quality of computer network by doing segmentation. According to Agus 2010, the best design functions of computer network are:

1. To anticipate developing of network medium capability.

2. Anticipate development total and kinds of user

3. Improving the quality of network tools.

4. Placing management of network instruments

5. Capability of adaptation toward the changing process.

6. Make it easy in maintenance of management

Therefore, network design is an process that should be done with well until design function of network can be implementation with well too. Thus, the writer design toward Bina Darma University network as requirement to support Bina Darma Univeristy 123.

Meanwhile, computer network architecture is the way to use software and hardware in order one computer with others can make communication and change the data. In this chance, the writer will make planning of computer network design and segmentation of Bina Darma University with looking to the design aspects and requirement architecture. Computer network which will suggest is suitable make with requirement architecture in getting Bina Darma University 123. Topology suggestion includes of *consisting of a high speed backbone (Core Layer), concentration areas (Distribution Layer), user connection points (Access Layer).* Design making of computer network should be suitable with *network hicarci design.* Agus, 2010 states that *Core Layer* has function to prepare the link between sites optimally. *Distribution Layer* is functioned to prepare connection based on the policy of company and *Access Layer* which is functioned to prepare workgroup to user of the network.

In this research, topology of computer network which will be designed to connect whole campus, namely main campus, campus A, campus B, campus C and campus D and the main campus as central network.
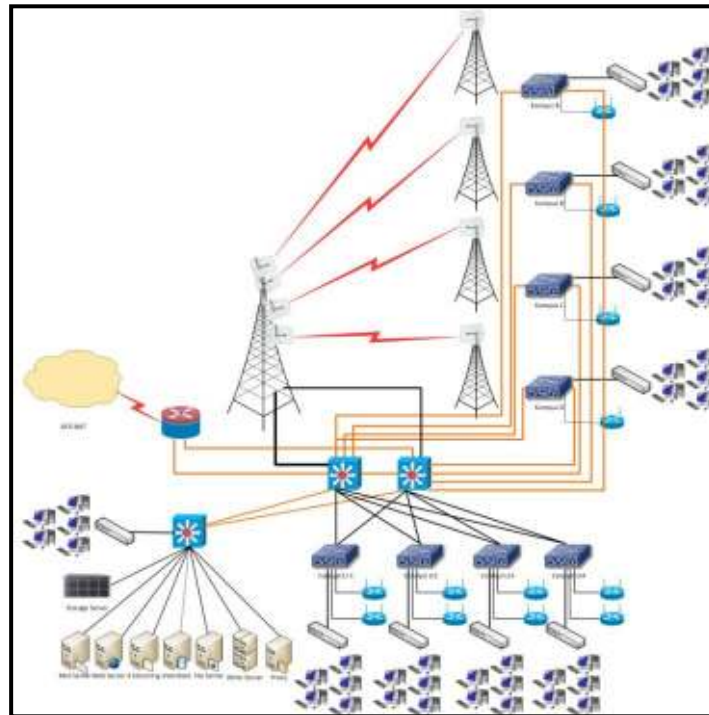
Figure of Network Topology Design at Bina Darma University

4. Conclusion

This research is suggestion of development strategy design of computer network and hardware platform which can be used as manual of information technology development until it can improve quality and competitive value of Bina Darma University.

Masterplan of information technology very important when information technology and information system which will build or in process to build. *Masterplan   of* information technology makes easy in looking the how far the system is build or implementation.

This research has produced master plan of information technology at Bina Darma University which is focused to computer network design and platform or hardware of information technology and as reference in deciding tools specification in implementation of information technology at Bina Darma University.

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KNOWLEDGE INFRASTUCTURE FOR MANAGING MANGROVE FORESTS BASED FISHPOND AREA TO IMPROVE THE LOCAL PEOPLE WELFARE

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Abstract. *Many functions of mangrove forests and fishpond could be utilized for surrounding human live. They could be used to optimize the life quality and welfare of nearby population. The fuel wood, construction wood, fish, shrimp and shellfish that could be useful for local people to life, do their business activities and get some opportunities. In contrast, without structured concept to maintain them all, they would be damaged in a couple years later. The strong reason why the management concept to maintain and optimize the mangrove forests and fishpond in one area is very required to keep them sustainable. By using three methods: systems approach, to see the problem and related parts of the case holistically; cynafin framework model, to understand the situation, create the knowledge and produce some decision alternative candidates; and object oriented model, to design related parts in knowledge infrastructure; the knowledge infrastructure for managing mangrove forest based fishpond area to improve the people welfare would be systematically explained and explored in this paper.*

1 INTRODUCTION

To be effective, knowledge management (KM) needs to be supported by information technology infrastructure, as knowledge originates from data and information. This means information technology will support the process in knowledge management. Quality of knowledge management is determined by knowledge itself; how the knowledge is defined, translated, communicated, standardized and used for particular purposes, especially in making decisions [1]. Moreover, the Information Technology with the combination between knowledge management systems and other systems is expected to be able to address complex problems. Indeed, "knowledge management is the systematic management of information to develop strategy and guide practices" [2]. Knowledge management represents a series of new management methods and management thinking, based on the meaning of knowledge management and tacit knowledge [3]. Other systems that support to make many types of policy utilize analytical methods, such as decision analysis, optimization algorithms, program scheduling routines, for developing models to help decision makers to formulate alternative policies, to analyze their impacts, and to interpret and to select appropriate options for implementation [4] in [5].

Knowledge management infrastructure research area, [6] have identified

technology supports to knowledge management; and [7] have developed knowledge infrastructure for learning community.

As one of natural resources, forests have a role to maintain the natural ecological balance and stability. For examples, West Kalimantan Province (Indonesia) has a strategic geographical location and natural forest resources, but now, much of West Kalimantan's forests have been destroyed by human. Will the phenomenon of deforestation continue to happen with its mangrove forest? Based on data and information of Environmental Ministry of Indonesia, Indonesia had 7.7 million ha of mangrove forest [8], which places Indonesia as a country with the highest density mangrove forest in the world. However, it 3 million ha remaining in 2010. It effects of conversion mangrove forest becomes fishpond area, illegal of mangrove vegetation, environmental pollution, reclamation and sedimentation. West Kalimantan has had 342,600 ha mangrove forest with condition 48.9 % severely damaged, 3.16 % moderately damaged, 47.9 % undamaged [9].

Mangrove forests are crucial, not only for sustaining biodiversity in these intertidal swamps, but also for their direct and indirect benefit to human activities. Energy and nutrients are assimilated and stored in the leaves of mangrove trees. As a detritus-based ecosystem, leaf litter from these trees provides the basic for adjacent aquatic and terrestrial food webs. Because most energy and nutrients are biotically stored rather than free in the water or substrate, the species diversity of these swamps is directly dependent on the primary productivity of mangrove plants. Mangrove swamps function as nurseries for most of the sport and commercial fish found in deeper water. Mangrove swamps also provide feeding grounds for large reef fish. As a result, mangrove-assimilated energy and nutrients are exported to surrounding coral reefs [10].

Unlike many upland tropical forests, mangroves offer little in the form of commercially extractable timber. However, research conducted at mangrove sites throughout the coastal tropics has revealed widespread, often intensive direct extraction of diverse resources by local people, especially for use of fuel wood, construction wood, fish, shrimp and shellfish. Mangroves are also crucial for sustaining some near shore fisheries, because their habitats are important for the juvenile stages of shrimp and fish species [11]. In addition, mangrove forests play a vital role in coastline protection, mitigation of wave and storm impacts and mudflat stabilization, and protection of coastal water quality. They also provide critical habitat for fish and wildlife [12] in [13].The healthy mangrove forests can also prevent salt water intrusion, preventing damage of fresh water ecosystems and agricultural areas [14].

In fact, the big problem is faced. Mangroves are declining and under international circumstances are considered not only to be rare but also threatened [15]; [16]. To conserve the mangrove forests, the role of government and society is required, through policies on how to use and conserve it. To support the policy-making process, the role of knowledge management is needed. It will make policies more effective and useful in managing the mangrove forest.

Effective policy is required to manage mangrove forests based fishpond sustainably. The effective policy could be defined based on data, information and knowledge from related institutions. In addition, the combination of data, information and knowledge management systems; is required to make effective

policy to manage mangrove forest based fishpond sustainable. Data (including spatial data) would be used as the basis in this research, because mangroves exhibit zonation patterns in a number of different geographic regions [17]; [18]; [19] in [10]. The large variation in floristic composition of mangrove communities means that patterns of species distribution across the intertidal zone will vary substantially among geographic regions [10].

The paper explains the knowledge infrastructure implemented in case of mangrove forest based fishpond area for improving local people welfare. The aim of the paper answers two questions of the research: what are stakeholders and interconnected parts (technologies and management aspects) in knowledge management of mangrove forest based fishpond management; and what is kind of knowledge infrastructure needed in managing mangrove forest based fishpond for improving local people welfare.

2 MANGROVE FORESTS

Mangroves are extraordinary ecosystems, located at the interface of land and sea that offer a considerable array of ecosystem goods and services. They are vital for food security and protection of coastal communities; they provide a wide diversity of forest products, nurseries for aquatic species, fishing grounds, carbon sequestration, and crucial natural coastal defenses that mitigate the impact of erosion and storm action. Global climate change and the associated risks of sea level rise and extreme weather events have increased their importance. Calls for conservation have also increased in recent years with growing evidence that mangroves may have an important role as natural buffers in protecting coastlines from the impacts of storms and extreme wave action [20].

3 PROBLEM ANALYSIS

Problems occurred in mangrove forest based fishpond management classified into four categories, based on cynafin framework [21]: known, knowable, complex and chaos category. In know space, problems can be solved by using deterministic rules and procedures; and the outcome can be predicted. In knowable area, a bit more work is required to solve the problem; the answer is not immediately known, or that an answer can be found through formal analysis. Furthermore, in complex space, problems in this space are not so amenable to analysis; some formal analytical processes will run into several problems. The last one is chaos space; in this space try and error actions to solve problems can be executed. From four types of problem, this paper only wants to focus on the first three types of problem: known, knowable and complex; and the main interest of the paper is on complex area related to effective policies and local people welfare.

Figure 1 shows that some problems can be categorized in to those spaces. The powerful knowledge infrastructure and supporting from stakeholders involve in the problem area is very required. For making an effective policies, some information about local people need, mangrove forest and fishpond area condition; and converted to be knowledge are needed. Rules of all stakeholders by using technology to effectively communicate to each other; are able to make knowledge

conversion run more easily. In addition, for increasing local people welfare, some information and knowledge about status of local people welfare, their behavior, their works, etc.; are some information and knowledge can support in making some actions to increase the local people welfare. For this problem, the IT implementation and stakeholders' involvement are strongly required. Finally, correlation among stakeholders and technology in knowledge management infrastructure has to be realized to implement policies have been made.

| **Complex**
Making an effective policies; implementing policies; increasing local people welfare | **Knowable**
Encouraging local people's behavior to work; increasing local people's awareness of the importance of mangrove forest and fishpond for their life; bridging communication lack between local and central government; socializing policies |
| **Chaos**
Political situation | **Known**
Deforestation of mangrove forests; starting up for new area of fishpond; distribution of fishpond product; training in mangrove forest and fishpond management; understanding local people's need; extracting knowledge |

Figure 1: Cynafin Based Problem Categorization

4 KNOWLEDGE INFRASTRUCTURE

Many related components support to KM. To convert and process from data until knowledge, many components configured in one infrastructure have to be implemented in KM area. Based on [22] in [6], knowledge infrastructure could be categorized into three layers: Low level Interface, Knowledge Management and High Level Interface Infrastructure (Figure 2).
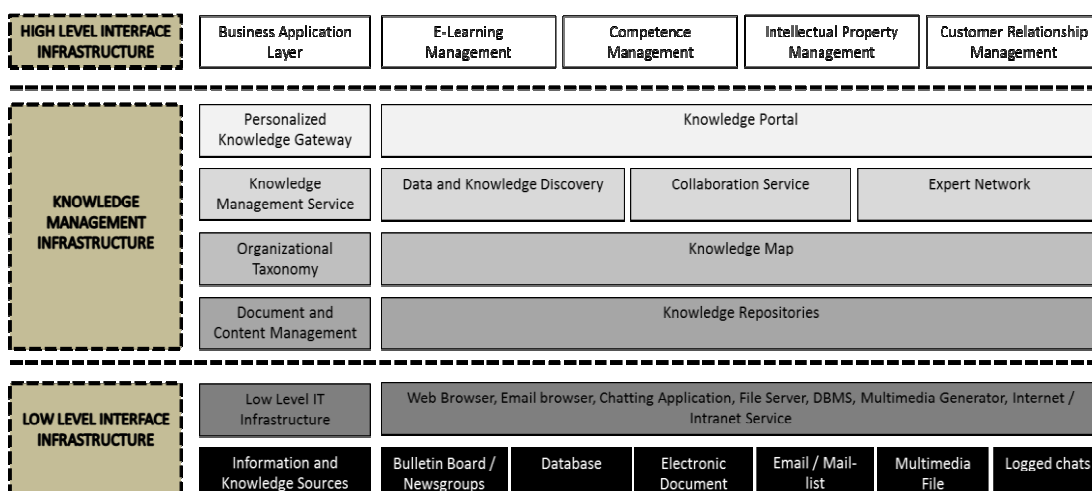

Figure 2: Knowledge Infrastructure

Organization can implement the knowledge infrastructure gradually, from low level until high level of infrastructure layer. In one layer of infrastructure, organization can also apply a selected technology or application it needs urgently. The technology (especially Information Technology) and application can make transformation of data, information and knowledge can run structurally, traceably, responsibly and accurately.

In the low level of knowledge infrastructure, there are two categories: information and knowledge sources; and low level IT infrastructure. The lowest layer handles sources of explicit knowledge. Explicit knowledge resides in repositories as documents or other types of knowledge items (e.g., e-mail messages and database records). Standard authoring tools (such as word processors) and database management systems (DBMS) support this layer. File servers, e-mail browsers etc. support the infrastructure layer [6]. Low level IT infrastructure required not only for capturing and handling explicit information and knowledge, but also for sharing them to each other stakeholders involve in and correlate with the organization; community, both local and center government, agriculture and forestry department, farmer, even buyers or national and international business partners.

Indeed, the source of knowledge is not only from explicit document or sources, but also from implicit source to be tacit knowledge; such as experiences, local behavior, unwritten local rule. All knowledge is recorded, stored, processed and disseminated in the second layer of knowledge infrastructure; knowledge management infrastructure. Document and content management tools with features for search and retrieval as well as analysis and maintenance represent knowledge repositories. The organization of knowledge is based on a corporate taxonomy and serves as a "knowledge map" supported by classifying and indexing tools. KM services are provided using tools for data and knowledge discovery and collaboration services. Through portals, knowledge can be distributed to different users and applications, such as e-learning, competence management, intellectual property management, and customer relationship management [6].

All part of knowledge should be connected and correlated to other community or other organization by using many kinds of knowledge aspects and components, such as e-learning, competence, intellectual property and customer relationship management; through business application. These parts categorized into high level interface infrastructure.

5 DIAGRAM OF USECASE

Generally, there are six actors can use knowledge management systems; five actors are as human actors: Researcher, People, BusinessPartner, Administrator and Government; and one actor is as a systems actor. The SystemsActor consists of five other systems actors BusinessApplication, ELearningApplication, CompetenceApplication, IntellectualPropertyApplication and CRMApplication. The interaction patterns between actors and systems can be depicted in some usecase; and the configuration of all can be configured in one diagram called diagram of usecase (Figure 3). Systems administrator is an actor who plays the role to run the systems technically. One of some roles done in knowledge management

systems is DataExtracting. DataExtracting is a usecase to extract data needed by the systems. Many technology media (it has been told above in Figure 1) can be used in extracting data are database management systems, file server and multimedia generator. In addition, from the external data, many technologies can be used to extract data: email and web browser, internet and intranet service, etc. Those technologies, automatically can generate data to be information for some purposes and can be used by many actors: Researcher, People, businessPartner and Government.

Government consists of two kinds of government: local and central government. This actor interacts to system through four usecases. Knowledge also can be generated automatically by using some information or other knowledge from other sources depends on knowledge types; tacit or explicit knowledge. Government also has responsibility to make and to implement some policies. The systems facilitate the government to do that (see Figure 2, government actor connected to PolicyMaking and PolicyImplementatingusecase).

The research actor can use almost all results that are provided by the systems; information, knowledge and policy. So do people actor, it can use all results produced by the systems. Especially for people actor, it consists of two kinds of actor: Farmer and BusinessPlayer. The last actor is BusinessPartner. It uses two types of the usecase: InformationGenerating and PolicyImplementing. Policies can be disseminated through other actors, such as e-learning; competence; intellectual property and customer relationship management; and business application.

Figure 3: Diagram of Usecase

6 CONCLUSION AND FUTURE WORKS

Knowledge infrastructure shows stakeholders and interconnection parts in knowledge management of mangrove forest based fishpond management for improving local people welfare. The process of knowledge infrastructure started from problem analysis stages; where all problems related to case mapped in to four area of problems: know, knowable, complex and chaos. Furthermore, the connectivity between both human and systems actors with knowledge

management systems described by using diagram of usecase. The detailed research about knowledge architecture is strongly needed to be conducted as the future work.

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ANALYSYS OF DEVELOPMENT AND THE IMPACT OF IMPLEMENTING ICT TO ENHANCE SALES AND MANAGEMENT ON FARMERS GROUP SME

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Abstract. *Using information and communication technology is one of the solutions in accelerating a business. A research on a group of Small Medium Enterprise called Gapoktan Tunas Melati (Tunas Melati Farmers Group) regarding to develop and implementing ICT have been done. A small version application likes ERP was build and deploy. The application for monitoring stocks, sales, and production was successfully build. The problems more on delivering the technology to user, which most of the member of this Groups of Farmers are not too familiar with technology. Another problem here is the measurements unit of ingredients. Technology aspects and cultural aspects need to be balance. In conclusion, education is needed to increase the performance and benefit of using technologies.*

1 INTRODUCTION

Rapid development of technology has now become an important part to support the increased performance and productivity of an industry or organization. By utilizing the right technology, the process routine or repetitive calculations can be performed automatically by the computer. Thus, companies can allocate time and energy for other activities is more important and useful, not only that, information technology can provide a competitive edge in the business world.

Today, home industries, small medium enterprise (SME) are growing from day to day. This kind of business are on they move to develop. Their products variety even more diverse and numerous. SME also play an important role in economic development of a country.

The price and availability of hardware technology is very diverse and affordable nowaday. While at the other hand, not many people are using these technology till it full potential. ERP (Enterprise Resource Planning) is a powerfull concepts to maximize the use of technology in beneficial the industries. While it is not cheap, and not many of them are appropriate to fit the local industries and business process.

By using appropirate technology, a lot of repetition and redudancy process can be reduce. That is what this Farmers Groups need.

2 FARMERS GROUPS, A SME

According to the Law of the Republic of Indonesia, Number 20, 2008 about Micro, Small and Medium enterprises, SMEs need to be empowered as an integral part of the economy who have the position and strategic potential to fullfil and balance the national economy as this in on developing.

Farmers Groups is a collective of people in a certain area, normally in a district. These groups are under monitoring of Ministry of Cooperative and SME of Republic Indonesia. Each of these group have their own unique characteristics as a produsen to fill their area needs and also distribute for markets. Each group consists of several families that doing small business in that area. Their can be a produsen of food, clothes, accessories, batik, or other things.

Tunas Melati is a farmers group for Slipi district, Jakarta. They consist of around 12 families, that most of them produce on snacks, especially Jakarta traditional snacks such as palm roots (akar kelapa) with its variety of taste, likes original, soto, sesame, chocolate and so on, also red ginger milk are their main products.

What they produce currently around 30 kg of palm roots snacks per week. The market and themself were on move forward to scale more bigger than current. While with their willingness to move forward and support from Ministry with a loan of one hundred million, they seeking technology as one of the solution. According to the research and discussion, there are a lot of other farmers groups that also see technology as solutions.

3 TECHNOLOGY FOR SME

Appropriate technology is that set of technology that is appropriate to meet the needs and the development goals.

Without using of information technology today, SME will have serious and fatal consequences in the future and will imply the risk of lagging behind economically with all the implications that this esentials [Berisha, 2009].

Despite the complex and uncertain nature of technology implementation, there are a number of tools available to assist implementers. The most general of these, Pacey's (1983) technology-practice framework (figure 1), which stresses the complex nature of technology implementation and the need for a synthesis between technical, cultural and organisational aspects, is a useful starting point for thinking about the technology implementation process.
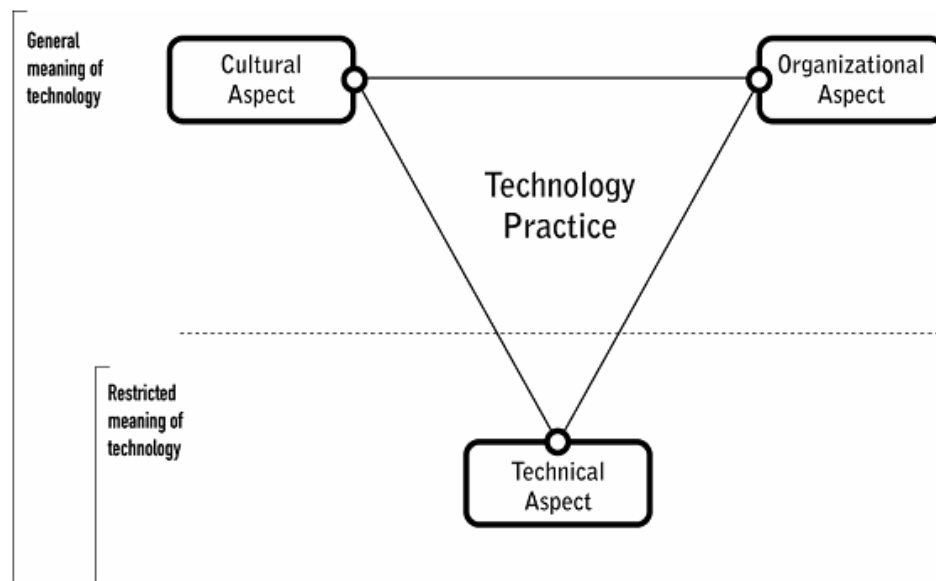
Figure 1 : Technology and its practice (Adaptive from Pacey)

For developing an application, an SDLC (Software Development Life Cycle) is used, and at the first phase of development, what needed is analysis. The business process is the main and important key for the success of develop and implementing an application. This also supported by the research from Aberdeen Group, that shows that the most important strategies to implementing an ERP is the standardize business process.
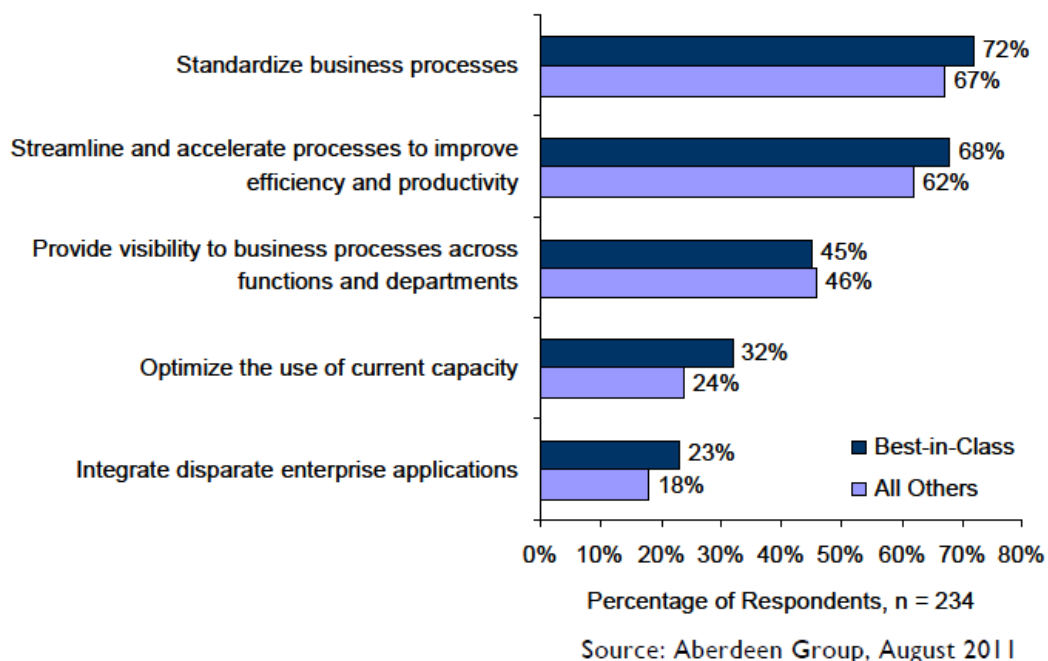

Figure 2: Strategies to support implementing ERP

According to reserch of Fong (2011), the highest priortity that need implementation of technology in China SMEs is the Marketing and Sales, followed by the enterprise managements.
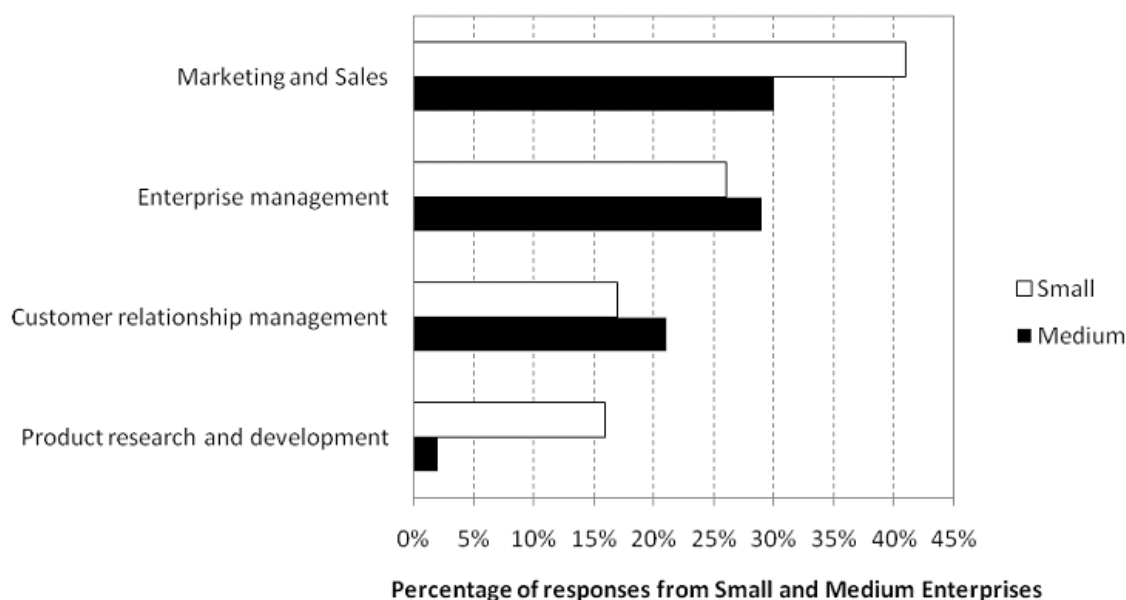

Figure 3:Critical area for implementing technology

4 ANALYSIS ON TUNAS MELATI

The on spot and direct analysis on the Tunas Melati Farmers Groups done for two months. This group is a produsen of food industries. Most of the members are the house wife.

The problems on this group are :
1. Most of them are housewife that are rarely using technology, especially computer
2. They did not have the standardize measurement yet on the production. It is shows on how many eggs that used, it will depend on the size of the eggs. As examples, if the eggs is big, than 4 is enough, otherwise, 5 eggs is needed. If the compound result is too soft, then the flour is added to the compound.
3. They did not have a management system to monitor their assets, their sales and their financial matters
4. Sales are done by direct sales and entrust their products to nearby shop and restaurant. They gain new customer by from mouth to mouth strategies from current loyal customers

The result of the analysis is rank the critical area that need to be done so that implementing the technology can benefit this SME.

As the result of the SWOT analysis, business requirement analysis, the area that need to focus on are :
1. Marketing / Sales strategies
2. Marketing / Sales monitoring and management
3. Stocks and production management
4. Purchasing

Strategis for marketing and sales strategies are using social media such as Facebook as the that is the easiest and strategic method to implement in Indonesia. Besides, develop a simple website for delivering more detail information about production process, and the variety of products.

Building a simple application likes ERP is another strategies to solve the Management, marketing, stock, production and purchasing problem. The application called monitoring Tunas Melati. In building this application, web based strategies is choosen. This is because of the users are not familiar with technology, so while teaching them how to use web based technology such as social network for their sales, it will benefit and more easier for the user to learn one technology only at a time. And also the strategies to implement the monitoring system to their web site for online purchase in the future.
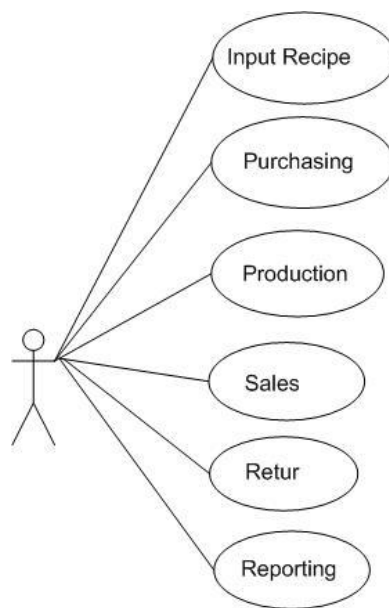

Figure 4 : Use case of the monitoring application

Description of each component of use case are :

1. Input recipe
   It have function for user to input the ingredients of each production and how to cook. The ingredients and the amounts is used for one recipe production. It means that the production must be a number of recipe for each time.

2. Purchasing
   There is three types of items, consumable goods such as eggs, flour, etc, raw materials such as palm oil, plastic bags, vanili, salt (This is a group of items that cannot be count exactly when used), and assets. Each time of purchase happens, the same type of items unit are increase.

3. Production
   Each time of production happens, the amount of consumable goods will be deducted, that is for counting the stock. Also after production, there will be an output of the production. The amount of each type of packaging need to be input for sales. So if the item is 0, then there supposed to be no sales can be performed.

4. Sales
This function is used for managing the sales, storing the customer and sales information. There is 2 types of sales, direct sales/ cash and credit. For credit types, there will be an additional steps, payments, and also refunds.
5. Returns / refunds
Return and refunds only for credit type sales. The items that have been returns cannot be sold any more.
6. Report
This function is for generating report, for purchasing, sales, direct sales, credit, refunds, and productions.

Deriverable from the usecase analysis, there are 13 tables needed to support this applications (as shows on Figure 5).This application built base on HTML and javascript technology and MySQL as the database.
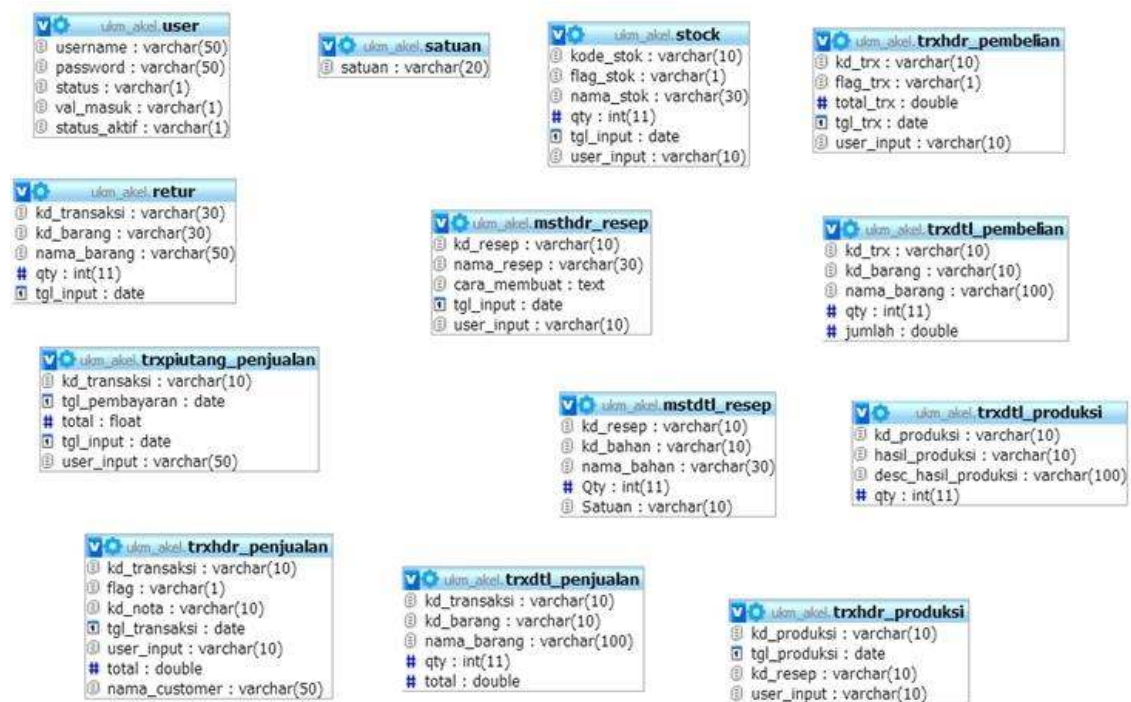

Figure 5 : Tables for the monitoring system applications

5 IMPLEMENTATION OF APPLICATION

This is a web based application that supposed can be develop in future for ERP concepts. There are several type and number of user, each of user have their own password.

Figure 6: Recipe pages

Implementing this monitoring application takes several days, as there still a lot of adaptation need to be done for both parties, especially the users. The users tend to not familiar and need to change some of their habit and business process(cultural aspects).

There is not much constrain in the technology aspects it self, more on the technical problem in using applications. While most of them are focused on the production itself, they do not have time and resources to using this application to enhance their business.

6 PROBLEM and IMPACT ON IMPLEMENTING TECHNOLOGY

Implementing social network strategis are fun session for this farmers group. Because they also learn to make their own profile, and add one another as friend. While on the next session meeting asking their progress of using social networks, much of them have the problem do not have time to play their social network.

Building website is not a big deal, they are very pleased while seeing the website, but again they are not willing to direct interact with them. They looks like some kind of affraid, affraid to ruin the website.

Monitoring application already build, training session have been done. The most and big problem is the unit of measurements. Even in the unit of ingridients and the unit when doing purchasing is very different. Examples : eggs are purchased in Kg, while production, in the ingredients, the unit of eggs needed is 4 or 5 eggs needed.

Another problem is the output of production, there is no one standart resut. Take the Palm Root snack as example, 1 recipe can produce 1.2 – 1.5 Kg. The type of packaging also different, depend on the need and demand. It can be for 100 gram, 250 grams, 500 grams, or even personal pack that have no weight, just pack.

Both application and users try to adapt to each other. In the application sides, the unit of output production are open. It means that after doing the production and packaging, then the user input that process and amount of each type items. At the other hand, users

adapt in the eggs problems, so if they bought eggs, they need to count how many eggs that they got.

Application also adapting in the case of sales price. They have the habits to sales in different price. It cannot be deny that according to their culture, this is how they doing business. So for the one who buy alot or reseller, the price is different with occasionally customers, sometimes to the one that always refunds, they sells in higher prices. The solution for this is an open price in the sales function. So the users need to input the price according to their transaction.

7 CONCLUSION

Untill now, the implementation is still not very smoothly done. It is because of the habit in their business process and need of resources to manage and use the application.

In conclusion, there are several aspects that need to be highlight for better future development :

1. Socio-technical aspects need to be develop as bridge between society and technology
2. Attention more on learning and how to use technology need to be increase especially for midle ages people
3. Developing application that fit to local culture is needed to push the growth of using technology
4. Increasing the scale of research to produce a standard application that can be used by many other SME
5. SME is an area that need to be focused on, as most of them are still far away from technology

Lack of talents in developing local based content and financial constraint are the problem that need to be solve. The local community need to concern more on these SMEs, so all part of the society can be improved by using technology. The market for SMEs still very large, not only local, but also national and international.

8 ACKNOWLEDGEMENTS

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MODEL DEVELOPMENT KNOWLEDGE ASSET MANAGEMENT SYSTEM FOR PRIVATE HIGHER EDUCATION IN WEST JAVA

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Abstract. This study aims to create a model of software used for managing knowledge assets at the private university in West Java in the face, breaking and taking decisions on various issues that occur, especially problems that are not regulated in the manual procedures established by the college management. The method of research was done to achieve the goal of this research is descriptive qualitative method and experimental methods to support the analysis relating to the object of research. Data collection by conducting interviews with the managers of university.

Outcome documents management previously entered into the system (KMS) will go through the process of pre-processing the case folding and stopword removal. After that each of the words and phrases in the document will be projected by WordNet inside the extractor. The results of this process will then generate a set of concept. Concept will then be sent to the next process is the process of analyzing. In this process would be calculated emergence concept in the document (CF) and the emergence of documents that contain the emergence of concept (DF). Concept derived from the processes will then enter into the process of weighting, using the CF-IDF.

1 INTRODUCTION

In general in Indonesia, the college is the last stage of a series of levels. Starting from elementary, junior high, high school / vocational school, and the last is the university. At the college level education has been directed / focused on the placement of, meaning that every student will be educated in accordance with the majors are selected based on their talents and interests they have each. Currently there are about 3,000 colleges, both private and nageri, developed and maintained throughout Indonesia. This shows the high competition management colleges. This condition triggers changes panorama changes over the last decade. Panorama changes may include changes in paradigm, management, competition and so on. It is therefore in management colleges need to apply modern management (C Mandey Lucia, 2009).

This paradigm shift is mainly triggered by the development of information technology, making e-learning, e-university, and the like began much discussed and arranged. So is the change in the management of the agency concerning higher education, both public and swasta.Perguruan held high not only be seen as a center for science, research centers, and community service centers, but also a producer of corporate entity" science"

to" compete" to ensure survival. Competition, as experienced by the company's profit, including competition in the field of quality, price, and service. Management requires knowledge and management skills

One important thing that can be the focus of improvement for private colleges is to utilize the knowledge assets of each manager to be transferred to the next manager from time to time so that the process of managing private colleges can be sustained. It can be used by subsequent management, knowledge can also be used by other managers who face similar problems. Process a variety of assets such knowledge will enrich a manager in solving management problems.

Management of private colleges require a written management regulations (Rule written). The people involved as manager of a community college will usually dominate after management issues experienced at least one period of office, so that the experience is considered to have the information or knowledge management problem solving university campuses. But unfortunately, the result of the experience of the knowledge assets are scattered and stored on each individual officer. As a result, handling high education management issues become less effective, because it requires the observation stage of data to find the data required for the initial phase of the next observation will be carried out repeatedly. Repetition is because the transfer of knowledge between officials very little, occurs only when the officials recently joined the organization, and if there is a discussion among fellow officers.

Conditions repetition at this stage of the actual data observations can still be avoided by the use of documents yield management problem solving college before, ie by collecting information and knowledge that have been documented in these documents. But unfortunately, made access to information and knowledge stored in documents would be quite difficult to do. This is due to the increasing number of documents the results of problem resolution management colleges, so as to explore the information and knowledge stored on these documents will also take quite a long time.

The problem of access to information and knowledge assets stored in existing information systems, can be helped by building a knowledge asset management system (Knowledge Management System). In the implementation of knowledge assets stored on the content of the documents the results of problem solving should be extracted into the system, so that information and knowledge can be easily retrieved by the user.

2 LITERATURE REVIEW

2.1 Knowledge Management System

According to Alavi and Leidner (2001), Knowledge Management System is a system created to facilitate the capture, storage, retrieval, transfer and reuse of knowledge. Meanwhile, according to Skyme, Knowledge Management System is exsplisit vital knowledge management, systematically, and the processes associated to the formation, organization, diffusion, use and exploitation of knowledge again. Based on the definition of the above experts, basically have the same purpose and perception, and it can be concluded that the Knowledge Management System is a system used to perform the capture, storage, retrieval, transfer and management of knowledge to facilitate the re-use of knowledge. Polanyi a chemist was the first to introduce that knowledge consists of two types of tacitknowledge and explicitknowledge. Tacitknowledge is the

knowledge that dwells in the human mind in the form of intuition, judgment, skills, values and belief are very difficult to be formalized and shared with others. While explicitknowledge is knowledge that can be or has been codified in the form of documents or other tangible form so that it can be easily transferred and distributed using a variety of media. Explicitknowledge can be a formula, cassette / cd video and audio, product specifications or manual.The kind of knowledge, by Nonaka and Takeuchi (1995) can be converted through four con-version processes, namely Socialization, Externalization, Combination and Internalization. The four types of the conversion process is called SECI Process (S: Socialization, E: Externalization, C: Combination, I: Internalization).
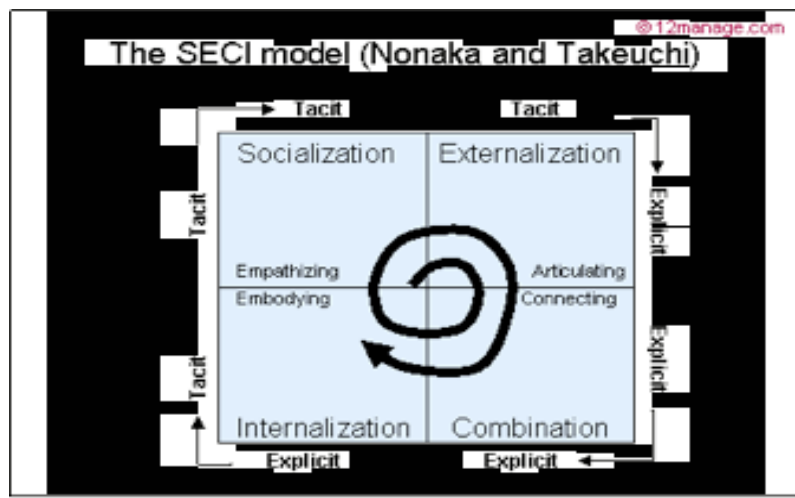

Figure 2.1 : SECI model

1. Socialization
   Sharing tacit knowledge through face to face communication or shared expe-rience.
2. Externalizing
   Trying to convert tacit knowledge to explicit knowledge to develop concepts and models. In the phase of knowledge, tacit converted to form understood and interpreted, so it can also be used by others. Externalized and theoretical knowledge is the basis for creating new knowledge.
3. Combination
   Compilation of explicit knowledge to a wider entity and system concepts. When knowledge in explicit form that can be combined with the knowledge that has been proposed previously. At this stage of knowledge is also analyzed and organized.
4. Iternalization
   Internalization means understanding explicit knowledge. This occurs when explicit knowledge to tacit change and be part of the individual's basic information. The cycle continues now in a spiral of knowledge back to socialization when individuals share tacit knowledge of his secret. This is how the amount of knowledge grows and previous concepts can change.

2.2 The Implementation Knowledge Management

In deciding KMS implementation strategy for the organization, there are five steps that must be followed. The five stages can be seen in Figure 2.2.
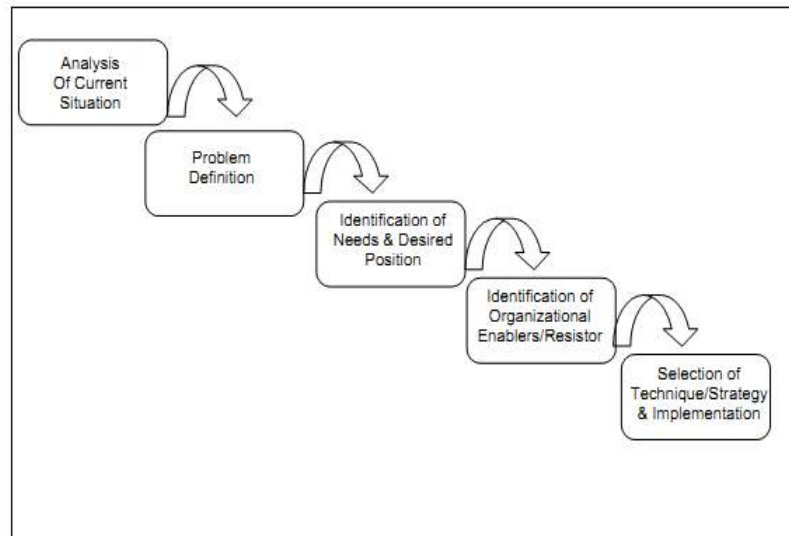
Figurer 2.2 Implementation of Knowledge Management

1. Analysis of Current Situation
   Analyze a situation or condition that is currently going on in the organization. This needs to be done to determine what the desired result as the organization and the resources that are available. With this analysis, will be able to identify the gap between what is desired and organi-zations that are currently available within the organization.
2. Problem Definition
   After going through the stages of analysis, the next step is to define the problem that has been found.
3. Identification of Needs
   To identify the needs of what is needed and what domains will be caught in the system.
4. Identification of Organizational Ena-blers/Resistors
   Identify obstacles that may hinder the development of such systems and the launch issue of access, the individual reluctance to share and other things
5. Selection and Implementation of Tech-nique/Strategies
   At this final stage, will be evaluated from the previous process to determine the type of knowledge management strategy and will be applied.

2.3 Text Mining

Text mining is the development of data mining and has the same goal of getting knowledge from data, in text mining such knowledge means taken from documents (articles, writings, etc.). In the process of gaining knowledge, text mining is divided into three phases, namely pre-processing, discovery, and post-processing. But not all of the steps in the application may be used, depending on your usage. According to the book The Text Mining Handbook, text mining can be defined as a process of collecting information which a user interacts with a set of documents using the tools of analysis

that is a component in data mining. The goal of text mining is to obtain useful information from a collection of documents.

2.4. CF-IDF (Concept Frequency-Inverse Document Frequency)

To determine the value of a match between the documents necessary knowledge and keyword weighting. Weighting also called weighting is weighting the words / phrases that have resulted from the previous stage. Model weighting can be weighted global, local or even a combination of both. One such combination is the weighting CF-IDF (In-verse Document Frequency-Concept Fre-quency). This method is a development of the method TF-IDF (Term Frequency-In-verse Document Frequency) is first popular. In this method does not do the calculation of the term (such as TF-IDF), but by calculating the key concept is found in the text.

In the CF-IDF, document represen-tation approaches using semantic networks called semantic core document. The docu-ment is then mapped in a semantic network called Wordnet and converted from a set of terms into a set of concepts (concept). This approach makes the concept of the CF-IDF look smarter than TF-IDF. Concept mentioned in this method is a compound word or a combination of said term can have many meanings and lead to ambiguity in the readings.
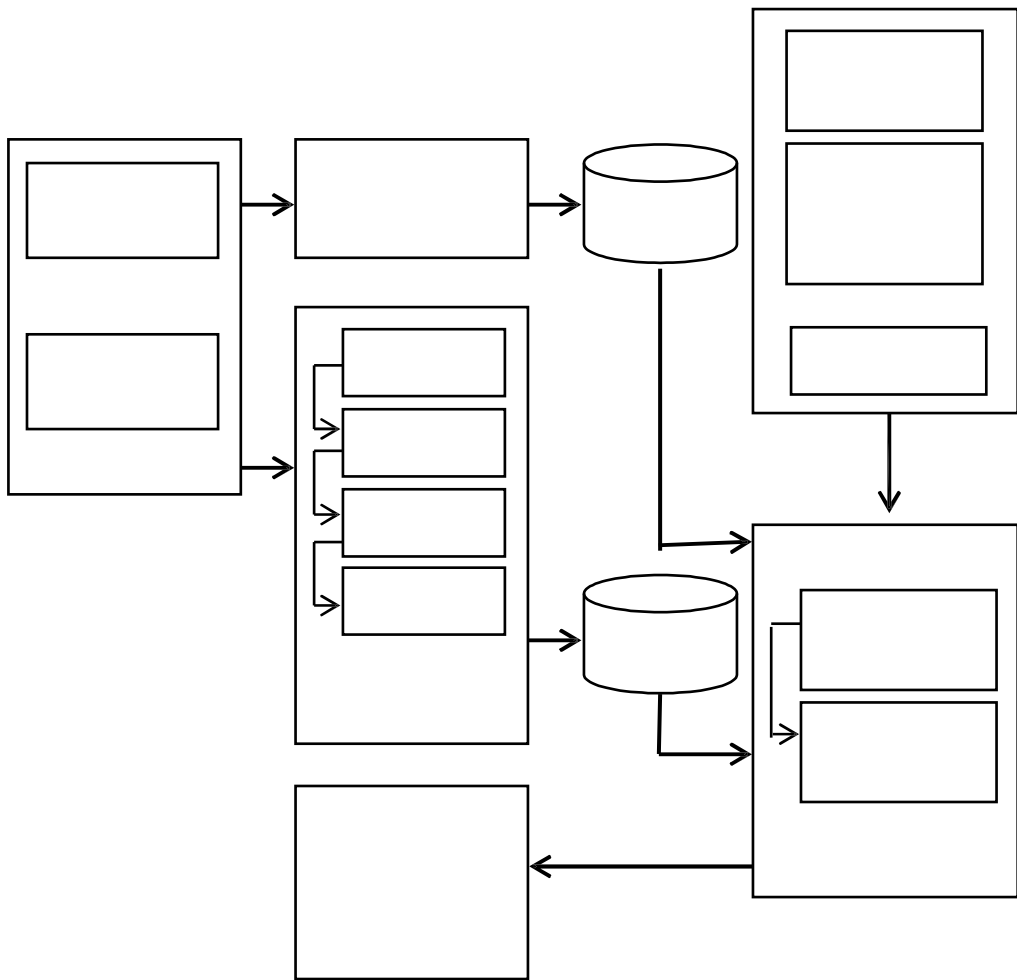
3 RESEARCH METHODOLOGY

The method of research was done to achieve the goal of this research is descriptive quali-tative method and expe-rimental methods. The system to be deve-loped in this research, based on the needs of managers of private universities to access information and knowledge from these reports the results of the previous problem solving, so the new system will be developed, to allow users to access relevant knowledge pool which can be used for the subsequent pro-blem solving. The description of the system to be developed is shown in figure 3.1.

4 RESULT

4.1 Establishment of Knowledge

In the management of higher education, socialization processes performed by each individual instance conversation, discussion and other similar activities. When the conversation is there a process of knowledge transfer, tacit to tacit.

There are Externalization process of knowledge transfer tacit knowledge into explicit knowledge. In the management of higher education, tacit knowledge in the form of decision-making to a problem that is not set in SOP (Standard Operating Procedure) based on experience, intuition, judgment, skills and confidence of each individual. Each officer will share problems and solutions that have been completed into the system. Such knowledge would then become the new knowledge to other officials in resolving the same or similar problems.
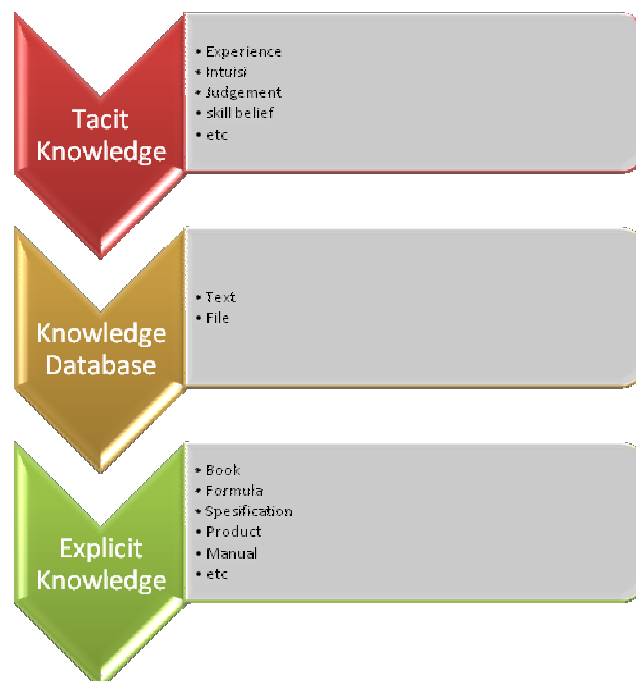

Figure 4.1 : Establishement Knowledge Proces

Combination process is transfer process explicit knowledge to explicit knowledge. For example, in the production of a prototype, books and so forth. While the Internalization

transferring explicit knowledge to tacit knowledge such as professors who teach students and so forth. The process of knowledge formation of tacit knowledge into explicit knowledge as on. In the KMS to be constructed, the know-ledge base is a machine that can store data and knowledge to search documents that conform to the required

4.2 System overview

Input block there are two entries namely document and search keywords. The second input is equally through pre-processing stage. Pre-processing is one of the text mining process. In the pre-processing stage, the process will be further divided into several sub-processes namely case folding, stopword removal and analyzing. This process is intended to clean up the document from the things that could roil further knowledge processing results.

Folding process removes the case from the documents and punctuation will also alter all the letters in a document to be lowercase. Then the process of stopword removal, this process will eliminate words that are not essential from documents such as conjunctive. Having gone through both the pre-processing process, both the input document and the keyword will search through the level before extraction by analyzing levels. This level will translate each word in the document with WordNet until recovered concept of each word or phrase. While the process will determined connectivity analyzing each document based on the concept that it owns.

Input documents that have been through the process of going through the analyzing extraction. In that level there counting process the CF and the DF calculations. CF value is how often the document concept while DF is calculated based on the total value of a concept document. Input search keywords that have gone through the process of going through the further extraction of the CF-IDF calculation. The process of the CF-IDF calculation would result similaritas value your content with search keywords. The documents that have similaritas with search keywords will then be displayed as output from the system.

4.3   Proses Text Mining

In the search process in the system, to find a match between a keyword search problem with the document, use one of the methods of text mining, namely CF-IDF (Concept Frequency - Inverse Document Frequency). By using this method, each word or phrase that appears in the document will be mapped to the WordNet into a concept that has the same meaning. After that, then calculated the weight of each of the documents that have similar problems (similarity) with search keywords entered by the user. Weight calculation by first calculating the frequency of concept in the document (CF) and frequency of occur-rence documents contained concept (DF).

In calculating the weight of compliance documents, will be used CF-IDF method. In this method, the required frequency of occurrence of concept documents in Table 3.7 and the frequency of the appearance of the number of documents that contain the same concept as in Table 3.8. For the calculation of the weight cf use the following formula:

$$cf_{i,j} = \frac{n_{i,j}}{\sum_k n_{k,j}} \dots\dots\dots\dots\dots\dots (1)$$

When

$cf_{i,j}$ = frequency ratio concept on document

$n_{i,j}$ = number of occurences of concept in a document

$\sum_k n_{k,j}$ = total appearance of the entire concept in document

Calculation of weights idf:

$$idf_i = \log \frac{|D|}{|\{d: c_i \in d\}|} \ldots\ldots (2)$$

When,

idf_i = frequency ratio document

$|D|$ = total number of documents

$\{d: c_i \in d\}$ = number of documents the emergence of concept

Idf weighting formula calculation above, the weight value will be 0 if idf total number of documents and number of documents contained the same concept of appearance. For example, let's say the total number of documents and number of documents contained concept occurrence is 5, then;

$$idf_i = \log \frac{|5|}{5} = \log 1 = 0$$

Idf value will be used for further calculations, the calculation of the CF-IDF weight calculation formula as follows:\

$$W = cf_{i,j} \times idf_i \ldots\ldots (3)$$

When :

W = CF-IDF weighting

$cf_{i,j}$ = frequency ratio concept on document

idf_i = Idf document frequency ratios

A value of 0 in the idf weights will make the CF-IDF weighting also be 0. Therefore, the addition of conditions on the calculation of the value of idf. Where value is added idf value 1 as in formula 4.

$$idf_i = \log \frac{|D|}{|\{d: c_i \in d\}|} + 1 \ldots\ldots (4)$$

5 CONCLUSION

Development of an asset management system model for the development of knowledge management of private universities is needed in order to deal with various problems and needs to be acted upon quickly and accurately. With the development of an asset management system is the manager does not require a long time to solve the same problems encountered by previous managers. Likewise, the new managers face the same or new problems may share their knowledge to future official successor.

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INFRASTRUCTURE PROJECTS IN INDIA-CAUSES OF DELAYS AND REMEDIAL MEASURES NEEDED TO EXPEDITIOUSLY COMPLETE THEM FOR FASTER GDP GROWTH

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Abstract. *This document provides possibilities and ways to improve infrastructure development in India. Infrastructure development in India is a major requirement for India's GDP growth. Our fiscal, judicial and regulatory policies need to be amended to facilitate desired amount of investments in our infrastructure projects as per the annual plan. Considerable potential exists to get foreign capital at reasonable cost. Infrastructure projects like Mega Power Plants, Highways and expressways, Airports, Ports, Railways, Real Estate, have long payback period and hence will require large chunk of foreign investment on long term basis at low interest rates. Banks in India generally will fund projects for 10 years, whereas infrastructure projects have 20 to30 years payback period.*

1.   FINANCING OF LARGE INFRASTRUCTURE PROJECTS

One solution is that the banks in India finance the infrastructure project for the first 7-10 years and subsequently the financing can be done by bond issue in foreign countries. Also long term funds can be provided by sovereign wealth funds and pension funds by investing in the Indian debt market provided our government gives them preferential treatment. Delays in implementation of large infrastructure projects be it a mega power project, highways construction etc are common, due to lack of holistic approach in interpretation of policies by various departments of the government.

2.   PLIGHT OF MEGA POWER PROJECTS IN INDIA

Coal is not made available to a 4000 Megawatt project in Sasan, India after the project is ready, because of dispute on transfer of land held by Coal India (Public Sector Company) subsidiary Northern Coalfields Ltd. Delays in coal supplies would severely impact the project profitability, for no fault of the promoters of the project, in this case Reliance Power a very large and reputed company in private sector in India.

Foreign Direct Investment by China Light and Power Company in a 1700 Megawatt project in Haryana, India has not been supplied coal by Coal India Limited. The company had to write to the PMO (Prime Minister's Office) For intervention.

The reason given was that enough rail rakes have not been provided by the Indian Railways to supply coal the power plant in North India. The ultimate situation is that the Coal India Limited does not have sufficient coal and can supply only 50-75% of coal requirement of power plants. Balance coal requirement should be met by coal imports which is costlier than the domestic coal. Ultimately the target of 60000MWpower projects by 2015 generating power profitably will not happen because of lack of sufficient domestic coal supplies.

3.   HIGHWAYS CONSTRUCTION IN INDIA

Highways construction is much below the planned level. About Rs 15000 crores payment is overdue to the construction contractors because of the payment guidelines interpretation disputes between the National Highways Authority of India and the contractors.

Intervention by the government was necessary, and a committee of 3 Chief General Managers of PSU, (Public Sector Undertaking) Banks and one retired judge from the High Court has been formed by the Reserve Bank of India to expeditiously disburse the overdue payment to the construction contractors. Further allotment of the new contracts by NHAI will be possible after that, and hopefully the construction of highways will move at faster pace in keeping up with the planned target of the government as per the11th Five year plan(2007-2012).

4.   GOVERNMENT INITIATIVES

The Cabinet Committee on Infrastructure (CCI), under the Chairmanship of the Prime Minister, was Constituted on July 6, 2009. The CCI approves and reviews policies and monitors implementation of Programmes and Projects across infrastructure sectors like Roads, Power, Ports, Telecom, Airports, Railways, Real Estate, Mining, Oil & Gas.

The Planning Commission has projected that investment in infrastructure would almost double at US$ 1,025 billion in the 12th Five Year Plan (2012-17). Of the US$ 1,025 billion, 50 per cent is expected to come from private sector, whose investment has been 36% in the 11th

Plan. With a view to streamlining and simplifying the appraisal and approval process for Public Private Partnership (PPP) projects, a Public Private Partnership Appraisal Committee (PPPAC) has been constituted under the chairmanship of Secretary, Department of Economic Affairs and Secretaries of Planning Commission, Department of Expenditure, Department of Legal Affairs and the concerned Administrative Department as its members.

The infrastructure sector is governed by specific statutes governing the specific sectors it encompasses. These statues clearly provide the modes and means of private participation. Generally private participation is allowed through grant of licenses the private developer or through contractual relationship. The scope and extent of private participation is determined by the state government concerned and can be of varying degrees, such as on a build, own and operate (BOO) or build, operate and transfer (BOT) or build, lease and transfer (BLT) basis. These are just a few of the popular modes.

5.   RAILWAYS

While it is possible for other infrastructure projects in ports, highway & airports to be an independent system which could be operated and maintained independently of the existing system, the same is not possible for Railways. Here any project has to be supplementary or an extension to an existing larger railway network. Due to this historical perspective, railway activities are not readily available to private sector which poses a new challenge of building capacity with private sector through PPP.

Besides this, Railway Stations at metropolitan cities and important tourist centers need to be modernized to provide world – class passenger amenities and services to the large multitude of passengers using these stations. IR is planning to do so by attracting private investments in the area by lever aging the land around and airspace above the stations.

A comparison of the projects which are in the process of being implemented through PPP and the size of IR leads one to the conclusion that the projects in PPP format do not, as of now, form a significant financing option. On an optimistic note, it also shows that the scope of PPP in IR is immense. India needs investments in infrastructure to the tune of $456 billion at current prices (more than $80 billion in Railways) during the Eleventh five year plan (2007-2012) to keep pace with the economic growth it is experiencing. It must be noted that in spite of such dire need of funds in IR and the limited nature of its surplus, the IR has followed a cautious approach in inviting private sector participation in IR.

6.   THE DELHI METRO RAIL CORPORATION (DMRC)

DMRC has partnered with Google India (through Google Transit) to provide train schedule and route information to mobile devices with Google Maps. The Delhi Metro though plagued by controversies in the form of technical snags, overcrowding and accidents at the

construction sites has proved as a model for the other metros in the country to follow. Phases 3 and 4 will expand the total journey to 413.8km (at present is 190km) and are scheduled to open in 2016 and 2020 respectively. With such a great pace of work, the Delhi Metro will soon become one of the fastest expanding metro networks in the world.

New Metro project to serve from Noida Uttar Pradesh to Greater Noida about 30 kilometers route has been recently sanctioned. This project will be completed by end 2014. The proposal was pending for more than 2 years with the state government. The completion of this project will bring faster urbanization of Greater Noida and will result in faster growth of real estate projects along the 30 kilometer route.

7.   GMR AIRPORT PROJECT

Delhi airport project debt: equity 5:25 financial closure was very difficult. Presently revenue inflows are less than projected.

8.   ROADS AND HIGHWAYS PROJECTS

8.1.   DELHI GURGAON EXPRESSWAY

Toll collection so many issues. There have been so many changes in the ownership Of this project. Finally because of the failure of the toll collection by the private, finally the ownership has been transferred to the state government. This is one example where the expressway was not operationalised for lack of toll collection facility and ownership.

8.2. YAMUNA EXPRESSWAY (GREATER NOIDA TO AGRA)

Toll collection very low, delay in opening for public use after completion, although land bank along the expressway may fetch handsome returns for the promoters in the long run.

9.   TELECOM SECTOR

Telecom operators are in bad shape, bottom line no good. ARPU (Average Revenue Per Unit) has come down from Rs 467 to Rs97. Although talk time has gone upto 346 minutes. Have not been easy to attract debt and equity. Rupee denominated bonds can be issued in USA and Canada Pension funds.

10.   CONSTRUCTION SECTOR

Timely completion of project very difficult, huge risk for the investors. States do not follow what the federal government says. Land acquisition laws are big bottleneck in the construction sector.

11.   FDI IN DOMESTIC AIRLINES

First investment by a foreign airline in Jet Airways after the government liberalized the foreign direct investment policy a few weeks before, is under negotiation under the new policy, government has permitted foreign carriers to invest directly upto 49% in an Indian domestic carrier. The liberalization comes at a time when the Indian market is trying to extricate itself from a serious financial crisis, and airlines are looking for fresh cash infusion to growth.

Kingfisher Airlines had to close his services, as they were unable to face competition of low cost carriers, which have grabbed over 65% of the market. Here also our government has delayed matter of FDI investment by foreign airlines, in order to support government operated Air India which will be a clear loser if the deal between Etihad Airlines and Jet Airways gets finalized.

12. CONCLUSION

GDP will improve when our government changes the investment climate. The surplus funds available are used by our government floating bonds.. Banks are forced to buy up government bonds. Two-thirds of households savings in a year are reinvested in the government bonds.. This money should actually be channelised for investing in the private sector projects.

Bottlenecks choking growth are also in need of attention. Coal shortage is hurting electricity production. Road builders are not able to make highways as the environmental clearances promised to them by NHAI are taking too long.

Therefore it is imperative that our government mobilizes greater investment in the private sector projects, so that the domestic production increases, so that our imports are reduced. Otherwise India's 5.4% current account deficit will further increase. This also means that our government should avoid the temptation to indulge in vote- buying spending on populist measures.

Above points explain why GDP growth for the current financial year is expected to slow to a 10- year low of 5.5%

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SURVEY ON SEQUENTIAL PATTERN MINING

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Abstract. *Database containing data sequences is very interesting to be explored for meaningful knowledge from sequence data. Sequential data form patterns that give meaning to user. Sequential pattern was obtained through implementing sequential pattern mining algorithms.*

Sequential pattern mining algorithm requires repeating database scanning. Sequential pattern mining also discovers many short, trivial and less meaningful sequential patterns to user. The challenge is how to find the sequential pattern mining algorithm that requires only a few database scans and the discovered sequential patterns provide significant meaning for user. Another challenge is how sequential pattern mining can be applied to a variety of conditions and constraints of databases, such as dynamic database and multi-dimensional database.

Various sequential pattern mining algorithms are developed to answer the above challenges. In this paper, we provide a survey of sequential pattern mining algorithm to give overview of research in sequential pattern mining.

1 INTRODUCTION

Nowadays, sequential pattern mining has attracted many researchers' attention due to its contribution for knowledge data discovery. It is because sequential pattern mining finds frequent subsequences from sequence data in database. In many data types, subsequences give meaningful knowledge to learn.

Sequence data with temporal information contains sequential events. We take an example of retail sales data in a supermarket, which after a customer bought a laptop, customer will buy a printer. The purchase process is a series of data with sequence where number of items purchased in each event is not considered. The sequences found are very interesting to learn as knowledge for user. It can be analyzed and used as a basis for strategic decision making such as marketing programs. Based on the knowledge of the sequential pattern, the shop owner can do promotions and set up the

placement rack that brings all of these items in order according to ordered purchased items.

Sequential pattern mining is a method for searching frequent subsequences in a sequence data set, where a sequence contains ordered events [1]. Sequential pattern mining has been used to mine various type of data, such as protein data [2];[3];[4];[5], transaction data from both retail and other transactions [6], text documents [7];[8], web usage mining [9];[10], rules [11], bioinformatics data [12], data stream [13]. Sequence of data on each data type contains meaningful knowledge.

This paper contains a survey about many approaches that have been done in sequential pattern mining. This paper will elaborate the idea in several sections. Section I gives an overview of areas that sequential pattern mining can contribute. Section II explains about general approaches for mining sequence database. Section III contains conclusion of this paper.

2 APPROACHES FOR SEQUENTIAL PATTERN MINING

Sequential pattern mining was originally developed by Agrawal and Srikant [14] for market based analysis. Sequential pattern mining is the process of data mining on a data set that contains repeating sequence of events considering time. Sequential pattern mining is one of the developments of frequent itemset mining. Let there be I = {i1, i2,. . ., ik}, that I is a set of all items. A subset of I is called itemset. Sequences α = _t1, t2,. . ., tm_ (ti ⊆ I) is an ordered list. Each itemset in a sequence represents the set of events that occur at the same time (same timestamp) while different itemset appears at different time.

Based on the type of database, the approach taken for sequential pattern mining can be grouped into three categories: static database, dynamic database and multi database. Static database is a database with fixed number of data and has no insertion, append or deletion operation on data. Various approaches of sequential pattern mining has been developed for getting sequential pattern on static database, such as Apriori, GSP, PSP, Spade, SPAM, PrefixSpan, CloSpan, Bide, TSP, WCloSpan, MSPX, PMSPX, SPIRIT, D-Miner. Dynamic database is a database which has data insertion, append and deletion. Sequential pattern mining approach for mining dynamic database must be able to accommodate changes to the database so it doesn't need to find sequential patterns from scratch but utilizing previous sequential patterns to get updated sequential patterns. Examples of sequential pattern mining for dynamic databases is GSP+, MFS+, IncSpan, CISpan, Pisa, SeqStream. Multi database consists of variety of data, for example transaction data combined with web usage data. Some sequential pattern mining approaches for multi database is PSFP, PrefixMDSpan, AMGMSP.

Process of finding sequential patterns needs repeated database scans. It requires time-consuming computation. Moreover, number of sequential patterns found is exploded while patterns found are short and many of them do not provide significant meaning for user (trivial). Another problem is scalabity. This problem comes with the growing of mined database.

The challenges faced in sequential pattern mining is to develop an algorithm with few database scans while number of sequential patterns obtained is few and meaningful to

user. For scalability issue, sequential pattern mining algorithm is challenged to mine updated database, multi database and multidimensional database effectively & efficiently. Therefore, many studies on sequential pattern mining were done to address the above problems.
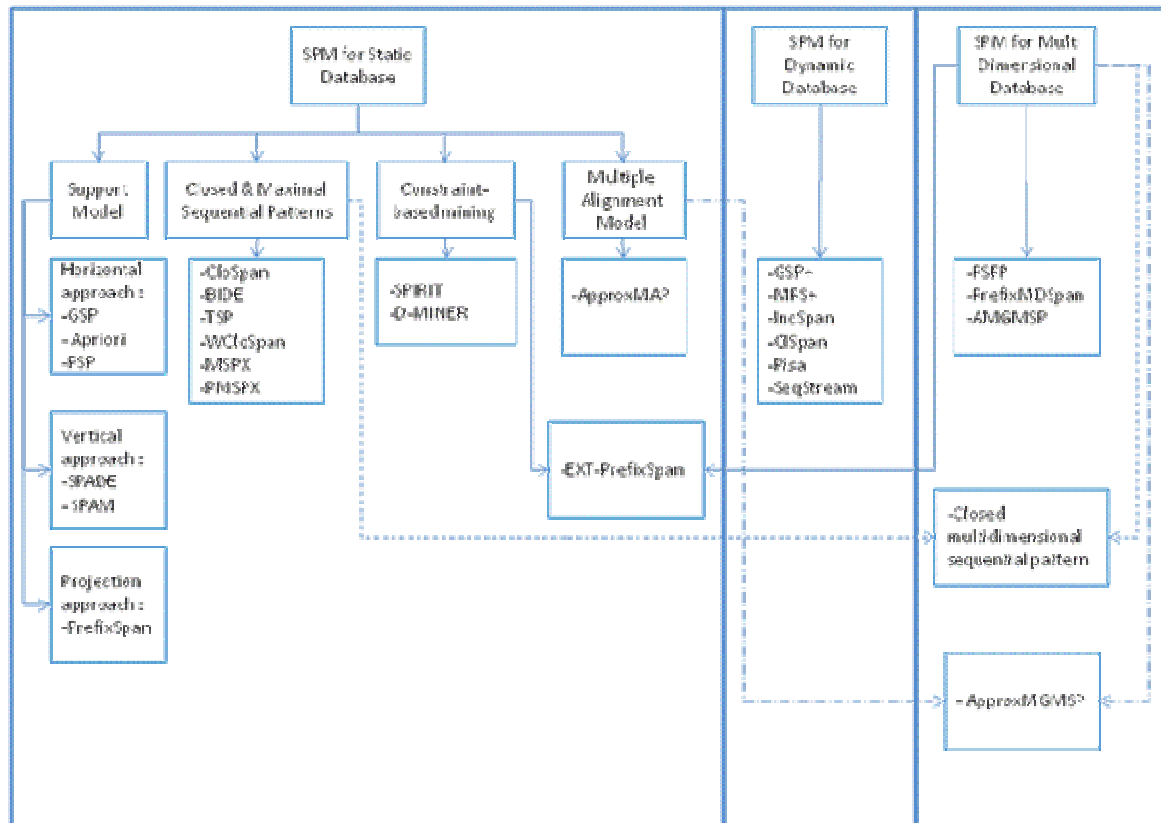

Figure 1. Approaches of Sequential Pattern Mining

A. Sequential Pattern Mining for Static Database

Several approaches in sequential pattern mining for static databases can be subdivided into several categories: exact sequential patterns based on support model, closed and maximal sequential patterns, constraint-based sequential patterns, multiple alignment/approximation sequential patterns.

A.1. Support Model of Sequential Pattern Mining

In general, the algorithms used in sequential pattern mining are divided into 3 categories based on the evaluation method for finding candidate sequential patterns [16] :

1. Horizontal approach. This approach uses an breadth-first search. Several methods in this approach are : Apriori and GSP (Generalized Sequential Patterns). GSP is an algorithm in sequential pattern that is based on Apriori, horizontal approach, a bottom-up and breadth first search [17]. GSP (Generalized Sequential Pattern) makes multiple passes over data that searches frequent items started with composing 1-element frequent sequences and other frequent based on previous pass. GSP finds

length-1 candidate through 1 time scan database and sorts it based on the value of support and ignore candidates with support < min_sup. For each level of the sequence with a length-k, this method scans the database to get support value for each candidate sequence and generate length-(k+1) candidate from length-k repetitive sequences through Apriori. This is repeated until there are no repetitive sequences nor candidate that can be found [18]. GSP method faces obstacle when applied to large-scale data mining since it requires repeated database scanning to be able to get sequential pattern. Another algorithm development based on GSP is PSP [19].

2. Vertical approach. This approach clusters frequent sequences based on prefix similarity and candidate sequences enumeration. Method using this kind of approach is SPADE (Sequential Pattern Discovery using Equivalence Classes). SPADE is an algorithm based on vertical approach that clusters frequent sequences based on the common prefixes [20]. Basically, SPADE improves efficiency by reducing number of database scans since it only needs 3 database scans. The first scan aims to obtain frequent items. The second scan aims to get frequent sequences with length 2 and the last scan is to associate table with the corresponding sequence_id and itemset_id (or transaction_id) with the length 2 frequent sequences in the database, called the id_lists. [16]. An extention of SPADE algorithm is SPAM (Sequential Pattern Mining) which is a vertical approach algorithm that uses bit-vectors to represent id-lists [16].

3. Projection Approach. This approach is a blend of horizontal and vertical approach. Algorithm that has projection approach is PREFIX SPAN (Prefix-project Sequential PatterN Mining) [21]. The idea of PrefixSpan is to project horizontal database, for given prefix sequence P, so that projected database contains only sequences that has prefix P. PrefixSpan aims to project database horizontally so that the database contains only sequences that have prefix P. The frequency of the prefix sequence can be calculated in the projection database and through recursive projections, all frequent sequences can be enumerated. PrefixSpan has better performance in finding sequential patterns than GSP or SPADE. However, GSP, SPADE, SPAM and PrefixSpan are conventional method using support model that finds exact sequence patterns in database.

A.2. Sequential Pattern Mining For Closed & Maximal Sequence

Sometimes sequential patterns which were found from mining process are short or trivial. It is a challenge to find the complete patterns that have significant meaning or closed sequential patterns. Closed sequential pattern or closed subsequences is sequence that contains no super-sequence with same support. Closed sequential pattern is more useful than the complete set of frequent patterns.

Closed sequential pattern mining is developed by Yan et al, 2003 [22] through CloSpan algorithm. More development on the algorithm is algorithm Bide (Bidirectional Extension) to get frequent closed sequences through event extension that is forward and backward [23]. Algorithm Bide is better than PrefixSpan in time and requires less memory than CloSpan. The algorithm developed to TSP (Top-K Closed Sequential

Patterns) that leverages the length constraint and the properties of Top-K closed sequential patterns for dynamic support-raising and projected database pruning [24].

To get fewer number & significant meaning of sequential pattern, WCloSpan algorithm was found to give weight to the sequential pattern growth approach while still maintaining downward closure property [25]. Infrequent sequential patterns are removed by the algorithm MSPX. MSPX is a bottom-up approach and at each pass the algorithm is looking for the most of the infrequent patterns by counting only the potentially infrequent candidates against the database [26]. MSPX algorithm was developed further by Luo & Chung, 2012 [27] and named by PMSPX (Parallel MSPX) using multiple samples to exclude infrequent sequences.

A.3. Constraint-based Mining

Constraint is a limitation defined by user in finding sequential patterns from database. Constraint can be obtained from expert knowledge and user requirement. By applying constraint-based sequential pattern mining, sequential patterns obtained will be automatically filtered based on predetermined constraints.

Constraint-based mining addresses needs to get a small number of sequence patterns but interesting for user. With a few numbers of sequential patterns obtained, then time required for next data mining process will be reduced. Accuracy of data mining process will be higher since sequential patterns obtained are already in accordance with user requirement.

Given a constraint C for sequential pattern mining, C is a Boolean function C (α) on the set of all sequences. The problem of constraint-based sequential pattern mining is to find the complete set of sequential patterns satisfying a given constraint C [29]. Constraints can be divided into several types : item constraint, length constraint, super-pattern constraint, aggregate constraint, regular expression constraint, duration constraint, gap constraint. Item constraint is about whether a subset of items may exist or not in pattern. Constraint length is the length requirement of a pattern, whereas it can be meant as number of item occurrences or number of transactions. Length constraints can also be defined as the number of distinct items or the maximum number of items per transaction.

Super-pattern constraint is looking for a pattern that contains a particular set of patterns as sub-patterns. Aggregate constraint is a constraint of the aggregate item in the pattern, for example, an item with aggregate functions sum, average, max, min etc. Regular expression constraint is a constraint with a regular expression, such as disjunction and Kleene closure on a set of items. Duration constraint is only on sequence databases where each transaction in the sequence has a timestamp. This constraint requires sequential pattern to meet predefined timestamp difference requirement between the beginning and end of transaction. Gap constraint is also applied to the sequence database with a timestamp. Gap constraint requires a predefined timestamp difference between the two transactions that must be fulfilled.

Sequential pattern mining algorithm that considers constraint is SPIRIT [30]. Constraints on sequential pattern mining can also be assigned different weights on sequential traversal pattern according to its need [31]. Weights are for maintaining

downward closure property and pruning infrequent sequential traversal subsequence. One of constraint which is developed is occurrence list [32]. This algorithm uses a single generalized occurrence to represent several occurrences.

Other algorithm that is based on constraint is D-MINER [33]. To mine for descriptive patterns, i.e. episodes rules, there are two approaches that can be applied, that is Winepi and Minepi Winepi [34].

A.4. Multiple Alignment Model

Sequence patterns generated from conventional algorithms are often susceptible to noise. Sometimes sequential patterns that are interesting to users are not a complete one but patterns that are appeared in many sequences. From several patterns, there can be found an approximate pattern that represents all the existing ones. This approach addresses scalability needs.

Another model used in sequential pattern mining is multiple alignment model. The idea is that the occurrence probability of any two long data sequences purely by chance is very low. Therefore if there is a number of long sequences can be aligned with respect to particular items that occur frequently in certain position then the sequential patterns are statistically significant [15]. Given a set of sequences, an approximation method will cluster sequences into similar ones. Then each group will be aligned to generate a consensus pattern. Approximation is used for the sake of computational efficiency.

Multiple alignment model is suitable for mining multiple databases. Sequence pattern are searched at local level and summarized patterns are used in global mining process. Summarizing patterns uses approximation for patterns that are shared by many sequences or is called consensus patterns. Consensus patterns can be extracted through clustering sequences by similarity and then it is mined directly from each cluster by multiple alignment.

Approximate pattern mining is effectively applied to multiple databases. Approximate pattern mining is robust to noise that appears in the sequence patterns. Approximate algorithm was first introduced as ApproxMAP (APPROXimate Multiple Alignment Pattern mining) to obtain consensus patterns from large sequence databases [28]. Patterns are clustered based on its similarity. After obtaining the clusters, consensus patterns are mined from each clusters with multiple alignment to get the longest consensus pattern that represents the cluster [35].

B.   Sequential Pattern Mining for Dynamic Database

Many sequential pattern mining algorithms are developed for static databases. In practice, real database is not static but dynamic and growing. An example of dynamic database are streaming database and growing database. Database will have insert, update and delete operations. These operations will have an impact on data mining. Sequential pattern mining process will be done repeatedly starting from scratch to regain sequential patterns. We need to prevent this from happening since it will need more time to get sequential pattern mining process done. Therefore, an incremental data mining were developed to overcome constraints in dynamic database.

Several developments are made to get the sequential patterns in incremental way. Algorithms GSP+ and MFS+ were developed based on GSP and MFS algorithms to mine frequent sequences based on a set of frequent sequences obtained from previous database mining [36].

IncSpan algorithm was developed to overcome insert and append process in a large database [37]. IncSpan's objective is to mine frequent subsequences in a database that has insert and append process based on frequent subsequences that have been obtained previously. Incremental mining is also being used to mine closed sequential patterns, for example using CISpan algorithm (Comprehensive Incremental Sequential Pattern mining) [38].

Starts with user requirements for knowledge from the latest data and uninterestingness of old data, an algorithm Pisa was developed (Progressive mining of Sequential pAtterns). Pisa algorithm was meant to get the latest sequential patterns [39]. Pisa algorithm uses progressive sequential tree to maintain latest data sequences and get the complete set of up-to-date sequential patterns within a specified period of time and erase the data and patterns that are already obsolete (period of interest, POI).

Progressive sequential pattern mining is used to mine sequential patterns by considering interval item between successive items. This interval will distinguish between two events with the same sequence at a specified time period (Period of Interest, POI). Weighting approach is applied to progressive sequential pattern algorithm [40].

For a database with the stream and continuous data and a very high fluctuating data rates, such as data from the electronic sensor measurements, some algorithm development was made for sequential pattern mining. The challenge was on how to get the sequential patterns with short time and small memory constraints. SeqStream algorithm was developed for sequential patterns over data stream sliding windows incrementally [41].

The development of increment algorithm was made to handle updated temporal association rules in temporal database so that there is no need to rehash mining temporal algorithm [42].

C. Sequential Pattern Mining for Multi Dimensional

Multi-dimensional database is a collection of data that contains a variety of dimensions. The addition of dimensions to the mining process is expected to improve the usefulness of generated sequential patterns. Multi-dimensional sequential pattern mining is a process of sequential pattern mining with other unordered dimensions. For example is an online store that has customer database and customer's log data to a website with specific traversals and each traversal visits web pages [43].

PSFP, PrefixSpan with FP-growth algorithm [44] was developed to find sequential patterns in multi-dimensional database. This algorithm performs mining sequential patterns for base dimension (ordered) using PrefixSpan, while keeping the FP-tree for unordered dimensions that occur along the pattern. Another algorithm developed is PrefixMDSpan [43] which is developed from PrefixSpan. Some research on constraint-based sequential pattern mining is using an extended version of the PrefixSpan

(EXT-PrefixSpan) to extract constraint-based multidimensional frequent sequential pattern in web usage mining [45].

For distributed environment, ApproxMGMSP algorithm (Approximate Mining of Global Multidimensional Sequential Patterns) was developed to solve multidimensional sequential patterns mining problem for large databases [46]. The algorithm seeks approximate patterns in distributed environment. In ApproxMGMSP, local patterns are found by approximate pattern mining and afterwards global multidimensional sequential patterns are found by high vote sequential pattern model. Combining mining algorithm for closed pattern mining and multidimensional mining, an algorithm that mines closed multidimensional sequential patterns is developed. It combines the closed sequential pattern mining and closed itemset pattern mining of multidimensional information [47].

12 CONCLUSIONS

Sequential pattern mining is very useful for getting sequential patterns from sequence database. Sequential patterns obtained are expected to be interesting and meaningful to user. Computational time should also be kept low to achieve good time performance.

Many algorithms were developed to reach effectiveness and computational efficiency of sequential pattern mining. Constraint-based sequential pattern mining helps user to get non-trivial and meaningful sequential patterns. For multi database and multidimensional database, multiple alignment algorithm was developed to get approximate patterns that occur in multi databases. The algorithm can improve effectiveness and efficiency. While for dynamic database, incremental mining was developed to solve dynamic process in database, such as insert or append process.

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