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An Effective Location and Organizational Structure of Institutional Research Offices within a Higher Education Institution: A mixed-Methods Research Study*

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Abstract

The primary purpose of this mixed-methods research study was to identify factors classifying locations for and contributing to an effective office of institutional research (OIR) within a university organizational structure. Using the integrated results of a sequential explanatory mixed methods (QUAN → Qual) design for this purpose, the study also aimed to develop the effective organizational structure of OIR that fit its mission, logical organizational configuration, and associated situational factors.

The findings revealed that strategy and goal, sector, and technology were significantly classifying factors of OIR locations; while locating the OIR under the vice-president for planning or the vice-president for research, IR-mission focused, and years of IR operation were factors related to the effective OIR. The matrix organizational structure of the OIR was developed from the integrated QUAN and Qual research results, and then evaluated and suggested for the improvement by experts in IR and university administration. The new adapted organizational structure relocated an OIR to under the VP for planning. At the same time, coordination with staff from other related functions oversight by the VP for research (including the VPs for other affairs) who helped support conduct of IR and using the results for decision making.

Keywords: institutional research office, office location, organizational structure, higher education institution, mixed-methods research

* This research study aimed to identify factors classifying locations for and contributing to an effective institutional research office within a Thai higher institution's administrative structure. It also aimed to develop the effective structure of an institutional research office within a Thai university structure using integrated results of QUAN and Qual methods.

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Introduction

Higher education institutions around the world pay more attention to institutional research (IR) by conducting studies and applying research results in support of policy decision making, strategy planning, or operational quality improvement within the institutions (Calderon & Webber, 2015; Volkwein, Liu, & Woodell, 2012). Apparently, colleges and universities in the developed countries, i.e. the US and UK or in the developing countries like the Republic of Peru and Thailand have founded their official OIR with the primary mission on IR and support of research findings for better understanding and solving of crises. This also includes effective strategic decision planning for solving of critical issues facing the institution. Moreover, information from latest, reliable, systematic, and accurate reports on IR in forms of self-assessment or self-study can also be used as a key credential for administration of higher education quality standards accrediting process of institutions by national and international educational quality certification standards (Calderon & Webber, 2015).

Although offices of institutional research (OIRs) are officially established and have carried out the mission in many nations' colleges and universities for a long period of time, locations of an OIR and departmentalization of IR within the upper-level organizational structure in colleges and universities varied greatly. For example, some placed it within the planning and budgeting department under the office of the president, where support staff conducted the IR to provide information for policy formulation, institutional planning, decision-making, and budgeting for colleges and universities departments supervised by the VP for planning and budgeting, while others placed it under the supervision of provost or VP for academic affairs with the aim of making and bringing results from IR to support academic program planning, curriculum development, and teaching and learning management, as well as student outcome assessment, etc. In addition, the findings also indicated that some organizations placed their OIR directly under the office of the president (Swing, Jones, & Ross, 2016; Taylor, 1990).

Furthermore, some universities equated their IR to a faculty with the primary mission of promoting research; for instance, research and development institution, bureau of research and innovation promotion, and research management bureau, or mission on information technology like bureau of computer and information technology, bureau of media and

information technology, these research promotion or technology support agencies have academic support staff to coordinate and run IR projects funded by such agencies to outside researchers who mainly conducted IR under the supervision of an assigned VP for research or VP for technology for a respective task (Swing, Jones, & Ross, 2016). As indicated by the latest national survey of OIRs for US colleges and universities, 51 percent of the surveyed OIRs were to report to the VP for academic affairs who held a high level academic position as chief academic officer, while 26 percent positioned the offices directly under the president. The remaining reporting line for organizational structure of colleges and universities suggested that seven percent and five percent reported to the VP for strategic planning and organization three effectiveness, and the VP for business administration and budget, respectively, while three percent and two percent directly reported to the VP for information technology and student affairs, respectively (Swing, Jones, & Ross, 2016).

The organizational structure and functions of OIRs designated within higher education institutions in Thailand indicated significant differences to research from some OIRs of higher education institutions in other countries such as the United States of America or even from other developing countries in Latin America, in which the majority of them directly reported to the VP for academic affairs and to the university president (Saavedra, Pita-Carranza, & Opazo, 2015). More specifically, public universities in Thailand mostly designated the office under the VP for research or the VP for planning (Wuwongse, 2013; cited in Ko, 2015, p.149), while most small private universities in Thailand often placed it directly under the office of the president.

Besides a range of locations within the organizational structure of higher education institutions, departmentalization of OIRs based on “division of labor” through distribution of the duties and responsibilities of personnel to achieve the goal of the mission for IR (Bolman & Deal, 2013) also unveiled different patterns. For instance, functional/discipline-based includes classification (a) report preparation and distribution, (b) planning and special projects, (c) database management and technical support, and (d) research and development or product/ service-based classification. Information from results of IR exclusively for customers is comprised of (a) academic support, (b) planning and budgeting support, (c) application and enrollment administration, and (d) student activities support (Volkwein, Liu, & Woodell, 2012).

Since locations of an OIR in the organizational structure of colleges and universities affect the scope of authority and responsibility of the OIR, as well as the facilitation or obstruction in conducting and applying IR to support decision making on big or small scales

(Leimer & Terkla, 2009), departmentalization of the OIR is also critical to corroboration and work flow for the execution of the IR mission within the organization to achieve its goals (Brass, 1984, cited in Taylor, 1990, p.27; Volkwein, Liu, & Woodell, 2012). Locations of an OIR and departmentalization undertaking mission to the highest effectiveness oblige IR structure design in two mentioned issues to be consistent with an overall structure and context of organizations inside the university. It covers six fundamental factors, i.e. university sector, university size, strategy and goal, technology, the university chief executive officer (or CEO)'s characteristics, and management. These six fundamentals coexist in holistic patterns of interdependence (Bolman & Deal, 2013; Daft, 2012).

Despite scores of IR, experts do exist, e.g. Swing, Jones, & Ross (2016); Taylor (1990), Volkwein, Liu, & Woodell (2012), the survey research method was conducted most to investigate the locations and departmentalization of an OIR within a university organization, especially in the US and Canada. However, no empirical research results exist from previous studies indicating classification factors for locations of the OIR within a university organization mentioned earlier as well as such how locations explained the effectiveness in carrying out the mission of the OIR (after other influencing factors were statistically controlled or adjusted). Moreover, no extensive studies on how effectiveness in executing the mission of the OIR were related to departmentalization and location of an OIR that helped facilitate an effective operation. Knowledge and understanding on such key issues are crucial for high level managements' decision-making on determination of the location and departmentalization for a successful OIR.

This paper aimed to report the processes and results of a study that employed mixed-methods sequential explanatory design (Creswell, 2014; Creswell, & Plano Clark, 2017). It was necessary to use the qualitative approach in the final phase to describe the quantitative findings in the first phase on factors classifying locations, and contributing the effectiveness of the OIR with statistical significance over different weights, which could partly be due to organizational culture (Bolman & Deal, 2013) of colleges and universities within the context of higher education in each country, and thus difficult to understand by merely using the quantitative approach alone. Results of an integrated quantitative and qualitative approach created exhaustive and multidimensional information about the locations and departmentalization of the OIR before utilizing the decision on model structure for the OIR. The model would then be evaluated using expert criticism and judgment (Eisner, 2004) for management of higher education institutions.

The first phase of conducting research aimed to seek answers of whether (a) six fundamental factors, i.e. sector, size, strategy/goal, technology, university CEO characteristics, and management, could classify (or predict) the locations of an OIR within a university's organizational structure, and if so, how. Also whether (b) factors on locations and organizational contexts, i.e. size, OIR support staff's characteristics, the chief OIR's characteristics, IR-mission focused, and years of OIR operation, could predict the effectiveness of an OIR within a university organization, and if so, how. Then answers for research questions in a later stage were pursued in order to be able to understand how (c) the main factor could identify the locations and factors which contribute to the effectiveness of the OIR with statistical significance. And (d) whether organizational structure of an OIR in a university developed from an integrated quantitative and qualitative approach was appropriate or not, and if so, how according to evaluation based on experts on higher education administration and institutional research in Thailand.

Research Methods

Study Design

To successfully answer research questions as stated above, this research was therefore designed employing mixed-methods sequential explanatory design (Creswell, 2014; Creswell & Plano Clark, 2017). Scope of study employed 3-phase research design. Namely, (a) the initial phase utilized the quantitative approach (QUAN) of correlational research method to identify main factors determining the effective location of an OIR within a university's organizational structure in Thailand. Later followed by (b) the qualitative approach (Qual) which used the multiple case study research method (Stake, 2006) to explain quantitative findings of factors that helped identify the locations and contribute the effectiveness of an OIR at different statistical significances. Then, findings from an integrated QUAN and Qual approaches were interpreted, which resulted in important information for decision making on departmentalization for an effective location of OIR. The final phase included (c) evaluation on the effectiveness of designed departmentalization model which employed expert criticism and judgement (Eisner, 2004) in the fields of higher education administration and institutional research. Data collection in research phases engaged QUAN, which regarded validity and reliability as detailed on setting, sample/ participants, data collection instruments and procedures, data analysis in each phase of research including integrated findings from both QUAN and Qual methods shown in Figure 1.

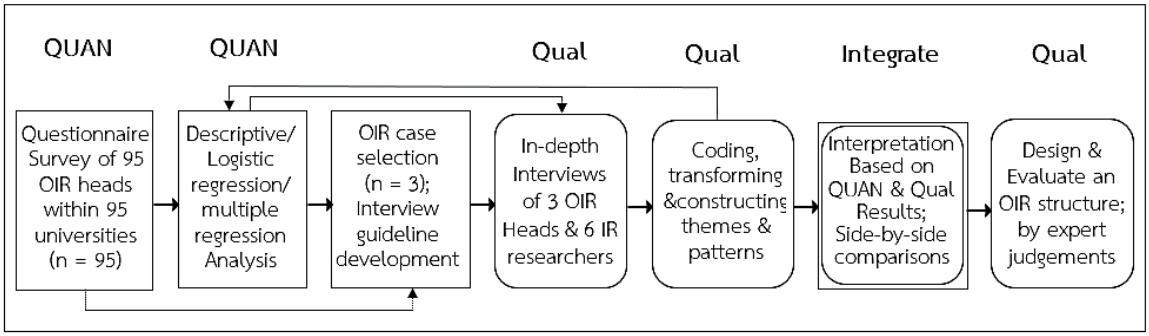

Figure 1: Three-Stage Explanatory Sequential Mixed-Methods Design

Phase I: QUAN Methods. The researcher sought after the answers to research questions on issues pertaining to the first and second research questions based on quantitative approach (QUAN) using correlational and prediction analytics designs (Creswell, 2014) with sample, data collection instruments and procedures, and data analysis, as follows.

Sample: Phase 1 research sample comprised 95 middle executives of the office (or other units such as institution, bureau, division or taskforce) with the mission related to IR. Such offices were structured inside 95 university organizations. A sample of 123 executives was selected from the population of the OIRs in 123 universities including public, autonomous, and private universities located in Bangkok and all regions of Thailand. Disproportionate stratified sampling technique employed university sector and region as stratum in random order with regard to power of statistical test using multinomial logistic regression for a minimum sample of 10 per one estimated parameter for model predicting continuous independent variables and classification, which was considered sufficient for logistic regression analysis and multiple linear regression analysis (Hair, Black, Babin, & Anderson, 2009), used in quantitative analytical research testing of hypotheses about defined factors (or independent variables) with five effective organization structures of an OIR.

Instruments and data collection methods: Quantitative data for phase 1 research were collected by the researcher. Sample received a questionnaire by postal mail, which contained five-point Likert scales. It was used to measure the predictor or independent variables through validity and reliability according to assessment principles. The content of questions in the questionnaire covered independent variables and dependent variables, as follows.

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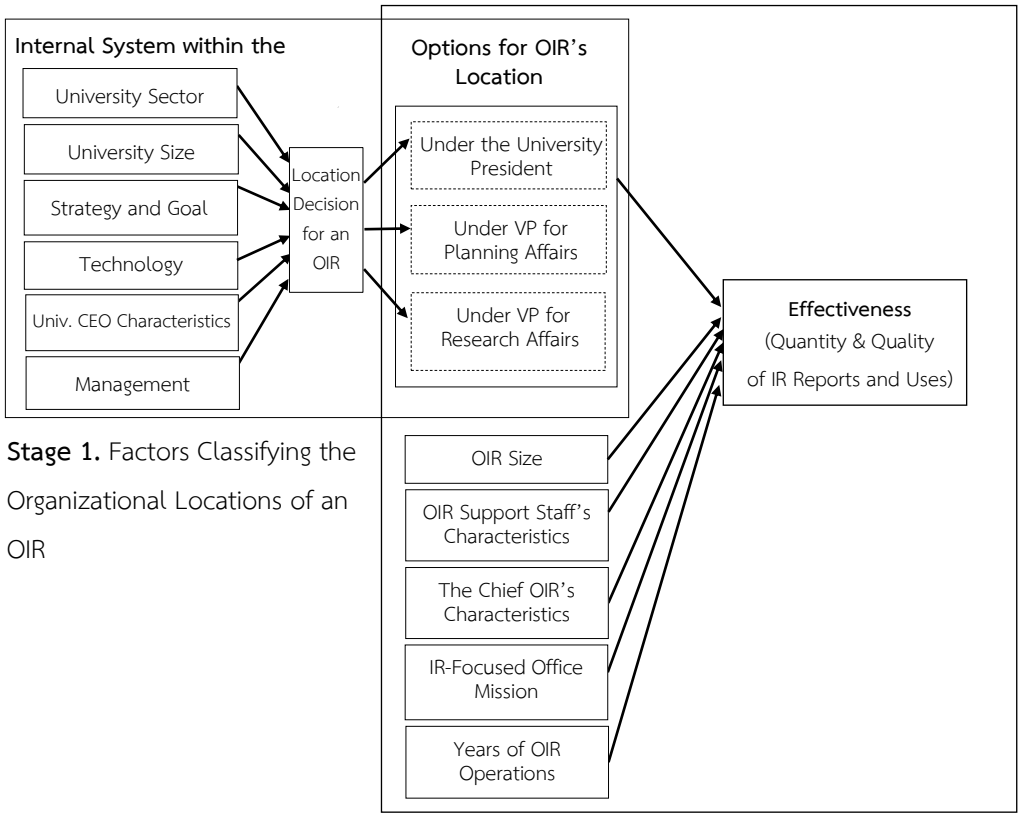

Stage 1. Factors Classifying the Organizational Locations of an OIR

Stage 2. Factors affecting the organizational effectiveness of an OIR

Figure 2: Conceptual Framework Used in the First QUAN Phase

Predictor or independent variables: Predicting factors for identifying the location and effectiveness of an OIR within a university organization consisted of (a) university sector (public, autonomous, and private), (b) campus size (small, medium, and large), (c) strategy and goal, (d) technology, (e) OIR size (f). OIR support staff's characteristics, (g) the chief OIR's characteristics (h) IR mission–focused office (IR-focused, IR and research support-focused, research support-focused), and (i) Years of OIR operations.

Dependent variables: comprised (a) locations of an OIR in a university organization (under the university president, VP for planning, and VP for research) and (b) effectiveness of an OIR by considering the overall quantity and quality of various published or distributed research.

Data analysis: questionnaires returned from sample were used in preliminary data analysis by the researcher. First, missing data; data distribution; assumptions; analyses for percentage, mean (*M*), standard deviation (*S*) via descriptive statistics were verified. After that, main data analysis by means of inferential statistics was carried out in order to test the two key hypotheses: (a) factors classifying locations of an OIR using multinomial logistic regression and (b) factors related to the effectiveness of an OIR within a university organization using multiple linear regression analysis. (Hair, et. al., 2009; Hosmer, Lemeshow, & Sturdivant, 2013). Relationship between independent variables and dependent variables according to the research hypotheses defined under Morgan (2006)'s ideas of a structural contingency theory helped identify factors determining locations of an OIR within a higher education institution following Mintzberg (1983)'s five components of organization. It suggested locations of (a) strategic apex by the president as the university executive who directly commanded office personnel to conduct IR (b) of technostructure on planning and environmental scanning for useful information for supporting decision on policy changing or strategic planning of the university, placed under supervision of VP for planning who needed the information and (c) of support-staff for research and innovation development on university personnel positioned under the VP for research who oversaw support staff to administer and publish IR projects, besides support on academic research and innovation development as their core function. The integration of Morgan (2006)'s structural contingency theory and Mintzberg (1983)'s five components of organization were used as a conceptual framework for the first, quantitative phase (QUAN Phase). This can be summarized as shown in Figure 2.

Phase 2 Qual Methods. A qualitative multiple case study design (Stake, 2006) was used in the second phase to explain why factors on OIRs' location and organizational context, tested in the first phase, were statistically significant factors of the effective OIR within a university organizational structure. Purposeful sampling of key informants who administered and carried out IR at the OIR was employed for phase 2 research. This was used as a case study for universities with organizational structure and other associated characteristics, which was summed up as follows.

Case study 1 (Θ_1). Located within the planning division of a large public university, the first OIR case study pursued its mission on IR for information prepared for the executives used in policy decision making, budget appropriation to functions in university, development plans for the university, development of database for university management as well as preparation of important university documents and reports. Currently, the first OIR case study

is positioned under the planning division director as an operation management reported to the VP for planning.

Case study 2 (Θ_2). Located within the planning division of a medium autonomous university, the second OIR case study pursued its mission on IR for information serving executives in strategic decision making, current and future university administration in general as well as development of information database and preparation of documents and reports on important statistics from university operation. Currently, the second OIR case study is positioned under the chief of planning division and reported to the VP for planning.

Case study 3 (Θ_3). Located in the research center of a small private university, the third OIR case study pursued a mission focusing on IR primarily conducted by its personnel. Since this private university's research center structured its organization as a network *"hub",* university's research personnel specialized in various fields that could produce assorted IR papers useful for policy making, planning, and supporting for executives' decision making. Currently, this OIR case study is positioned under the VP for research.

Participants, instruments, and analysis. Phase 2 research study design of participants, instruments, and analysis were performed by the following within-design consistency quality approach and between-design cohesive interaction by phase 2 Qual approach and phase 1 QUAN approach. A systematic and continuous study process was followed to ensure that the quality of meta-inference of conclusions taken from the integrated findings from QUAN and Qual approaches was accurate and reliable (Creswell & Plano Clark, 2017). In addition to complying with substance of the third research questions. Within-design consistency in each research and between-design cohesive interaction, when combined, yielded an important principle in research design, especially the mixed-methods sequential explanatory design (as shown in Figure 1) as stated by Ivankova (2014, pp.29-31).

Participants. The phase 2 Qual approach was conducted with participants selected by the researcher following the concept of Ivankova, Creswell, & Stick (2006) to enhance the quality of the integrated conclusion from findings of the two approaches. Three chiefs of the OIRs within a university organization (θ_{11}, θ_{21}, θ_{31}) were purposefully selected as the sample from the initial correlational research design to provide important information for the follow-up qualitative multiple case study design. They administered the OIR within each university used as case studies, and locations were set within organizational structure and context conducive to effective execution of the IR mission according to different research hypotheses. Moreover, two senior researchers working in OIR in each of the three universities were also

selected to give information in phase 2 research ($\theta_{12}, \theta_{13}; \theta_{22}, \theta_{23}; \theta_{32}, \theta_{33}$) in order to help enlarge and triangulate perspectives as perceived by the executives of each OIR and others with trustworthiness.

Instruments of data collection. Data collected from 9 samples in three case studies of executives and senior researchers from OIRs in universities employed in-depth interviews that developed the contents of questions and interview protocol development connected to the QUAN research findings of phase 1 statistical analysis including observation of locations within university organization. And other related contexts of an OIR that in fact contributed to the effectiveness in carrying out the mission of the OIR with (and without) statistical significance according to phase 1 quantitative research findings.

Data analysis. Qualitative data collected from in-depth interviews with participants in the research and field observations in the three case studies on issues related to phase 1 findings required understanding. The researcher used concepts and analytical methods of within-case and cross-case analysis by Stake (2006) and Miles, Huberman, & Saldaña (2014) through analysis both during and after data collection progress, with three main activities in order starting from (a) data condensation through focusing attention and thought on the selection, simplifying the data easier to understand by coding of data, and then sorting, grouping, and ordering codes that developed into themes, constructs on issues aiming to understand phase 1 QUAN research findings. (b) Data display utilized a matrix which displayed specific and common characteristics aimed at understanding. It also used network outlining relationships between concepts in codes that reflected conditions favoring the effectiveness in execution of the OIR's mission. Finally, (c) drawing and verification of conclusion were carried out on analyzed data to explore the plausibility, and trustworthiness by using triangulation strategy cross-data sources and data collecting methods in this research. Member feedbacks/checks were requested and a technique of searching for negative evidence was employed.

Phase 3 Qual Methods. Research design in the final phase tried to answer the fourth research question. Eisner (2004, 2010)'s educational connoisseurship and criticism, a qualitative evaluation research design was used to assess the organizational structure of an OIR within Thai universities drafted based on an integrated QUAN and Qual results by using side-by-side comparisons (Creswell & Plano Clark, 2017). Results from Qual analysis were acknowledged in participants' words from the in-depth interviews in phase 2 and used as reference to support/ confirm of results from QUAN analysis in phase 1.

Participants. The phase 3 Qual approach was conducted with three experts. The first expert was a professor of higher education administration, a former permanent secretary of the Ministry of University Affairs and minister of the Ministry of Education who currently holds the position of president of a university and chairperson of many university councils including the Association for Institutional Research and Higher Education Development. The second expert was a professor of educational research and evaluation, a former permanent deputy secretary of the Ministry of University Affairs and the president of a public university and deputy minister of the Ministry of Education who currently holds chairpersons of many Thai autonomous and public university councils. And the third expert was an associate professor of higher education administration, a former permanent deputy secretary of the Ministry of University Affairs and the president of a public university and an advisor to the deputy minister of the Ministry of Education who currently holds a position of deputy chairperson of the Association of Institutional Research and Higher Education Development.

Data collection and analysis. In-depth interviews were conducted by the researcher in order to gather information from the three experts. An evaluation-question technique was performed on organizational structure of the locations of an OIR within a university organization, and on whether or not departmentalization of the OIR developed from the integrated conclusion of both phases contributed to the OIR in an effective execution of its mission, and if so, how. Information taken from the interviews of three experts was analyzed by the same methods and procedures in phase 2.

Results

Phase 1 QUAN Findings: Most universities in Thailand placed their OIR within the research and development institutes or unit with a research support mission under the supervision of the VP for research (48 out of 95 samples). Of these 48 universities, 39 were public universities, six were autonomous universities, and three were private universities (81.25%, 12.50%, and 6.25%, respectively). While 26 universities; 14 public universities, eight autonomous universities, and four private universities (53.85%, 30.77%, and 15.38%, respectively) placed their OIR within the planning department, or unit, under the office of the president. The VP for planning was responsible for the planning mission such as bureau of strategy. The remaining 21 universities; seven public universities, one autonomous university, and 13 private universities (33.33%, 4.76%, and 61.90%, respectively) designated their OIR in the office of the president who directed (or delegated) the power to the VP for academic affairs. This corresponds to the first purpose of data analysis.

The results from staff characteristics analysis of 179 samples consisting of heads and staff members of OIRs in 95 Thai universities, which IR mission-focused varied in three missions. Thirty-three universities (34.74%) primarily focused on conducting IR by their office staff members. Twenty-three universities (24.21%) focused on conducting IR by their office staff and supporting others to conduct IR. Thirty-nine universities (41.05%) primarily focused on conducting IR by others through financial funding allocations. Of 179 office heads and support staff in 95 universities, 53 (55.79%), 48 (50.53%), and 6 (11.32%) held bachelor's, master's, and doctoral degrees, respectively. For their academic fields of the highest degree, 46 (25.70%) received their most recent degree in education, 39 (21.78%) in social sciences, 40 (22.35%) in humanities, 42 (23.46%) in science (including computer science, engineering and nursing), and 12 (6.70%) in other fields. Regarding years of IR operations, 26 (14.53%) were veterans with over eight years of experience, while 55 (30.73%) were newcomers with two years or less. About half of them had between two and eight years of experience.

Table 1: Results of Classifying the Location of an OIR Using Multinomial Logistic Regression

Variable	*B*-coefficients	SE_B	*Wald* χ^2 *(z-test)*	*p-value*	*Exp(B) (Odds ratio)*	*95% C.I. for Exp(B)*	
						Lower	*Upper*
Located directly under the President (Compared to the VP for research)							
Constant (Y-intercept)	-1.43	2.35	0.37	.54			
Strategy and Goal	-1.43	0.59	5.84	.02	0.24	0.08	0.76
Technology	0.63	0.56	1.26	.26	1.88	0.63	5.67
Univ. CEO's characteristics	-0.59	0.65	0.82	.37	0.56	0.16	1.99
Management	1.11	0.70	2.51	.11	3.03	0.77	11.92
Small-size university	1.17	1.16	1.02	.31	3.23	0.33	31.60
Medium-size university	0.83	0.79	1.12	.29	2.29	0.49	10.67
Large-size university	0.00[a]	.	.	.	.	.	.
Private university	3.64	0.95	14.63	.00	38.12	5.90	146.21
Autonomous university	0.45	1.26	0.13	.72	1.57	0.13	18.35
Public university	0.00[a]	.	.	.	.	.	.

Located under the VP for planning (Compared to the VP for research)

Constant (Y-intercept)	2.78	1.79	2.41	.12			
strategy and Goal	-0.22	0.49	0.20	.65	0.80	0.31	2.08
Technology	-0.73	0.41	3.21	.07	0.48	0.22	1.07
Univ. CEO's characteristics	-0.45	0.56	0.63	.43	0.64	0.21	1.93
Management	0.31	0.64	0.24	.63	1.37	0.39	4.77
Small-size university	-0.29	1.18	0.06	.80	0.75	0.07	7.49
Medium-size university	-0.28	0.63	0.20	.66	0.76	0.22	2.59
Large-size university	0.00[a]	.	.	.	.	.	.
Private university	1.64	0.96	2.91	.09	5.17	0.78	34.23
Autonomous university	1.41	0.70	4.09	.04	4.08	1.04	15.94
Public university	0.00[a]	.	.	.	.	.	.

Note: (1). R^2 = 0.39 (Cox and Snell), 0.45 (Nagelkerke). *-2LL* value = 147.66, Final Model $\chi^2_{(16)}$ = 47.26, $p < .001$. Deviance $\chi^2_{(166)}$ = 146.28, $p > .05$, Pearson $\chi^2_{(166)}$ = 186.11, $p > .05$. And (2). a = values for the referent group obtained via reference cell coding.

Factors Classifying the OIR Locations. As shown in Table 1, data analysis by multinomial logistic regression using likelihood ratio tests could be summed up to: strategy and goal (*-2LLR* = 154.33; $\chi^2_{(2)}$ = 6.67, $p < .05$), technology (*-2LLR* = 154.52; $\chi^2_{(2)}$ = 6.85, $p < .05$) and university sector (*-2LLR* = 170.95; $\chi^2_{(4)}$ = 23.29, $p < .01$). It could classify (or predict) the three locations of an OIR within the university organizational structure with statistical significance. The multinomial logistic coefficients of each variable for classification of locations of the OIR under the president compared to under the VP for research suggested that strategy and goal could significantly classify OIR locations under the president (*B*= -1.43, *Wald* $\chi^2_{(1)}$ or *z*-test = 5.84, *exp*(*B*) = 0.24, $p < .05$). Considering the multinomial logistic coefficients for this statistically significant variable, it implied that a unit increased in the strategy and goal score of the university, which focused on proactive long-term planning, the odds ratio of determination for OIR locations under the president was expected to decrease for 1.43 units while controlling other independent variables in the prediction model to the same level. The odds among IR offices within the university with a great emphasis on strategy and goal setting of the planning process of being placed under the president was 0.24 times greater than the odds among IR offices within the university without an emphasis on strategy and goal setting for the planning process. The confidence interval indicated that the odds could be as little as 0.08 times or as much as 0.76 times larger with 95% confidence.

The sector of the university being private could also significantly classify the location of OIR under the president (*B*= 3.64, *Wald* $\chi^2_{(1)}$ = 14.63, *exp*(*B*) = 38.12, *p* <.01). The multinomial logistic coefficient for this university sector was equal to 3.64 units higher than placing the office under the president. That is, the odds ratio of placing OIR under the president directly within the private universities was expected to increase for 38.12 units. In other words, private universities tended to place the OIR under the president. The odds ratio indicated that as university sector changed from public (0) to private (1) the change in the odds of placing an OIR under the president compared to under the VP for research was 38.12.

In addition, the status of Thai autonomous universities, which operated independently from the bureaucratic system unlike the traditional public or state universities, could significantly classify the location of OIR under the VP for planning (from the VP for research) (*B* = 1.41; *Wald* $\chi^2_{(1)}$ = 4.09, *exp*(*B*) = 4.08, *p* <.05). The multinomial logistic coefficient for this statistically significant variable was 1.41 units higher than placing the OIR under the VP for planning. In other words, the odds ratio of placing an OIR under the VP for planning in the autonomous universities was expected to increase for 4.08 units. That is to say, autonomous universities tended to place the OIR under the VP for planning. The remaining independent variables could not significantly classify the location of the OIR in the university organizational structure under the VP for planning from the VP for research. Technology could also significantly classify the locations of OIR under the president from the VP for planning (*B* = 1.37, Wald $\chi^2_{(1)}$ = 5.12, *exp*(*B*) = 3.92, *p* <.05). And when considering the multinomial logistic coefficients for this variable, it implied that with a unit increase in technology use in the core process of the university, the odds ratio of the OIR locations under the president was expected to increase for 1.37 units. The results of classification of the OIR location within the university organizational structure and hierarchy with six independent variables showed that 64.20% of the 95 OIR samples in the Thai universities could significantly classify OIR location in the university organizational structure correctly.

Factors Affecting the Effectiveness of OIR: The R_a^2 showed that 26.05% of variance in the effectiveness of IR offices could significantly be predicted by five independent (or predictor) variables related to OIR contextual factors: size, support staff's characteristics, the chief IR officer's characteristics, IR mission-focused, and years of operations ($F_{a(6,88)}$= 5.16, *p* < .01). When the OIR locations were added into the regression model 1 that previously included the set of five predictors, the R_b^2 values went up to 0.414. These results indicate that 41.40% of the total variance that occurs in the OIR effectiveness can be significantly predicted

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together with all predictor variables in the regression model 2 ($F_{b(8,86)}$ = 7.61, p <.01). In other words, 15.40% of the total variance in OIR effectiveness could significantly be predicted by OIR locations, while controlling for those five variables in the regression model 2 to the same level, (R^2_{Change}= 0.154, $F_{Change(2,86)}$= 11.120, p< .01).

The regression coefficients of independent variables and t-test in Table 2 indicate that IR mission-focused with two dummy variables, which are IR-mission focused, and IR and research support-mission focused (compared with research support-mission focused) is critical in predicting the total variance in OIR effectiveness for two highest ratings: 0.86 ($t_{(86)}$= 4.50, p <.01) and 0.53 ($t_{(86)}$= 3.96, p <.01), respectively. Subsequently, OIR location with two dummy variables of location under the president and location under the VP for planning (compared with location under the VP for research) is equal to -0.71 ($t_{(86)}$= -4.46, p <.01) and -0.41 ($t_{(86)}$= -2.50, p <.01), respectively. Standardized regression coefficient (β) for the last significant predictor variable: the number of years of OIR operations established equals 0.29 ($t_{(86)}$= 3.18, p <.01). While regression coefficients of the remaining predictor variables differs from 0 with no statistical significance level of .05.

The results of regression coefficient on the OIR locations under the president and under the VP for planning denote -1.93 and -1.02, respectively. They imply that change of location of OIR from under the VP for research (0) to under the president (1) is likely to reduce IR effectiveness by 1.93 units. Similarly, if placing the location under the VP for planning (1), it tends to decrease OIR effectiveness by 1.02 units. Furthermore, regression coefficient results from IR-mission focused as well as IR and research support-mission focused of 2.04 and 1.37, respectively, indicate that change from research support-mission focused only (0) to IR-mission focused (1) or to IR and research support-mission focused (1) likely relates to the increase in OIR effectiveness for up to 2.04 and 1.37 units, respectively. Similarly, the age of OIR operations that increases 1 unit (year) likely relates to the increase in OIR effectiveness by 0.03 units when controlling for other variables in the prediction model 2 to the same level (See Table 2).

Table 2: Results of Predicting the Productivity of an OIR Using Multiple Linear Regression

ANOVA Table

Source	*SS*	*df*	*MS*	*F-test*	*p-value*
Model 1[a]: Regression	30.65	6	5.11	5.16	.00
Residuals	87.02	88	0.99		
Total	117.66	94			
Model 2[b]: Regression	48.69	8	6.09	7.61	.00
Residuals	68.97	86	0.80		
Total	117.66	94			

Model 1[a]: R_a = 0.510, R^2_a = 0.260, $SE_{a.est}$ = 1.000, $F_a(6,88) = 5.16$, $p < .01$;
Model 2[b]: R_b = 0.643, R^2_b = 0.414, $SE_{b.est}$ = 0.900, $R^2_{Change} = (R^2_b - R^2_a) = 0.154$,
$F_{Change(2,86)} = 11.120$, $p < .01$

Coefficients Table

Variable	*Unstandardized coefficients*		Standardized coefficients	*t-test*	*p-value*
	B	*SE*	β		
Constant (Y-intercept)	1.71	0.52	-	3.27	.00
Location under the president	-1.93	0.43	-0.71	-4.46	.00
Location under planning VP	-1.02	0.41	-0.41	-2.50	.01
IR-mission focused	2.04	0.45	0.86	4.50	.00
IR&research support-focused	1.37	0.35	0.53	3.96	.00
OIR size	0.03	0.06	0.04	0.44	.66
OIR staff characteristics	0.06	0.16	0.04	0.37	.71
Chief IR officer characteristics	-0.01	0.16	-0.01	-0.02	.99
Years of OIR operation	0.03	0.01	0.29	3.18	.00

Phase 2 Qual Findings. Results from qualitative data analysis in phase 2 sought out an explanation of results from QUAN data analysis in phase 1. This was to understand two main issues, i.e. (a) factors classifying the locations of an OIR within a university organization and (b) factors classifying the locations and contexts of organization, which related to the effectiveness of OIR recognized through experience of the executives and researchers at the university OIR, responsible for administering and performing IR of the three cases studies in this research.

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Description of factors identified OIR locations from the quantitative method: Results from the search for answers to the third research question using multiple qualitative case study design unveiled that phase 2 participants from the selected three OIRs in the case studies provided essential information needed to understand findings from phase 1 QUAN data analysis, which was relatively consistent as shown in Table 3. It indicated that strategies and goals were consistent to the plausibility of locating OIRs under the VP for planning. This was due to the flexibility in conducting research and applying results for decision-making on strategic planning and goal setting over the execution of university mission. Location under the VP for planning was likely to occur in autonomous universities because they were mostly urged to pursue their mission over competitive edges and quality excellence. After core process reengineering for more flexibility and independence of traditional bureaucratic organizations, they needed to accelerate and use information to support decision making for proactive planning under the direction of the VP for planning. Whereas OIRs in private universities were often placed under the president since a budget was required to build one. Moreover, most private universities in Thailand were small. Therefore, they often centralized by placing the office under the president's and distributed IR results to departments via high-speed information technology. For that reason, the use of technology in operation processes or systems has increased relative to the plausibility of placing the OIR under the president's direction.

Table 3 Description on Factors Classifying and Contributing to an Effective OIR

Quantitative Findings	***Qualitative Findings*** (Description of Quantitative Findings)		
	Case Of Θ_1: $(\theta_{11}, \theta_{12}, \theta_{13})$	*Case Of* Θ_2: $(\theta_{21}, \theta_{22}, \theta_{23})$	*Case Of* Θ_3: $(\theta_{31}, \theta_{32}, \theta_{33})$
1. Strategy and goal related to plausibility of OIR location, to be placed under the level lower than president at VP for research	For better IR management on strategic plans and goal setting, VP with available time and expertise was needed	President held a lots of administrative works, hence insufficient time for IR administration for planning strategies/goals	President retained insufficient time to oversee IR for planning strategies and goals, hence appointment of VP
2. Autonomous universities tended to place OIR under VP for planning	Autonomous universities were reformed from public universities that OIR were placed under VP for planning and focused on IR results for development plans	IR and information are much needed for development plan to excellence of the autonomous universities hence placement close to user	Autonomous universities were split off from bureaucratic system in order to streamline administration hence IR for planning under VP for planning

Quantitative Findings	***Qualitative Findings*** (Description of Quantitative Findings)		
	Case Of Θ_1: $(\theta_{11}, \theta_{12}, \theta_{13})$	*Case Of* Θ_2: $(\theta_{21}, \theta_{22}, \theta_{23})$	*Case Of* Θ_3: $(\theta_{31}, \theta_{32}, \theta_{33})$
3. Changes in mission focus from IR support to IR conduct and both IR support and conduct were likely to associate with an increase in IR effectiveness	With clear role and duty and permanent researchers in the OIR required IR findings to meet the target fast	OIR served only as IR support yielded irrelevant results useless for executives' decision making	With own personnel in the OIR and collaboration with outsiders on IR resulted in goal achievement
4. Changes in locations of OIR from under VP for research to under the president directly tended to reduce IR effectiveness	With many administrative works rather than research, university presidents in Thailand were not likely to specialize on IR, hence below target IR results	With many overall administrative works, hence no time for university presidents on IR outcomes	President's specific focus on decision making from IR results rather than on direction for personnel in OIR rendered more IR results submission
5. Changes in locations of OIR from under VP for planning to under VP for research tended to increase IR effectiveness	VP for research better handled budget and specialized on IR than VP for planning, hence more on target IR results	More budget and appropriation for IR staffs, hence more IR results under VP for research	VP for research's oversight of OIR rendered more budget and human resources for IR, hence more IR outcomes

Description on factors predicting the effectiveness of OIR: By the same token, participants from the selected three OIRs in the case studies reliably provided essential information needed to understand findings from phase 1 Qual data analysis as shown in Table 3. It read that the locations of OIRs were able to predict the effectiveness of the OIR at statistical significance up to 15.40 percent since the locations within organizational structure clearly affected role and duty, as well as the substance of sufficient control and resource allocation. This affected the amount of IR outcomes produced on target. There were changes in mission focus from IR support to IR conduct, while both IR support and conduct were likely to be associated with an increase in the effectiveness of the OIR. Because encouragement persons outside OIRs could conduct IR alone, it may result in irrelevant outcomes for the management's utilization. While staff for IR conduct or support personnel from outside rendered on-target quality IR, changes in locations of OIRs from under the VP for research to under the president directly tended to reduce the effectiveness of the OIR. Participants from the selected three OIRs in the case studies precisely provided a reason that Thai university presidents carried out all administrative works thus, there would be no time for instructing staff to conduct IR or support decision-making enough for on target outcomes.

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Whereas changes in locations of OIRs from under the VP for planning to under the VP for research tended to increase the effectiveness of the OIRs because of more resources for IR. Quantitative analysis findings revealed that OIRs established for many years tended to increase their effectiveness due to stability on role and duty transition as well as more skillful and experienced staffs rendering on target IR results.

Phase 3 Qual Findings. The researcher used the integrated conclusion from phase 1 QUAN method and phase 2 Qual method to outline organizational structure and coordinate the systematic mechanism within the OIR as follows.

Mission. OIR was tasked with a core mission to study, analyze, research, and report accurate and reliable official information about university operation. It also included support for personnel from outside to propose IR projects or join an IR team with the aim of getting IR outcomes useful for strategic planning and decision making for executives and direction on constant quality improvement of the university educational service management.

The OIR's organizational structure. After evaluating through expert judgments by three specialists on higher education administration and institutional research. In general, the three experts agreed with nearly all proposals on the organizational structure of the OIR drafted by the researcher in accordance with the integrated research findings from quantitative and qualitative approaches in the two initial phases. They only disagree on the issue of location and recommended to place it under the VP for planning (rather than the VP for research) citing consistency on convenience in conducting research and frequency in applying results to support strategic decision making for planning and development of the university. The president, VP for research, and other VPs jointly acted in administering university IR as the Executive Board for IR and as administrators of related system of works that helped furnish the resources (budget and staff for research) to the VP for planning who was the chief officer for IR. For this issue, the first expert believed that the influence of the location of an OIR within a university organization against the effectiveness would lower using the networks of IR systems and other support systems via university information technology systems. Thus, the researcher concluded by using results from the evaluation and experts' recommendations improved the initial drafted organizational structure of the OIR, to a more appropriate and complete organization structure, as shown in Figure 3.

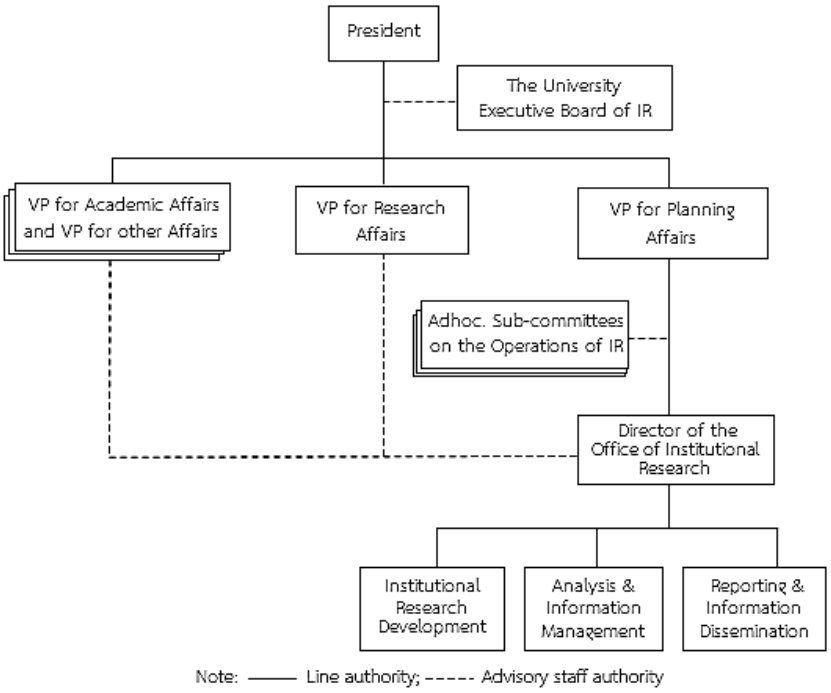

Figure 3: Adapted Organizational structure of the OIR from Expert Judgments

Figure 3 unveiled that new adapted organizational structure relocated an OIR to under the VP for planning with the core mission of conducting, supporting, and distributing IR, as well as providing service for research findings for executives or interested individuals use in decision making over university management for excellence. In addition, the internal OIR was also departmentalized into three parts, i.e. IR for development, data analysis and information management, and reporting and dissemination. An academic support personnel headed the office by generally following orders from and reporting the performance to the VP for planning (solid straight lines denoted primary chain of command). At the same time, coordination with staff from other related functions oversight by the VP for research (including the VP for academic affairs and other VPs) who helped support conduct of IR and using the results for making decisions, which these VPs acted as chain of minor command of personnel in OIR (dash line denoted secondary chain of command). Design of a chain of command with more than one commander initiated cooperation among the core function and support departments on IR as well as helped reduce the disadvantage of the lack of support on resources from placement of OIR under the VP for planning. This also increased the chances of engagement on research problems and of more result application, responding to the needs of related VPs under the concepts and principles of matrix organization structure.

In addition, IR Executive Committee was chaired by the president and members consisted of experts from operators or university graduates along with academic affairs of university and higher education administration and of IR, VP for planning as member and secretary and other VPs as members with an administrative agenda approved by the university council. Its roles and duties included IR problem formation, in which the results were used to support decision making, setting of rules and procedures related to grants for IR according to university regulations, consideration and approval of IR proposal as well as establishment of IR ad-hoc subcommittee. The number of subcommittees for each fiscal year depended upon suitability determined by the IR Executive Committee. Tasks involved screening for quality IR project proposals, reporting of progress and final IR paper funding requested and conducting research or performing related IR commissioned by the IR Executive Committee and effectively fulfilling the goals set fourth by policies and directions from the IR Executive Committee.

Discussion and Conclusion

Research findings were consistent with the concept of Calderon and Webber (2015), which supported a study by von Prondzynski (2013; Cited in Calderon and Webber, 2015). It stated that universities achieving in planning and decision making needed to place the OIR within a university organization at a position facilitating four key tasks: i.e. communication, consultation, clarity, and openness so as to reach the goal. Placement of an OIR under the VP for planning therefore helped support the administration with all four necessary tasks which required empirical information from IR results in strategic planning and decision making to efficiently achieve the goal. These findings clearly reflected the accounts from university administration and IR Thai experts who participated in the study and believed that placing of the OIR at a position "close at hand" of the VP for planning who frequently used a lot of results, highly affected executives and staffs all over the organization to follow plan until reaching the goal and vision. Thus, universities with strategies and goals focused for long-term planning were likely to have a high tendency to place their OIR under the VP for planning.

The integrated findings indicated locations of an OIR under the president's direction with the VP for planning and VP for research who together effectively administered functions related to IR mission. They supported resources in doing IR and bringing results to use in decision making under matrix organizational structure as well as collaborated among VPs and personnel in those functions. The president should specify the location of OIR and departmentalized internally employing this formation to allow the drive of IR conducting and results, utilizing the provision of constant strategic decision planning and operation

development reaching university's vision. Moreover, administration and staff of newly founded OIRs should learn management processes and IR practices in accordance with operation systems under organizational structure of the OIR which have ran for many years with an emphasis on good practices, as results from this study revealed that OIR operation was a factor related to effectiveness. And due to time limit on the study, the organizational structure of the developed OIR was not actually implemented and evaluated within a university context. Therefore, if possible this organizational structure should be used in implementation and evaluation within a real university context especially, in the universities that the president trusted in the value of decision making via information obtained from IR-based decision making, as well as supported and facilitated the implementation of organizational structure of OIRs developed from this mixed-methods research study.

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