VIRTUAL OFFICE SERVICE MANAGEMENT:
PROPOSED DEVELOPMENT MODEL
IN INDONESIAN UNIVERSITIES

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ABSTRACT

Virtual office activity performed at several universities in Indonesia is still allegedly limited on Online Transaction Processing (OLTP) or merely a recording of available activities transaction, and has not reached the Online Analytical Processing (OLAP), which supports decision-making functions. Thus, there should be an evaluation of the virtual office services implementation that have been performed, along with the virtual office service system development with Enterprise Resource Planning (ERP) concept, to optimize information technology resources so that the intended use of the virtual office application can achieve optimal performance to all stakeholders. Based on the evaluation results of the existing virtual offices application and analysis of user requirements, it is proposed a virtual office service development model for Universities in Indonesia, particularly lecturer dashboard, office service dashboard, and accreditation dashboard model. Satya Wacana Christian University (SWCU), which was nominated as the Best University in Central Java in terms of Information and Communication Technology (ICT) application in TeSCA) version was used as a sample in this study.

Keywords: Virtual Office, Enterprise Resource Planning (ERP), Management Information System, University, Information & Communication Technology.

Introduction:

Office is a supporting unit within an organization. Its presence is needed by stakeholders to gain information and administrative services. In an organization, it can be regarded as the central of information for all stakeholders involved in an organization. Thus, the existence of the office can't be separated with the Management Information Systems (MIS) in an organization. Office work is often known by the term "administration", or paperwork (clerical work). Those are narrow understandings. Broadly, office work is a series of activities to collect, record, process, reproduce, transmit, and store the data and particulars required in the organization. In other words, office tasks and activities can be concluded as the management of information resources within the organization.

The development of information technology which is apparently felt, makes human activities are increasingly facilitated, and so the office service activities. Information technology application in offices makes office works and services run more easily, more efficient, and more effective. The form of information technology development impact in the office activities is virtual office. Basically, a virtual office is an implementation of office automation efforts that aims to help employees to improve their productivity.

So that happened in the university environment in Indonesia. Every college have had or implemented an academic information system to support its activities, for example the academic, financial, personnel administration, and others. Those office activities, which include activities to collect, record, process, reproduce, transmit, and store the data and particulars required in the organization, have been carried out digitally or automated. So basically the implementation of the virtual office is already implemented in some universities in Indonesia, but those applications of network-based information system are essentially still partial and not being integrated as a whole or there was no ERP based system's roadmap (Pasharibu et al., 2013). Each unit has its own applications and database to support their activities, and might be can not produce a good performance. More on the utilization of information technology activities, universities in Indonesia is still allegedly limited on Online Transaction Processing (OLTP) in their virtual office activities and have not reached the Online Analytical Processing (OLAP). OLTP applications are developed to meet the day-to-day transactional database requirements and operational data retrieval needs of the entire community of users. While OLAP is a whole series of tools intended to make a business intelligence analysis and support the decision-making process (Abdellatif, 2011).

From the description above, it seems that information system implemented in some universities is still traditional in nature, with a system model of closed database architecture, or in other words, the database is still distinguishable, separate, and independent, so it is possible to perform a data redundancy on the certain database environment. In the development of information system, the current concept of Enterprise Resource Planning (ERP), is growing and many companies are moving towards. ERP is widely applied in manufacturing organizations or companies, but the concept is certainly very possible to be adopted and applied to other organizations such as educational institutions, which also has a complexity of activity. With this background, it is necessary to develop a model of virtual offices in universities, as well as analysis of the concept of Enterprise Resource Planning (ERP) development. This study aims to (1) Identify the application of virtual offices in the university environment; (2) Identify and evaluate the virtual office gap between OLTP and OLAP; (3) Describe and compile unit needs map in Universities, workflows, OLTP migration design to OLAP based on priority, which provide support for study program accreditation.

This study is expected to be a part of the knowledge and information system development and can be used by the public. In addition, this study is expected to help the identification of the office and information systems problems in university institutions and to contribute in the virtual office system model development in the concept of Enterprise Resource Planning (ERP), particularly in university institutions to achieve effectiveness and efficiency of the office services, to manage information resources.

Theoretical Framework:
Previous Study:

Researches and studies on the role of information technology in a variety of human activities have actually been done. However, study on information technology for virtual office activities is still limited. A publication on the use of information technology for office activities in geo-office concept has revealed that the computing capabilities multiplied with technological features present a variety of opportunities, providing various facilities to communicate, as well as provide options that are not available in advance, to work anywhere and anytime. With a paradigm shift in working, so the concept of geo-working should be considered to be implemented in facing the globalization era. In information technology convergention, work is no longer be a point of destination (office), but

an activity that can be done anywhere and anytime. Working as a telecommuter is an attractive choice. A new era of knowledge-based work is something that is inevitable to compete amid globalization (Sari, 2006).

To survive in the midst of the information communication technology advances, implementing the concept of geo-office, an office that is not geographically relevant and could be everywhere is very precise. To be not physically present in the office, people may work by utilizing a data network, computer, telephone anywhere on Earth, as revealed by Clarke (1993). Researches or studies related to virtual office is about telecommuting utilization. Telecommuting is the use of information and communication technologies in order to achieve remote work activities (Hortensia, 2008). In the next few years, telecommuters percentage will be the greater and more increasing. Improved access to computer networks, the increasing facilities of communication, the more easily access the Internet, the higher of office renting cost, and the desire to attract and retain potential employees are several reasons that support this trend (Sukoco, 2007). Global survey conducted AT & T and The Economist Intelligence Unit projected that telecommuting percentage will reach 80% (Focus, 2004). Besides, some studies indicate that each organization has the work allowing telecommuting in average of 50 % (Rodgers, 2001).

Virtual Office:

Virtual office is the automation of business processes that is previously manual (document-driven) to automatic (electronic-driven) so that documents used in a business process is a document in electronic form, instead of hardcopy. Virtual office is a term for shared office services, which normally includes business address, mail and courier services, phone services, receptionist services, fax services, answering services, web hosting services, and meeting & conference facilities. Activities shown may be guided by machine (computer) or other human agents (such as programmers or even computer which runs expert system with alternative assessment based on digital data from the expert response to a situation) (Shield, 2003).

Furthermore Boone (2007) revealed that virtual office is the office where the tasks can be done in any geographic location as long as the site is connected to a fixed company location through electronic communication technology. Virtual office is also called office automation that is a plan to combine high technology through improvement of the work implementation process in order to increase work productivity. Telecommuting becomes an attractive alternative for the employees and also employers within the office. When employees enjoy benefits such as flexibility and avoid a far work trip, the company may get benefits from increased productivity and costs associated to the office (Boone, 2007). With virtual office, a variety of business tasks can be done simultaneously more effective and efficient (McLeod, 2007). An article in Trends Magazine (2011) stated that virtual work makes employees happy and committed, compared to those who work only in the office. Employees may also consider that telecommuting will likely increase the level of stress in their household because all works are done at home, and employees have an assumption that telecommuting may have unfavorable impact on their future career (Brueggeman, 2005).

The concept of Enterprise Resource Planning (ERP):

The current information system must continue to evolve from traditional system to the up to date, or modern one. Traditional information systems model (particularly in manufacturing), is close to system with a database architecture models, or in other words, the database is still distinguishable, separated, and independent, so it is possible to perform redundancy of data in the database environment (Hall, 2008). ERP system is a computer application that is considered to be the most effective in the modern manufacturing industry, and it is recognized as a successful management system (Quiescenti, 2006).

Actually ERP is an information system designed for manufacturing and services company which role is to integrate and automate the business processes related to the operation, production and distribution aspects in the certain company. The concept of ERP can be run properly if it is supported by computer applications and infrastructure both hardware/software so that the processing can be performed easily. ERP is evolved from the Manufacturing Resource Planning (MRP II), where MRP II itself is the result of the evolution of Material Requirement Planning (MRP) that previously developed.

Furthermore about ERP system, it supports the information to flow more smoothly and seamlessly through the provision of standardized business processes, with a common database that supports communications operations. Or in other words, in this system, database is modeled, structured, and stored as the internal attributes of the data that can be accessed independently for a variety of applications. Information System is a determinant of the ERP implementation. A study suggested that information system resource is the major determinant ot build ERP

capabilities in companies, which in turn is needed to provide a positive business processes (Karimi, 2007) .

Warehouse Data Utilization:

Each organization put the data analysis tools and storage warehouse in order to maximize the information stored in the database and take advantage of the technology that is connected to the World Wide Web. The decision makers need accurate and reliable data regarding the operation which is currently being executed, trends, and changes that occur. Data warehouse overcomes this problem by integrating key operational data around the company/organization in a consistent, reliable form, and easily available for reporting. The data warehouse is a database, with reporting and querying tools, which saves the current data and historical data on potential things for all corporate managers, and combines them for management reporting and analysis (Loudon, 2004).

Data warehouse system provides fast and raw query tools, analytical tools, and graphical facilities for reporting, including tools for Online Analytical Processing (OLAP) and data mining. Data mining is the process of exploration and analysis to find meaningful correlations, patterns and trends by sifting through large amounts of data stored in the repository (Abdellatif, 2011). Datamining uses a variety of techniques to find patterns and relationships hidden in the large set of data and draw rules conclusions from the data set so that it can be used to predict future behavior and guide the decision makers (Fayyet, 2004).

Methods:

The method in this study was the Waterfall method. Waterfall method is a model of the software development process that was first published on other models. This method is suitable for the construction or application development system that is not too extensive and complicated. The advantage of this method is that at each stage which can be passed back to the previous stage or passed on to the next stage (Sommervile, 2001).
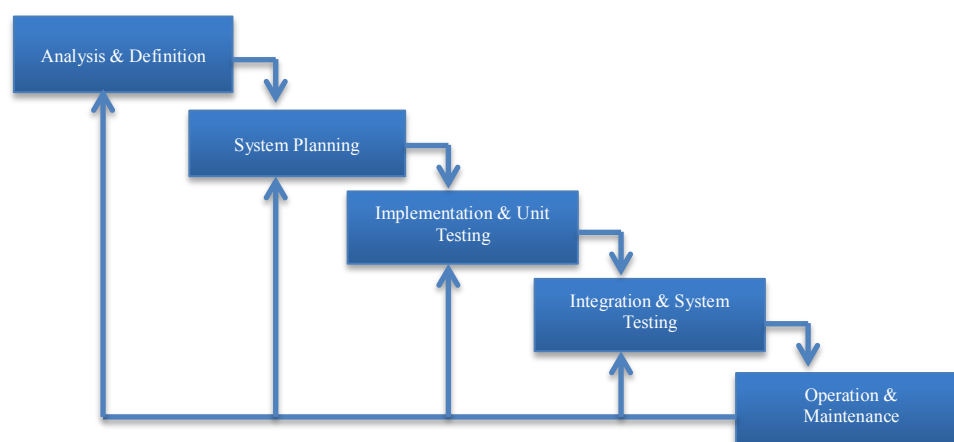

Figure 1. **Waterfall Method Illustration (Sommerville, 2001)**

Study Objects:

The study was conducted as a case study (holdout case) at the Satya Wacana Christian University (SWCU), since SWCU enters the top 6 of national category of Private University and the the best University in Central Java in terms of the application of Information and Communication Technology (ICT) - The ICT's Smartests Campus 2013 (TeSCA, 2013). Satya Wacana Christian University is a private university that stood since 1956. Currently, SWCU has 14 faculties, with 56 courses. SWCU has as many as 567 full time employees, consists of 312 lecturers, lecturers and employees instead of lecturers as many as 255 people. The number of active students who are currently served are more than 11,000 people. The main SWCU campus is located at Jalan Diponegoro 52-60 Salatiga, Central Java.

Data Collection Techniques:

Data collection techniques in this study were performed through observations and interviews. Observations were carried out on the user and the various operational application systems used in Satya Wacana Christian University. The data collection was performed through interviews followed by questionnaires to the respondents. Respondents in this study were staffs or employees as a user, those were office administration staff, faculty secretary staff,

human resource administration staff, financial administration staff, and accreditation staff. Interviews with these respondents aimed to obtain data and information of business process related to office documents in the form of a decree, which includes Teaching decree, Final Project Guidance decree, Student Advisor decree. And also aimed to obtaion data about others business process related to official letters publishing in the institution, employment documents, especially for lecturers, for example Lecturer Workload, Performance Reports, Financial Management, accreditation and also information systems in SWCU and the development process. In addition to observations and interviews, data collection was also performed through Focus Group Discussion (FGD), which involved researchers, Respondents, Managers and Staffs of the Technology and Information Systems Bureau, as well as some of the leaders in the institution.

Results & Discussion:
Information Systems in SWCU:

Management Information Systems Design at the Satya Wacana Christian University have nearly all the applications and database that support the university stakeholders' needs (Pasharibu et al., 2013). Some operational applications that have been used in SWCU that were identified, such as SWCU Admission, SIASAT (SWCU Academic Information Systems), Students Payment System, Student Welfare Systems, SWCU Financial and Accounting Systems (SIKASA), SMS Gateway, Student View, Work Information System, Space Management Information System (SIMARU), Health Care Systems, Polyclinic Information Systems, SWCU Personal Information Systems, SWCU Website, SWCU F-Learn, SWCU Report Service, SWCU Dashboard, Psychology Test Assessment System, Online Thesis, Library Application, EPSBED Converter, Establishment Card, Logistics Systems, PPMA System, SWCU Mail, SWCA (Satya Wacana Career Center and Alumni)/ Career Stock, RESEARCH / RIS (Research Information System).

Strategic Aspects of Research Results:

Flowchart of research development at the virtual office service model based on the concept of Higher Eduation Enterprise Resource Planning (ERP) in University had been observed in the division of information technology service center. Collecting documents (blueprints) on information systems, printed goods (hardcopy) of various forms of decree still get a little touch of information and communication technology (ICT), the availability of supporting resources (ICT support system), various documents and reports on Study Program Accreditation and University Accreditation, lecturers' workload reports, lecturers' credit overload reports, payroll, along with a variety of devices (software or apps) that have been built on its own and purchase (especially for a library), and hardware support. Observations and collection of documents were followed by interview Focus Group Discussion (FGD) to virtual office system users and the management of ICT services division (BTSI). FGDs were conducted to gather usage requirements and provision capability by the of ICT services division as well as business processes collecting (business process: rules, procedures, calculation formulas as well as data (information) security policies. For the first phase – the college that became the study object was SWCU along with the units (especially education units and supporting units).

This ERP-based virtual office research is based on the philosophy about user's perspective or of information technology usage which is oriented on improving the efficiency and comfort of the users (user centered approach) without prejudice to the security of data/information (data / information security standard). In short, a number of deviation (gap) findings between the standards and practices will be presented in the next section.

Application Program Fragmentation (system design):

In general, progress in the development of an application program which was customized to the units needs (faculties and support units) was no doubt, but there were still many problems in the relation (integration) between the program units in different applications. Communication between subsystems was still hindered by many obstacles, although conceptually Bureau of Information Technology (BTSI) in SWCU have determined a web-service, but in each subsystem practice, that was the application program based on operational problem solving, many were still isolated from each other.

The slow pace of integration was due to the complexity of the subsystems that could not be quickly knitted, due to the structure of a database problem, or other problems. As an illustration, the Foundation Board had a database itself for the employment purposes, as well as the financial part of the university, most faculties had their own database of employees for their needs, as well as the library had its own database of students and lecturers. If it was

already integrated, then each unit can accessed the information needed, more quickly.

Yet another example that showed the non integrated faculty and administrative offices center was in the assessment process (conversion value) and errata. Each lecturer stored student test data and the value database was only in relative values. Similarly errata process also still used hardcopy that should be transferred to lecturers, to the Vice Dean and Vice Rector I/ Grade Departement. Automated process should be made through the security levels: maker lecturer, checked by the study program secretary (checker) and known by the study program chief and directly posted to the Grade Departement. Everything is in the academic administration system electronic flow.

Fragmentation in application program occurs either because different people made up the application program, or because there was no standardization of the database because there was no departement which had the authority to set standards. This fragmentation can be regarded as a form of creativity, but on the other hand was quite wasting time in the management information systems, because electronically data access was not performed. Wastage would seem obvious when one study program will prepare the accreditation, accreditation task force should collect data in hardcopy from various units, such as data about the references from library. Besides the study program must compose a data request, whereas today's technology allows access to library statistical data through the intranet.

Data security policies and User Friendly:

Data security policies were implicitly existed; embodied in User ID and Password to access the internet facility or application program. There was no level of authority and there was no restriction forms based on the level of organizational. So currently everyone could have a lot of access keys (user ID and password) for each facility. A lecturer used different access **keys** for different interests: (1) access to academic information system (SIASAT), (2) university wifi access, (3) faculty wifi access, (4) access to salary, (5) access to the library for borrowing books, (6) access to electronic journals, (7) access to campus e-mail, (8) access to workload report, and (9) access to published reports. While the Faculty Secretary should establish a financial budget, tactics, admission, logistics, simanru to consolidate Study programs and programs, using more than 25 usernames and passwords; and also for personal purposes (see salary, workload, etc). So each "room" had its own key.

The absence of data security policies and user friendly approach generated a number of keys. Still a notion that it would be prepared "single sign on", a sort of master key for campus residents with only one key to open all rooms they are entitled. This provides an indication that there was already a sensitivity to the problems of complexity with different keys. However, to get access with one key "single sign on", "classification of data / information" option was still undecided as well as the formulation of appropriate policies that had not been prepared yet, it was associated with: (1) the authority of each user related to organization level, (2) encryption of data bases (database level encription), and (3) the exchange of data/information, and (4) the old policy of data retention and deletion policy. Data/ information classification of one to another institution can be different.

University of London Classification (June 2011) classifies the data into four: (1) confidential, (2) restricted , (3) protected , and (4) public. Bank Indonesia only differentiate into two: (1) confidential and (2) not confidential. Similarly, a number of organizations differentiate into three groups: (1) the secret (confidential), (2) for its own purposes (internal use only) and (3) open (public). The absence of classification and user policies caused the application program creator made an entry key (user ID and password) based on common sense according to the maker's safe feeling. This Quick and dirty rule approach should not be performed continuously if we want to give comfort to the user.

Information needs dashboard:

As described previously, the application program as a sub-system is designed to solve specific operational problems. SIASAT Application (Satya Wacana Academic Administration System) to solve the problem of manual academic administration, SIKASA (Satya Wacana Financial Administration System) to resolve the problems of financial administration (budgeting and reporting), MyUKSW (payroll) to resolve payroll operational problems, etc. This fragmentation, in addition to these reasons, was performed due to the difficulty to find the definition of the needs of each user group.

The application program users had been partially fulfilled their needs, but there were still many unmet needs, so it must be supplied manually by clerical departement or by the users themselves. For example, each Study program chief will ask the secretary to collect the GPA and graduates data to calculate the GPA frequency distribution and graduates productivity. The Secretary will request data to the Data Administration and Registration Departement, hereinafter set forth in Excel and give the results to Study Program Chief to be processed. This job requires extra time and can actually be finished by the integrated application program. Dashboard for Study Program Chief can

show relevant information immediately (real time) on the development of students GPA and productivity, as well as other relevant information. Furthermore, the various dashboards can support a variety monitoring of accreditation standards achievement, so the massive job which involves a lot of staffs in preparation for accreditation can be reduced. This ideal had not been realized because the fragmentation application programs had not been integrated. For the lecturers, there were still difficulties to directly monitor their career, this was due to no lecturers' career dashboard and they still prioritize services to students, especially teaching and guidance. The Decrees required by the lecturers also still manually proceed. Routine tasks of decision-making in the Decree form were still routinely prepared by the flow of activities (workflow) which relies on correspondence and the job involves a lot of paper (paper work) between the units (faculties and support units) to the SWCU Chairman, or Study Program to the Dean. In depth interviews to a number of information users had had the same standard idea, but there were variations in the details. Blue print of some information/data users were partially existed in hard copies and some were still in wishful thinking.

No Roadmap towards ERP:

OLTP (On Line Transaction Processing) Activity had been progressing with the advancement along with the Information and communications Technology, but some were still dispersed in terms of process and database, and there was no storage of data in a systematic and comprehensive way, and no online analytical unprocessed processing (OLAP) for the purpose of supporting information in decision-making. From the observation and in-depth interviews with key informants of Information Technology (BTSI) Bureau, the results illustrated that the roadmap to virtual office based on Enterprice Resource Planning (ERP) was not there, although BTSI management had admitted the concept as a strategic move in order to improve performance and competitiveness of the college.

Identification Results of Virtual Office Needs:

The results of data collection from respondents through interviews and Focus Group Discussion (FGD) indicated that the user requirements were more emphasised on developing a model of virtual office service system that supports the lecturers' academic administrative activities (in the form of dashboards for lecturers), office administration especially systems that support the Decree establishment, as well as the systems that support the accreditation of study programs, especially the preparation of BAN-PT accreditation forms.

Lecturers' Academic Administration (Lecturer Dashboard):

One of the main actors in the university is Lecturer. Charges against a lecturer is continue to increase, not only limited to meet the University Tri Dharma, but sometimes they also need to perform managerial duties or other administrative tasks. With the main objective of efficiency and effectiveness to support a lecturer performance, then each lecturer should be equipped a dashboard/a facility to easily access all activities related to his/her performance. Illustration or basic dashboard draft that a lecturer should have are Tri Dharma, Renumeration, JAFA (Functional Position), BKD (Lecturers' Workload), Library and Data Sources, and Managerial Duties.

Office Administration (Offices Dashboard):

Office dashboard is a dashboard that contains a variety of administrative activities in the university related to decree establishment in the university, such as, Teaching Decree (administer course Decree), Student Advisor Decree (Appointment of Students' Study Advisor), Examination Decree (Appointment of Examination committee), Research Decree, Community Service Decree, Task Force Decree (Appointment of Task Force), and Final Guidance Decree.

**Accreditation (Accreditation Form Dasboard):**

One effort to gain recognition of university activities implementation standard is through the accreditation process. Accreditation is done to determine the program and education unit feasibility in formal and non formal education in all education levels and types. In Indonesia, the accreditation of study programs and universities are undertaken by the National Accreditation Board for Universities (BAN-PT). BAN-PT is formed by the Ministry of Education and Culture in 1994 with the task of making the accreditation for universities. BAN-PT is an institution that has the authority to evaluate and assess, and determine the status and quality ratings of the study programs based on established quality standards. (BAN-PT, 2009);

One of the instruments in BAN-PT accreditation is the accreditation form. Accreditation form is a tool to collect and disclose data and information used to assess the feasibility and quality of university institutions. In the form, there are 7 (seven) standards that must be completed by each study program and should be submitted for

accreditation process to BAN-PT. Those standards are: Vision, mission, goals and objectives, and strategies to achieve (1st Standard); Governance, leadership, management systems, and quality assurance (2nd Standard); Students and graduates (3rd Standard); Human resources (4th Standard); Curriculum, learning, and academic atmosphere (5th Standard); Financing, infrastructure, and information systems (6th Standard); Research, community service, and cooperation (7th Standard).

Satya Wacana Christian University (SWCU) is one of the universities that follow accreditation by BAN-PT. Periodically, all courses in SWCU accreditation perform the accreditation process. Each study program forms a Task Force to carry out the accreditation process. One of the duties of the task force is preparing accreditation forms. This accreditation forms fulfillment is done manually by the task force, by gathering various data from various parties. Supposedly it does not need to be performed manually, but it can be performed automatically. Therefore we need a detailed identification of the data required in the accreditation forms, further to identify the availability of data that has been stored in the shared operational application system database in the institution. From the review it will be visible the patterns of data flow required for each standard in accreditation forms with data sources that are already available in the SWCU operational system database.

Virtual Office Service Development Model:
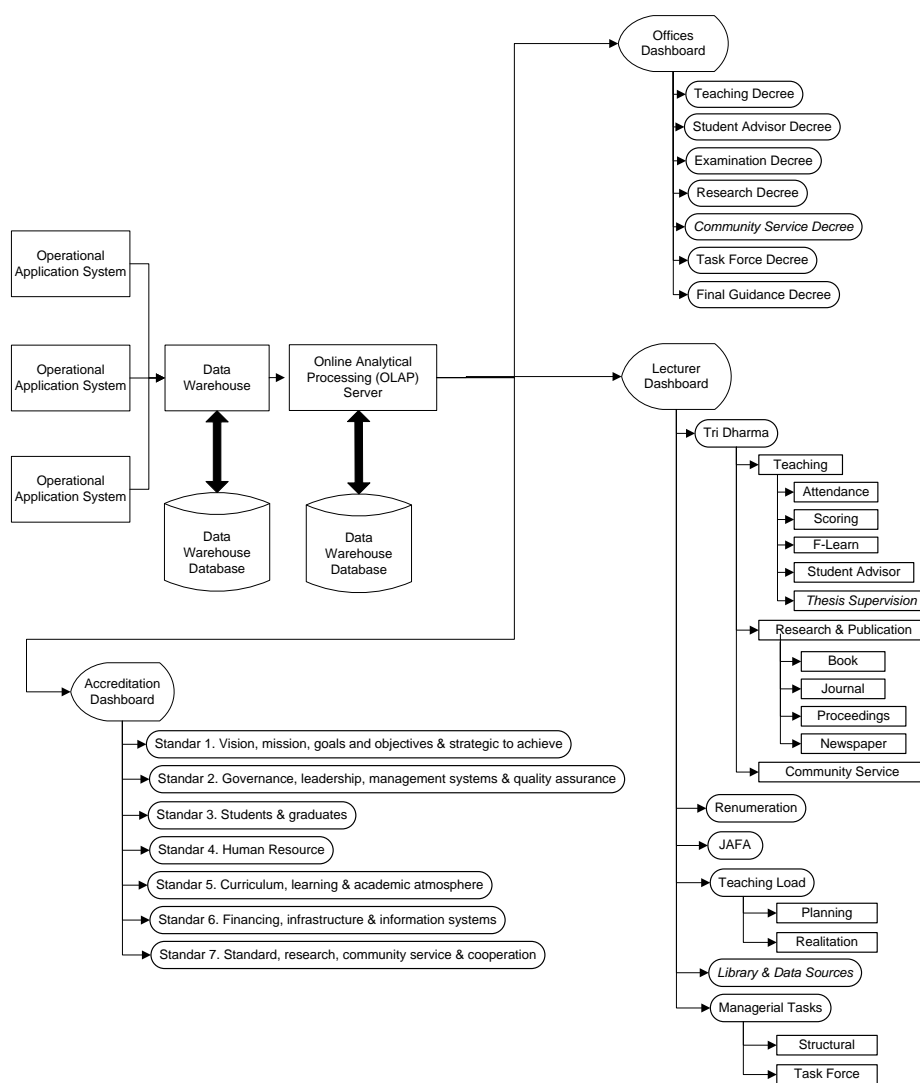
Figure 2. Proposed Development Model of Virtual Services in SWCU

From the study results, we propose the virtual office service development model (Figure 2). From the model, it appears that the data from all systems in the operational application via the Online Transaction Process in SWCU are collected in a data warehouse, and then been proceed through Online Analytical Processing (OLAP) Server to be communicated to the user, those are the lecturers and administrative staffs, to the benefit of lectures'/employees'

administration, office services and accreditation in the form of dashboard.

Conclusion:

Based on the study results, some conclusions that can be drawn were virtual office service activities at Satya Wacana Christian University (SWCU) is quite varied in types of services. Then, the architectural designs in SWCU information systems appears that the development of an office information system is performed partially and a number of gap findings between the standards and practices are application program fragmentation, no data security policy, no Information needs Dashboard, and no Roadmap towards ERP in place.

Furthermore, this study found that from the user requirements analysis related to the virtual office development model in SWCU, it is obtained a priority need for the design of virtual office system that support the lecturer administration in the form of lecturer dashboard, to support office administration activities (especially for various Decree establishment), as well as office information system which can support study program accreditation activities especially the preparation of BAN-PT accreditation forms.

References:

[1]   Abdellatif , Tamer S. Mohammed Abo Elsoud, Hesham Arafat Ali.(2011). Comparing Online Analytical Processing and Data Mining Tasks In Enterprise Resource Planning Systems, IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 6, No 2, November 2011.

[2]   BAN-PT, B. A.-P. (2009). *Buku III A Borang Akreditasi.* Jakarta: BAN-PT.

[3]   Boone, & Kurtz (2007). *Contemporary Business.* Jakarta: Salemba Empat.

[4]   Brueggeman, P. (2005). Telecommuting: Win-Win for All. *The Asset, Maret, Vol. 53, Issue 2* , 26.

[5]   Clarke, Arthur C. (1993). *Profile of the Future.* London: Pan.

[6]   Fayyet, S. R. (2004). Envolving Data Mining Into Solutions for Insights. *Communication Of the ACM Vol 45 No. 9* .

[7]   Focus, H. (2004). Telework: The Star of Flexible Work Option. *HR Focus, October Vo. 81, Issue 10 S2* .

[8]   Hall, J. (2008). *Accounting Information Sytem.* South Western. Mason USA.

[9]   Hortensia, Gorski. (2008). Virtual Workplace And Telecommuting: Challenges That Redefine The Concept Of Work And Workplace, *Annals Of The University Of Oradea, Economic Science Series. 2008, Vol. 17 Issue 4, P269-274.*

[10] Karimi, Jahangir , Somers, Toni M , Bhattacherjee, Anol. (2007). The Role Of Information Systems Resources In Erp Capability Building And Business Process Outcomes. *Journal Of Management Information Systems. Fall2007, Vol. 24 Issue 2, P221-260.*

[11] Loudon, K. (2004). *Management Information System, Managing The Digital Firm.* Pearson Education.

[12] McLeod, Raymond. &. George P. Schell (2007). Management Information System*, Edition 10.* New Jersey :Person Education.

[13] Mills, Geoffrey. O. (1991). *Modern Office Management.* London: Pitman Publishing Limited.

[14] Pasharibu, Y., S. Hari., Sugiarto, A., & Silintowe, Y. B. R. (2013). University Management Information System: Is That Supportive Enough and Is It Already Integrated? *Proceedings The 2nd International Conference on Information Systems for Business Competitiveness 2013*, pp.192-195. ISBN: 978-602-14719-0-6.

[15] Quiescenti, M, M. Bruccoleri, U. La Commare. (2006), Business process-oriented design of Enterprise Resource Planning (ERP) systems for small and medium enterprises, S. Noto La Diega And G. Perrone , *International Journal of Production Research,Vol. 44, Nos. 18–19, 15 September–1 October 2006, 3797–3811*

[16] Rodgers, C. (2001). Telecommuting and the Computer. *Facilities Design and Management, Vol. 20 Issue 1* , 22-25.

[17] Sari, Sriti, Mayang. (2006). Pengaruh Teknologi Komunikasi Informasi Pada Implementasi Konsep Geo-Office. *Dimensi Interior Vol 4, No.1* , 25-30.

[18] Shield, Rob. (2003). *Virtual, Sebuah Pengantar Komprehensif* . Yogyakarta: Jalasutra.

[19] Sukoco, Badri, Munir. (2007). *Manajemen Administrasi Perkantoran Modern.* Jakarta: Erlangga.

[20] Sommervil le, I. 2001. *Software Engineering*, . Edisi ke-6. United States Of America : Addison-Weley Publishers.

[21] TeSCA. (2013). Rangking TeSCa 2013. Downloaded September 20, 2013, from http://tescaindonesia.org/rangking/2013

[22] Trends Magazine. (2011), The Virtual Office Gains Momentum , Jan2011, Issue 93, p16-19.

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