Strategic Agenda-Setting of Institutional Research in Taiwan's Higher Education Institutions

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Abstract

As higher education around the world faces increasingly challenging times in responding to greater forms of accountability and competition, new stakeholder expectations, and rapidly changing technologies, institutional research (IR) will inevitably evolve to become a stronger force in such efforts. This study thus seeks to understand the establishment and development of IR Offices in Taiwan, by comparing their function and practice in public and private higher education institutions (HEIs). By using a document analysis method with five well-known Taiwanese HEIs, we show a growing level of planning and establishing strategy at IR offices. Implications for IR practitioners, contributions to institutional synergy, and institutional effectiveness are discussed. Specifically, this study will contribute on readers into three ways. Firstly, they will learn in the full picture of higher education system in Taiwan, and understand how HEIs initiate and operate the Office of Institutional Research. Secondly, this study serves as an example work task in which an institutional researcher draw on theory and research to develop a strategy, to design a methodological plan, and then to provide data and information that is used in strategic planning among administrative leaders. Thirdly, they will also understand the highlights that there is a significant diversity to be found in terms of approaches, priorities and perceptions of institutional research, even between five most well-known HEIs in Taiwan.

Keywords: Higher Education; Institutional Research; Office of Institutional Research; Organizational Operation; Professional Human Resource

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1. Introduction

American higher education institutions (HEIs) started to explore the use of systematized and institutional decision-making models based on empirical data as early as the 1940s. Although Taiwan had a relatively late start in studying the concept and application of institutional research (IR), the increasingly fierce and complex environment facing HEIs provides a context for investing in teaching and research in this area (Webber, 2012), and thus HEIs in Taiwan established the IR Offices in 2015. At first pass, the range of research topics and policy actions set out by this group might suggest that IR in Taiwan has indeed 'come of age,' and this issue is examined in the current study.

Since the beginning of the 1960s, economic factors have been the main consideration of the government in Taiwan, and thus the speed and scope of educational expansion efforts were carried out according to manpower projections. The Taiwanese higher education system has also made rapid progress in recent decades, at least in terms of the number of HEIs. According to statistics from the Ministry of Education (MOE) in Taiwan (2015), there were only 7 HEIs in 1949, and this had risen to 123 in 1991, and 157 in 2015. Of these, 63% are private HEIs, and the total number of college students was 1.34 million in 2015. The most preferred HEIs, those that accept students with the highest college entrance scores, are public ones, and most of them are located in northern Taiwan. Since the number of newly-enrolled students has been decreasing year by year, most private HEIs are facing a crisis with regard to shortages of incomes, funds and resources. With respect to different aspects of their autonomy (financial, academic, organizational, and staffing), the internal functioning of Taiwanese HEIs differs widely, as seen, for example, in their institutional governance structures. However, existing studies have often focused on providing an overview of the state of IR within a region (or a specific country) through the large-scale compilation of data on activities and organizational structures, and very little research has been carried out specifically on HEIs within Taiwan.

Since Stakeholders in the society and the industry have been emphasizing the significance of university education on students' learning achievement and graduates' employability, MOE in Taiwan intends to take IR as the resource of data and evidence in HEIs' institutional evaluation. Thus, in the next cycle of institutional accreditation system, in addition to the self-positioning and educational objectives of an HEI, Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) takes "core indicators" as the common evaluating content to ensure that the schooling quality and characteristics can be fully revealed and guarantee student learning

outcome based on actual resource conditions of each HEI. Therefore, to tie in with the purpose of institutional accreditation, student learning outcome has become regarded as one of the goals of running HEIs. Most importantly, MOE (2015) releases "Project of grants to improve the professional management capability of university" as the policy guidance, and adopts the concept of quality management of PDCA (Plan, Do, Check, Act), so as to many HEIs have started to check, clear and integrate non-structured data dispersed in internal and external universities, thus to establish database for IR and to develop evidence-based decision-making mechanism for institutional governance.

In particular, there is a lack of qualitative data regarding institutional experiences of IR. This study therefore aims to examine the status quo and formation of IR offices in Taiwan by considering the opinions and perceptions of those working in the field. Five HEIs are looking to extend their IR profiles, although each is approaching the task from a different starting point. This study adopted three factors - organizational operations, IR professionals and institutional applications - to undertake a proactive analysis and derive a sustainable operating model, focused on supporting strategic agenda-setting rather than conducting historical analysis.

2. Theoretical Background

2.1 Institutional Research - Definitions and Scope

IR has attracted great interest in the United States and has undergone remarkable developments in the past century. With the end of the Second World War, IR grew rapidly in HEIs, and the related authorities faced more complex decisions concerning institutional functions performance, and investments in information systems. Peterson (2003) charted the development of IR and showed how it became a routine activity in US higher education, noting how the expectations laid on institutional researchers have evolved in relation to the external political environment.

Higher education theorists and practitioners claim that IR is essential to effective decision-making in HEIs. Further, recent developments - including growing competition, rising costs, the need for cost containment, public demand for accountability, accreditation reporting requirements, and declining enrollment and graduation rates among certain student segments - have expanded the need both for IR and effective collaboration between researchers and administrators. Saupe (1990) thus identified IR as an essential component of sound institutional governance that should occur whenever any planning initiatives, policy formation, or institutional decisions are proposed.

Peterson (1985) stated that IR continues to evolve as a consequence of national and local policy decisions, advances in computing and telecommunications, the shifting budgetary climate and the growing internationalization of higher education, the increasing complexity and sophistication of decision-making, and the growing number and volume of calls for increased institutional effectiveness. The scope of IR professionals has thus expanded to encompass the roles of information architect, change agent, and consultant of choice within HEIs. In an effort to identify the role of IR at various HEIs, Delaney (1997) asked respondents to describe the typical research projects they conducted. The descriptions of these were then classified into the following eight categories:

1. Reports: institutional statistics, internal and external administrative reports;
2. Research, planning & policy analysis: planning and policy analysis studies, forecasting/statistical projections, longitudinal research, market and survey research;
3. Financial studies: cost analysis, budget planning, financial projections;
4. Enrollment management studies: admission, financial aid, retention studies;
5. Student surveys: learning engagement and alumni/ae surveys;
6. Faculty studies: faculty evaluations, faculty workload studies, salary analyses;
7. Academic studies: academic program review/evaluation, assessment of placement tests, outcome assessment;
8. Other projects: space utilization studies, transfer studies, and other miscellaneous projects.

Terenzini (1999) referred to IR as *organizational intelligence*, and elaborated on this idea by describing three tiers of organizational intelligence. The first is the *technical and analytical*, and this is needed to produce the facts and figures about an HEI, such as admission, enrollment, degrees awarded, faculty workload, and faculty-to-student ratio. Technical and analytical intelligence also includes the use of tools such as spreadsheets, knowledge of statistics, SPSS, and a background in survey research. These basic skills are necessary to succeed at an entry level in the profession of IR.

Terenzini's second level, on which the first is built, is *issues intelligence.* This includes knowledge not just about the technical aspects of the job, but also the particular issues faced by the HEI. Issues such as affirmative action, resource allocation, need for program evaluation, enrollment goal setting, and planning are of immediate importance to the HEI. It also requires knowing about and working with

the key actors and people at the HEI who are addressing these issues.

Tier one is thus more basic than tier two, and both are more underlying than tier three, which is *contextual intelligence.* The context involves knowing the HEI internally and externally, such as the history, culture, evolution, and external environment within which the HEI functions, and trends in that environment, such as the population of high school graduates and economic health of the state, especially if the HEI is primarily government-supported.

Volkwein (1999) discussed a variety of campus dualities, tensions, and policy collisions - internal versus external, academic versus administrative, professional versus institutional, access versus excellence, efficiency versus effectiveness, and assessing for improvement versus assessing for accountability, and these contradictory pressures produce a variety of challenges for the various roles of an institutional researcher. Volkwein (2008) then included science and technology as a task and implication of IR in different situations, as shown in Table 1. In addition to the four facets of IR, Serban and Luan (2002) developed Volkwein's (1999) framework by adding a fifth: IR as knowledge manager.

Table 1 Five Faces of Institutional Research

Organizational Role and Culture	**Purpose and Audience**	
	Formative and Internal, for Improvement	Summative and External, for Accountability
	Cell 1	**Cell 3**
Administrative and institutional	To describe the HEI; IR as information authority	To present the best case; IR as spin doctor
	Cell 2	**Cell 4**
Academic and professional	To analyze alternatives; IR as policy analyst	To supply impartial evidence of effectiveness; IR as scholar and researcher
Technology	To gather and transform data into information and knowledge; to collaborate in creating and maintaining information repositories and to facilitate the process of knowledge creation, capture, and sharing; IR as knowledge manager	

Source: Serban, A (2002), "Knowledge Management: The Fifth Face of Institutional

Research," J. F. Volkwein (ed.), *New Directions for Institutional Research, Number 113* (Vol. 4): Jossey-Bass.

IR as information authority. The internal and more administrative purpose and support role call on IR to describe the shape and size of the HEI, its students, staff, and activities. Here the institutional researcher educates the campus community in terms of data on admissions, enrollment, faculty, and degrees awarded. In Cell 1, the institutional researcher is largely concerned with the provision of information for administrative and managerial purposes, and requires expertise in the gathering and analysis of information, and the presentation of appropriate reports. Of the many challenging IR tasks, this one probably requires the least preparation in the form of education and experience. The role requirements correspond roughly to Terenzini's (1999) technical intelligence.

IR as policy analyst. The internal and more professional purpose calls on IR to study and analyze the HEI and its policies. In this role, the researcher works with top management as an analyst or consultant by supporting planning and budget allocation decisions, policy revision, administrative restructuring, and other needed changes. Here the researcher is the policy analyst who educates the management team. Beside the technical expertise of Cell 1, there is an emphasis on generating new information, evaluating it against reference points (for example, by benchmarking against others' performances), and perhaps recommending policy options. Studies that give alternative enrollment scenarios and revenue projections based on particular assumptions about inputs and attributes fall into this category, as do comparative cost analyses, student opinion surveys, and studies of salary equity. This role requires a relatively high level of education and training, as well as analytical and issue intelligence.

IR as spin doctor. Of the two external types, the more multi-administrative style is visible when IR assembles descriptive statistics that reflect favorably on the HEI. Many researchers are called on to play this advocate role, and need to protect against carrying this to an unethical extreme. Here, the IR staff presents the best case for the campus, and the institutional researcher needs, in addition to technical expertise, an awareness of the policy context within which reporting is to be produced. Some experience on the job and knowledge of the HEI are usually needed for success in this role.

IR as scholar/researcher. The more professionally oriented and analytic version of the external or accountability role is that of the impartial researcher and scholar, who investigates and produces evidence so that institutional effectiveness, legal compliance, and goal attainment can be judged. In Cell 4 the emphasis is on the wider

academic community and potential generalizability beyond the particular HEI, and the requirement is for standards of research and scholarship that are credible to an audience of educational researchers. While the primary interest is likely to be summative findings, these may feed back into institutional functioning.

2.2 Conceptual Framework: Understanding the Development of an IR Strategic Agenda

Taiwanese IR is still in the initial stage, and all IR related planning matters refer to the ideas and opinions of American HEIs, IR Associations and scholars. In order to establish unique, exclusive Taiwan IR, it is necessary to integrate different theories and consider the change of the environment of Taiwan higher education system to develop feasible IR strategic agenda one by one. Therefore, this study is made from the perspective of the system, stakeholders and interpretation to further connect Taiwan IR issues, thus to perfect IR Strategic Agenda.

2.2.1 Identifying IR issues as a basis for developing an IR strategic agenda

According to the Association for Institutional Research (AIR), IR is a concept whereby HEIs integrate accountability and improvement concerns in their institutional operations and interactions with their stakeholders. It thus includes concerns and issues related to faculty rights, student learning outcomes, institutional effectiveness, learning environment, institutional investment, governance, and stakeholder relationship management. Yet IR cannot mean the same thing to everyone, because IR issues "vary by institutions, by sizes, by sectors and even by geographic regions". Moreover, a responsible initiative today may become a potentially harmful action in the future. As a result, any HEI must recognize that IR can easily be interpreted as including almost everyone and everything. To respond to societal expectations and allocate resources, HEIs must first identify relevant IR issues so that they can develop a strategic agenda. Thereafter, IR issues and related institutional practices demand constant reassessments. The task of management is thus to understand the past, current, and future operating environments of an HEI. A systems perspective provides a relevant foundation for such tasks.

2.2.2 Adopting a systems perspective to developing an IR strategic agenda

Systems thinking involves seeing the world not as discretely compartmentalized units but rather a network of overlapping and interrelated elements (Reich, 1992); that is, "seeing interrelationships rather than things, … seeing patterns of change rather than static snapshots" (Senge, 1990, p. 68). Systems thinking focuses on recognizing the interconnections among the various parts, and then synthesizing these into a cohesive view of the whole (Anderson & Johnson, 1997).

From a systems viewpoint, HEIs are open social systems that must cope with external environmental and internal institutional uncertainty, as well as develop characteristics and perform processes that enable them to adapt to the opportunities, threats, and constraints that constitute the environment and society (Tushman & Nadler, 1978). As such, HEIs cannot control their own behaviors entirely (Waddell, Cummings & Worley, 2004). Adopting an open social systems perspective, we assert that HEIs should be regarded as specific systems of stakeholders (Vos, 2003) and interpretations (Daft & Weick, 1984). Furthermore, similar to Gregory and Midgley (2003), we regard systems thinking as a necessary perspective that enables an HEI to comprehend and respond to rising concerns about IR issues at local, regional, and international levels.

2.2.3 HEIs as multi-stakeholder systems

From a systems viewpoint, an HEI operates "within the larger system of the host society that provides the necessary infrastructures for the HEI's activities" (Clarkson, 1994, p. 21). Furthermore, according to stakeholder theory, HEIs have a moral duty to take stakeholders' concerns into consideration (Evan & Freeman, 1993), which means addressing the concerns of "any individual or group who can affect or is affected by the actions, decisions, policies, practices, or goals of an HEI" (Gatewood & Carrol, 1991, p. 673; adapted from Freeman, 1984). Stakeholder groups that convey their societal expectations to HEIs may include owners and administrators, faculties, students, professors, competitors, the local community, and government, and these often form coalitions that "have more influence than a stakeholder alone" (Vos, 2003, p. 142). Consequently, HEIs need a reliable mechanism to identify the relevant coalitions and related issues, and then define the clear limits of the stakeholder system that it represents.

Critical systems thinking can help resolve the managerial problem of identifying stakeholder coalitions and issues (Achterkamp & Vos, 2007; Vos, 2003). On the basis of critical systems heuristics (Ulrich, 1983, 1988) and considering a case of specific innovation projects, Achterkamp and Vos (2007) proposed a four-phase method - initiation, development/performance, implementation, and maintenance - for identifying stakeholders according to their level and timing of involvement with regard to a particular project.

We apply this method to the problem of identifying IR stakeholders, with each key IR issue the HEI faces representing a project to manage. For example, a student enrollment project might try to adapt existing procedures to address student school-selection issues; another project could develop a new enrollment channel linked to a particular IR issue, such as developing foreign student recruitment

solutions. The resulting IR strategic agenda would regroup different projects or programs according to whether they appear decisive and coherent with institutional goals.

However, HEIs must recall that IR does not simply entail various, disconnected issues, but instead pertains to developing several interconnected initiatives that help manage relationships and resolve any dilemmas among the competing interests of stakeholders (Werther & Chandler, 2006). The interrelationships among IR issues and their related projects must therefore be recognized to enable the HEI to design a constructive and coherent IR strategic agenda. Furthermore, this perspective demands a sound understanding of each key issue, as well as an institutional mindset that appreciates the complexities of the environment.

2.2.4 HEIs as interpretation systems

To identify the key coalitions of stakeholders, decisive IR issues, and their interrelationships, HEIs should develop information processing mechanisms to detect events, trends, and developments that are relevant to their activities. To "know" the environment, they must develop internal scanning processes that "identify emerging issues, situations, and potential pitfalls that may affect [their] future" (Albright 2004, p. 40). Institutional data then require interpretation (Daft & Weick, 1984) to become knowledge and understanding before the HEI can determine whether and how to respond to a potentially critical IR issue. Ashmos et al. (1998) noted this requires knowledge of which institutional players possess information that can help resolve a specific issue, and which groups should participate in the decision-making process.

Identifying HEIs' key issues requires administrative leaders to listen, look, and show consideration for institutional data (Bowen & Heath, 2005). Institutional mechanisms for apprehending the environment, processing data and information, and setting goals cannot be divorced from the individuals who possess these capabilities (Daft & Weick, 1984). In this sense, the HEI's interpretations of student data and subsequent decisions depend on how administrators perceive the interdependencies among institutional systems. When administrators share interpretations, they create an overriding institutional interpretation.

3. Methodology

3.1 Sample and Data Collection

Documentary analysis was undertaken with five HEIs' IR projects. In order to realize high level of representativeness of sample, in this study, the grants, location and the features of the HEI are taken as the conditions of sample. Among all, the

location is divided into the north, the central region and the south. The features of the university are the general universities having obtained grants from Taiwan MOE. The reason why this study adopts these universities is because they have obtained the affirmation of the experts and scholars in the planning and implementation of IR, so that they have obtained the grants from Taiwan MOE. In addition to official HEI websites and interviews with individual IR professionals, we also collect data from the Statistics Department of Taiwan MOE. For ease of reference, keys will be used to identify the universities considered, based on the regions and public/private status (N-North; C-Central; S-South; Pub-Public; Pri-Private), and a number (1 or 2) to distinguish between individual HEIs, i.e. *SPub1* is a South public university, *CPri1* is a Central private university, and *SPub2* is also a South public university.

Universities *SPub1* and *SPub2* are both large, well-established, leading public HEIs with several campuses in their regions. University *NPri1* is an autonomous state HEI with a long and prestigious history, while *NPri2* is a smaller private university, although considered to be one of the most promising HEIs in Taiwan. Finally, University *CPri1* is a prominent private one with a particularly strong international focus. All five HEIs are widely recognized as being amongst the leading universities in their respective regions, and all but one are ranked within the top 50 in Taiwan. It can thus be assumed that these HEIs are some of the most active in terms of IR. The selection of public and private HEIs broadly terms the overall distribution of public and private ones in each region. Table 2 shows basic information about these five HEIs including their IR professionals' educational background.

Table 2 Basic Information of IR Offices of Five HEIs in 2015

Item \ **HEI**		***NPri1***	***NPri2***	***CPri1***	***SPub1***	***SPub2***
Location		North	North	Central	South	South
Institutional type		Private	Private	Private	Public	Public
Institutional orientation		Research	Teaching	Teaching	Research	Research
Number of professionals in IR office		8	20	25	7	14
Educational background of staff in	Doctor degree (doctoral student)	6(1)	10(1)	17	3	10(4)

IR office	Master degree	2	8	6	3	2
	Bachelor degree	0	2	2	1	2

3.2 Scoring Criteria

While a small number of studies on the IR of higher education in Asian regions have been published, very little research has been carried out specifically on HEIs within Taiwan. In particular, there is a lack of qualitative data regarding the IR experiences of HEIs, especially individuals' perceptions about the process. This study therefore aims to consider the thoughts and perceptions of individuals involved in the institutional development process within HEIs in Taiwan, by means of a series of documentary reviews.

To establish the strategic agenda-setting of IR in Taiwan, this study referred to the previous literature, the MOE measurement indicators for providing grants to IR projects, and the evaluation criteria proposed by scholars, in order to perform expert assessments of the IR of the five HEIs. The assessment scores of the IR evaluation criteria were added up and sorted to list the IR activities of the current HEIs and predict the key directions in the future, and thus improve the strategic development path of Taiwanese IR. In terms of scoring, "high" means 3 points, "medium" means 2 points and "low" means 1 point. This study takes advisory panel and invites five Taiwan IR professionals to evaluate the university data collected, including IR professional, governance function and organizational structure. The scores given by these five experts were totaled up and averaged, and the final results were the scores of the items.

3.3 Assessment

A documentary analysis undertaken during a three-month period (December 2015 - February 2016) aimed to (1) assess the status of IR within the five targeted HEIs; (2) raise IR awareness among administrative leaders; and (3) propose guidelines for developing an integrated and structured IR orientation. To achieve these objectives and initiate the process of IR-oriented thinking within the HEI, we applied the suggested model by collecting various sources of information regarding IR initiative projects, administrative leaders' perceptions of IR and relevant issues. This study adopts a generic scale to evaluate the performance of these five HEIs' IR projects with regard to the IR professionals, governance function, and organizational structure within the HEI. From the five IR project applications, we collected and concluded the following important IR perception items based on the related stakeholders: (1) satisfaction at work toward faculty; (2) administrative leaders' involvement in IR; (3) administrative leaders' dedication to IR principles; (4) IR professionals' education and

training with respect to IR issues; (5) HEI's organizational structure; (6) IR-related normative aspects and commitments; (7) IR-related procedures and documentation; and (8) IR key performance indicators.

4. Findings

4.1 The Response of Taiwanese HEIs

To assess the usefulness of the suggested model, we collected and reviewed the IR projects of five renowned HEIs in Taiwan. These HEIs had already implemented some IR-related initiatives, but without a clear vision or any coherence or coordination among them.

Ideas related to IR have begun to have an impact in Taiwan; in particular, as shown in Table 3, University *NPri1* got the highest score in the area of IR, based on the all-embracing nature of IR with consequences for the most aspects of university life and experiences on campus. "In order to promote IR, experts and scholars with academic backgrounds in statistics, data processing, big data analysis, information management and higher education should be widely recruited. Through cooperation with the administration, information and research teams, we establish and explore specialized topics for IR characterized by research-based universities and propose related suggestions to promote the development of IR, reinforce the teaching quality and enhance the research ability." (*NPri1*) University *SPub2* got a higher score than University *SPub1*; *SPub2* has a policy of focusing IR activities on particular countries, such as the United States and Japan, which could be turned to the institution's advantage. "Establishing a scientific assurance system for student learning outcomes and implementing institutionalization by orderly organizing professional analysis teams to collect and analyze data are the core ideas to promote IR of the universities". Though *SPub1* is a state-owned university, it got a lower score than *NPri2*, indicating that "No clear IR strategy had been developed for the institution". It also showed that the function of the IR Office in *NPri2* had recently changed in response to an institutional decision to carry out IR activities, and staff members were now beginning to implement new policies. In these five HEIs, financial studies, faculty studies and other projects were perceived to be not very important (Table 3), and thus it appears that Taiwanese HEIs have given priority to student learning outcomes at the initial stage of IR in order to develop the strategic mode and methods needed to enhance student learning performance.

Table 3 Areas of IR Seen to be Important

Item	*NPri1*	*NPri2*	*CPri1*	*SPub1*	*SPub2*	Score
Reports (A1)	High	Medium	High	Low	High	**12**
Research, Planning & Policy Analysis (A2)	High	Medium	Medium	Medium	High	**12**
Financial Studies (A3)	Low	Low	Low	Low	Low	**5**
Enrollment Management Studies (A4)	Medium	Medium	Medium	Low	Low	**8**
Student Surveys (A5)	High	Medium	High	Medium	High	**13**
Faculty Studies (A6)	Low	Low	Low	Low	Low	**5**
Academic Studies (A7)	High	Low	Medium	Medium	High	**11**
Other Projects (A8)	Low	Low	Low	Low	Low	**5**
Score	**17**	**12**	**15**	**11**	**16**	

Furthermore, we checked five projects of these HEIs to determine their conception of IR practices and highlight the related IR dimensions. With this first round of data collection, the HEI's perception of performance with regard to common IR aspects were outlined and, more important, an overview was gained of the five HEIs with regard to IR issues, as shown in Table 4.

Administrative leaders' support for IR was perceived to be very important in all public and private HEIs. Except for the university *NPri1*, which had the highest score for "satisfaction at work toward faculty", the other four HEIs (*NPri2, CPri1, SPub1, SPub2*) got low scores for this, indicating that their IR activities are aimed at improving the quality of the education they provide, rather than the cognition of faculty members and reducing their work load is. Though *NPri1* and *CPri1* are private HEIs, they considered that IR can improve student success and learning outcomes. In this case it appears that the IR elements were primarily an institutional obligation and responsibility. It could thus be considered that the institutional approach to HEIs is relatively inward-facing, and more activity- than surface-based. It also shows that HEIs are taken as interpretation systems and IR as an interpreter to respond to critical IR-related issues, especially on student learning outcomes.

Table 4 Perception of IR Elements

Item	*NPri1*	*NPri2*	*CPri1*	*SPub1*	*SPub2*	Score
Satisfaction at work toward faculty (P1)	High	Low	Low	Low	Low	**7**

Administrative leaders' involvement in IR (P2)	High	High	High	Medium	Medium	**13**
Administrative leaders' dedication to IR principles (P3)	High	High	High	Medium	Medium	**13**
IR Professionals' education and training with respect to IR issues (P4)	High	Medium	High	High	Low	**12**
HEI's organizational structure (P5)	High	Low	High	High	High	**13**
IR-related normative aspects and commitments (P6)	Medium	Medium	High	High	High	**13**
IR-related procedures and documentation (P7)	High	Medium	High	Medium	Medium	**12**
IR key performance indicators (P8)	High	Low	High	Medium	High	**12**
Score	**23**	**15**	**22**	**18**	**17**	

Referring to the measurement indicators provided by the Taiwanese MOE, including organizational operation perspective, IR professional perspective and institutional application perspective, we assess the five HEIs using the IR project review process shown in Table 5. With regard to the *Organizational Operation perspective,* all five HEIs stated that "connecting the institutional and learning outcome system with individual data (O5)" and "establishing IR office to become a formal and professional unit (O12)" were by far the most important goals, and thus exploring student learning outcomes was the main objective when establishing an IR office. For example, university *SPub2* used its IR office to analyze student learning outcomes and find the key influence factors. Overall, some HEIs had difficulties in "conforming the function and orientation of IR operation to American IR offices (O10)" and "hiring full-time professional analysts (O11)", particularly at the professional level.

With regard to the *IR professional perspective*, except for the high score of *CPri1*, the other four HEIs seldom mentioned how to develop and promote the abilities and skills of IR professionals, especially in "providing IR staff mechanisms for professional development with capabilities to make international linkages (H3)". University *CPri1* deployed IR team members based on task contents and features, and made them participate in training and experience sharing to accumulate IR competence, thus creating a profession-development mechanism.

For the *Institutional application perspective*, the total scores of the HEIs and their averages on each indicator were about the same, except "combining the analysis results of student learning outcomes with decision-making of institutional resource allocation (I4)". This is interesting, as it implies that any analysis of student learning outcomes within the HEI, such as with a learning assessment or as part of the faculty

promotion process, will be reflected in resource integration or allocation, indicating that in most HEIs student learning analyses are not adopted to make resource-allocation and -integration decisions, and thus the value and application of the analytical results are significantly reduced. It is thus verified that integrating IR from the systems perspective can provide institutional administrative management a more macro viewpoint to examine the decision-making and student learning outcomes within an HEI, and to understand performance effectiveness and analytical results of IR.

In addition, it is less clear how the perceived government support translates into assistance for individual HEIs. Most private HEIs mentioned that the MOE provided funds to implement IR activities, but insufficient funding was cited as a significant obstacle, indicating that such support did not extend to individual institutional initiatives. Overall, most of the HEIs stressed that their independent status (as public or private institutions) meant that the decision to engage in IR was primarily taken at an institutional level, although for public HEIs there were existing obligations for evaluation and accreditation. The clear restriction was that private HEIs were constrained by a lack of government funding and, as such, IR activities in these were always likely to be more limited than at public ones.

Table 5 Scores of Three IR Constructs of Five HEIs' IR Projects

Construct	Item	Indicator	*NPri1*	*NPri2*	*CPri1*	*SPub1*	*SPub2*	Score
Organizational Operation perspective	The relationship between the implementation plan proposed by the university and the assessment and improvement of student learning outcomes	Selecting and processing the issues of student learning outcomes (O1)	High	Medium	High	Medium	High	**13**
		Identifying specific learning outcomes (O2)	High	Low	High	High	High	**13**
		Implementing the assessment of student learning outcomes (O3)	High	Medium	High	High	High	**14**
		Clarifying strategic improvement of student learning outcomes (O4)	Medium	Low	High	High	High	**12**
	The professional degree of students' acquiring, collecting, storing and analyzing the data for improving learning outcomes	Connecting the institutional and learning outcome system with individual data (O5)	High	High	High	High	High	**15**
		Specifying the structure and assessment method of student learning outcomes logically and systematically (O6)	High	Medium	Medium	Medium	High	**12**
		Using data storing, data visualization and business intelligence tools to facilitate data accuracy, reliability and accessibility (O7)	High	Low	High	Medium	Medium	**11**
	The affiliation, labor division and partnership between IR office and other departments	Building the central data warehousing system (O8)	High	Medium	High	Medium	Medium	**12**
		Drawing the organizational-level guidelines to cooperate with other institutional departments (O9)	Medium	Low	High	High	High	**12**
		Conforming the function and orientation of IR operation to American IR offices (O10)	Medium	Low	High	Medium	Medium	**9**

	The sustainability and operation plan of IR office	Hiring full-time professional analysts (O11)	Low	Medium	Medium	Low	Medium	**8**
		Establishing IR office to become a formal and professional unit (O12)	High	High	High	High	High	**15**
IR professional perspective	The professional background of IR professionals	IR staffs possessing major fields in higher education, quantitative analysis and database management (H1)	Medium	Medium	High	Medium	Medium	**11**
		Conforming the staffs' background and salary with their professions (H2)	Medium	Low	Medium	Medium	Medium	**9**
	The mechanism of professional development to IR professionals	Providing IR staffs mechanisms for professional development with capabilities to make international linkage (H3)	Medium	Low	Medium	Medium	Low	**8**
Institutional application perspective	The integration degree of teaching tutorship system and analysis of student learning outcomes	Combining analysis results of student learning outcome with mentoring policy (I1)	High	Low	High	Medium	High	**12**
		Applying the analysis results of student learning outcomes to improve effects on mentoring service (I2)	Medium	Medium	High	Medium	High	**12**
	The integration degree of resource allocation, faculty promotion and student learning outcomes	Connecting the analysis results of student learning outcomes with evaluating faculty for promotion, and emphasizing teaching quality by the reward system (I3)	Medium	Low	High	High	High	**12**
		Combining the analysis results of student learning outcomes with decision-making of institutional resource allocation (I4)	Low	Low	Medium	Low	Medium	**7**

	Other measures that can provide individualized learning experience and initiative tutorship based on the data analysis of student learning outcomes	Considering the analysis results of student learning outcomes to improve students' learning experiences (I5)	Low	Low	High	High	High	**11**
Score			**46**	**31**	**55**	**46**	**51**	

4.2 Developing the strategic agenda of IR in Taiwan

The preceding theoretical background leads us to suggest a comprehensive conceptual framework for understanding how IR strategic agendas are developed and implemented by HEIs. This descriptive model consists of two sequential loops, interconnected by two central elements: (1) managerial perceptions of IR issues and their importance, and (2) the resulting convergence of these managerial perceptions into an institutional interpretation, leveraged by existing institutional attributes and features. In large HEIs, convergence often requires an established IR committee or department (Beadle & Donnelly, 2004; Walker, 2005), composed of key administrators who debate and prioritize IR issues. Such committees usually assess the relevance of IR issues for the institutional development and culture of the HEI, orient the IR strategic agenda, and coordinate IR initiatives within the institutional system (Figure 1).

The first loop of our model, the stakeholder dialogue loop, refers to the process of interaction between the HEI and its stakeholders, and can also be considered as the IR office building period. Through this process, stakeholders can express their views about IR issues through a structured exchange (Stoll-Kleemann & Welp, 2006) on a continuous (or at least regular) basis. Such dialogue influences administrators' perceptions of the external environment, and produces greater awareness of the IR issues at stake. Feedback during this process eventually influences administrators' personal perceptions of IR issues and their relevance for the HEI. In this stage, in order to improve student learning outcomes, stakeholders will assist HEIs to improve school infrastructure, integrate data and establish information system, build student learning outcome tracing system and gradually complete IR issues. The constructive nature of stakeholder dialogue and feedback depends on the resources initially invested in the process.

The second loop of the model, the IR integration loop, can also be considered as the IR decision application period, addressing the development and implementation of key initiatives. Specifically, administrative leaders provide their perceptions of IR concerns, which become the institutional interpretation, which in turn serves as the basis for the strategic agenda. From a planning perspective, university administrative leaders typically assess the HEI's internal IR strengths and weaknesses, evaluate alternative strategies, and then develop action plans. Implementing IR initiatives and perceptions about the fulfillment of strategic objectives eventually influence administrators' perceptions of the various IR issues and their importance. In this stage, focused on evidence-oriented decision making, professionals will assist institutions in analyzing data, producing reports, expanding research issues and applying data and institutional decision-making to analyze the effectiveness of policies. Enhancing the functions of the IR office can thus support internal and external information analysis, project planning and decision-making, information storage and technical support, research and development, as well as other tasks.

Finally, stakeholders' feedback will be combined with the perceptual outcomes of IR-related initiatives and influence administrative leaders' perceptions of IR issues and their importance, which depend on their personal values, beliefs, and characteristics. This process induces a better understanding of current issues and the identification of new one. It also demands recurrent adaptations to the HEI's IR strategic agenda. Our model further highlights the need to establish efficient procedures to initiate IR strategic agenda development. This topic is especially critical to HEIs that lack any structured IR policies or systematic IR-related scanning processes. For these HEIs, administrative leaders' awareness, knowledge, and perceptions of IR are likely to be severely restricted or, at the very least, tacit and unshared.

This study collected the IR projects of five HEIs and sorted them based on IR measurement indicators, so as to plan out the Taiwan IR development strategy, as shown in Figure 2. The IR strategic agenda highlights how an HEI can rely on diversified internal managerial perceptions and know-how to identify key IR-related issues and establish its current IR status. The results of document analysis enable us to make simple but practical recommendations in terms of internal processes that HEIs should use to derive useful agendas for the development of action-oriented goals. Some IR activities are difficult to classify because they overlap several categories (Volkwein, 2008). We thus acted as the information authorities and became the research analysts, as this work was carried out based on IR activities ratings data. This study therefore suggests the following five-stage agenda related to the purposes, activities and elements of IR.

Strategic agenda #1 (IR office initiate stage): Assessment of student learning outcomes is carried out to identify how to establish a formal, designated office, and how this IR office will implement analysis of student learning outcomes with the support and assistance of all the relevant departments within an HEI. In this stage, the IR office has to formulate an institution-wide strategic policy for developing, acquiring and applying student data. (Indicators O3, O5, O12)

Strategic agenda #2 (IR issue diffusion stage): Student survey strategies, including the research design for data collection, deserve high priority to more clearly link problem-solving, improvement programs, assessment methods and database establishment to student learning outcomes, as well as tie the results of the analysis to well-developed institutional policies. In this stage, the IR office has to implement student learning outcome strategies with the support and cooperation of all relevant parties within an HEI. (Indicators A1, A2, A5, P2, P3, P4, P5, P6, P7, P8, O1, O2, O4, O6, O8, O9, I1, I2, I3)

Strategic agenda #3 (IR knowledge management stage): High-quality human resource management would be helpful for contextualizing student learning outcome analyses and provide better foundations for answering what IR professional initiatives are most appropriate to a particular IR office, and what types of data integration are needed to increase data

accuracy, reliability and accessibility. In this stage, the IR office has to improve human resources, and then use these in its quality enhancement activities. (Indicators A7, O7, H1, I5)

Strategic agenda #4 (Professional development and matching stage): Research is needed that compares the efficacy of human resource practices across contexts, including sectors, IR professionals, research synthesis, and other appropriate quantitative and qualitative methods. Importantly, theory-based research needs to assess human resource management practices and performance holistically at various levels. In this stage, the IR office has to monitor and evaluate the achievements of IR professionals' knowledge assets. (Indicators A4, P1, O10, O11, H2, H3, I4)

Strategic agenda #5 (Institutional resource integration and IR institutionalization stage): Future research should give high priority to resource allocation, finance, budget, and space planning with regard to institutional sustainable development, with particular attention to the linkages between institutional resource and student learning outcomes. In this stage, the IR office has to formulate institutionalized management and then further monitor and evaluate its own overall effectiveness and efficiency. (Indicators A3, A6, A8)

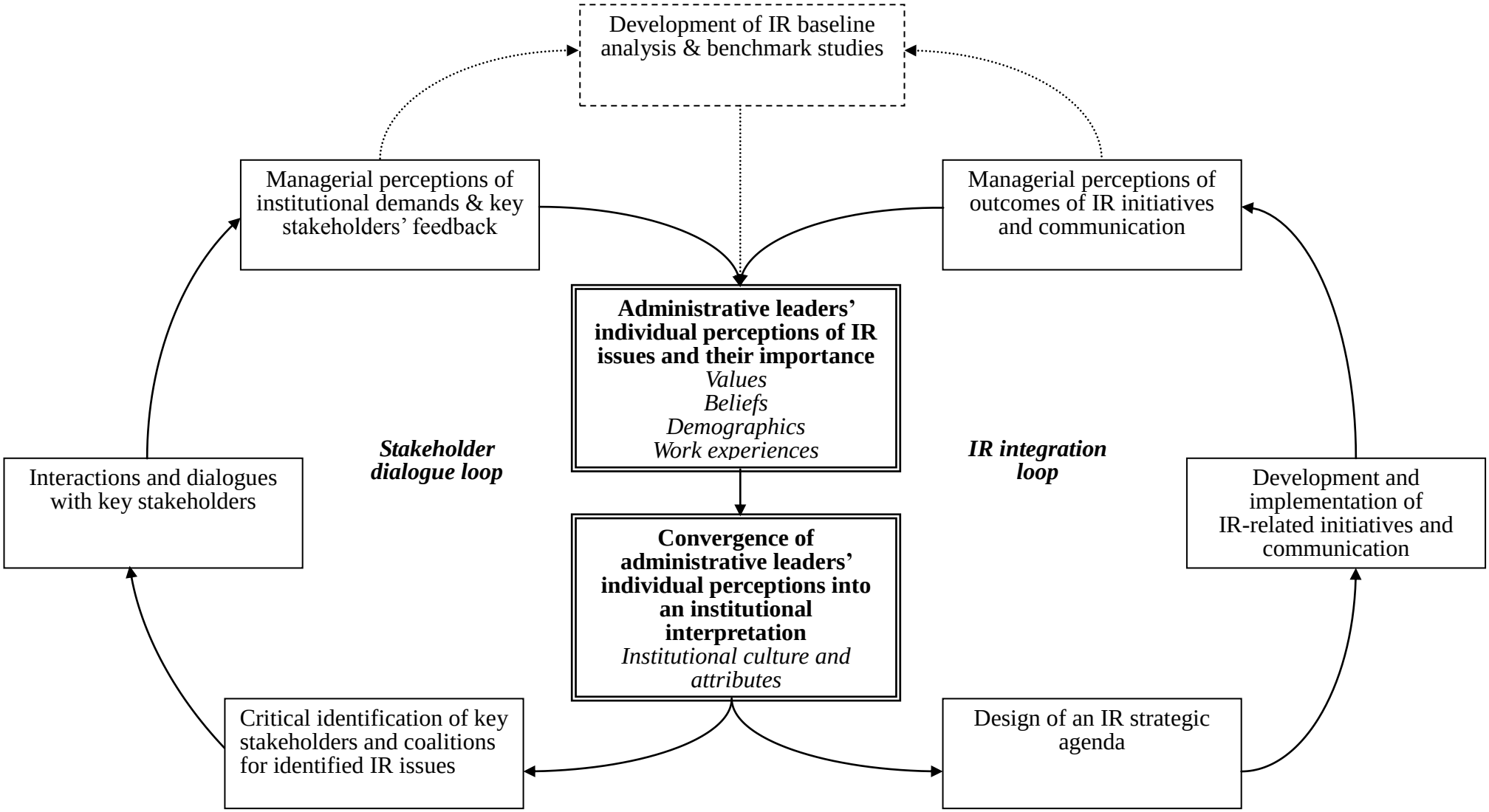

Figure 1. The Double Loops of HEIs Develop IR Projects in Taiwan

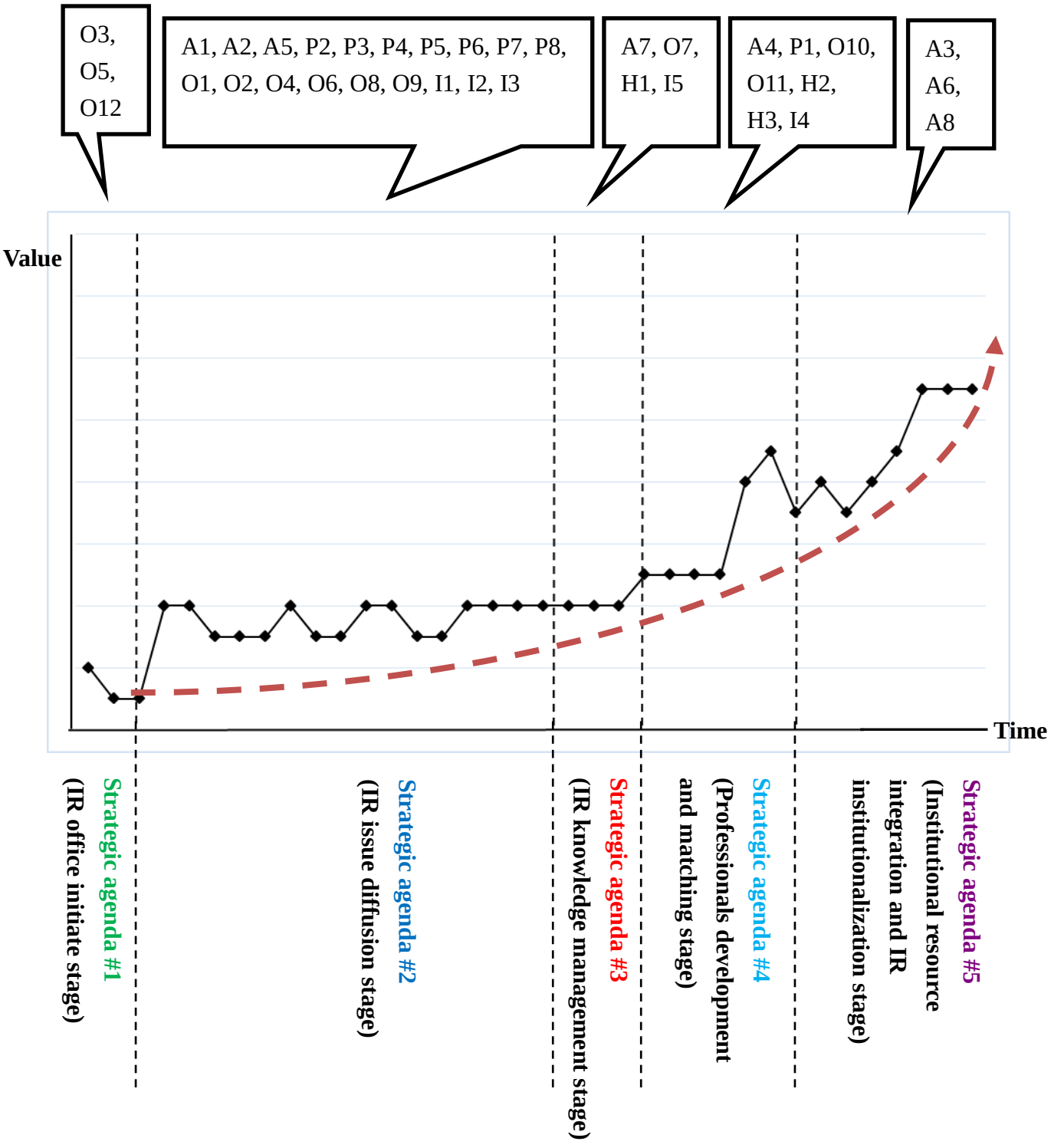

Figure 2. The Five IR Strategic Agendas of HEIs in Taiwan

5. Discussion and Conclusions

As we can see from the above analyses of IR projects, technology is now an important basis of development of IR activities, and a powerful facilitator of the IR

office's processes. However, the use of IT leads to the dominance of a database-centered view of organizational information resources and processes.

This study thus presents a broader concept of IR by using thirty-six indictors previously found to be characteristic of an HEI effectively managing IR activities. It is this model which appears in many conceptualizations of knowledge management. In fact, in our strategic agenda, this database model may not be the most valuable in the context of IR information processes. We provide evidence of the importance of effective IR professional management, such as strategic agendas 4 and 5. Thomas Davenport, director of research at Ernst and Young's Centre for Information Technology and Strategy in Boston, argues that the majority of information that managers draw upon is not embedded in computer systems - rather, it is principally in the heads of the professionals, or communicated to them through a number of channels (Quintas, Lefrere & Jones, 1997).

There is an awareness that, for the majority of HEIs, traditional database structures and IT approaches can capture or represent only a fraction of their knowledge and intellectual capital. Of course, this varies between sectors and organizational types - some forms of organization depend on large databases of tightly-structured information, but here the value added may still occur at a meta-level, such as having knowledge about which information sources are accurate, and what types of information, and patterns in the data, specific stakeholders may wish to pay for. Knowledge adds value to data by providing selectivity and judgment. Most HEIs confront environments that continue to grow more complex, unpredictable, and multifaceted. Because stakeholders convey "a variety of conflicting values and interests" (Lozano, 1996, p. 233), HEIs face serious challenges in their efforts to identify and prioritize the range of student learning outcome issues they should address. In particular, developing an IR strategic agenda can be a challenging task.

According to the IR strategic agenda established under the research findings, this study proposed the following practical implications in the context of current developed of Taiwan IR. Firstly, it has been founded that the first two stages are the pioneering ones of an IR office, so that the original organizational structure should be changed and responsibilities of an office should be planned. Also, IR professionals should establish the value and significance of an IR office and integrate students' learning database as a basis for future issue analysis. Secondly, besides the analysis on students' learning issues, the second, third and fourth stages also relate to individual professional development, salary and promotion. Therefore, it is suggested in this study that HEIs should provide a favorable environment for the advancement of IR professional knowledge and promotion, so that the recruitment and retention of IR

talents are the priorities. Finally, it is shown that an IR office must integrate institutional resources and fully apply them on the development of the university, such as knowledge management and institutionalization. As a result, HEIs should take advantages of the establishment of institutional knowledge integration platform from IR offices to effectively apply resources and knowledge as well as creating new knowledge, thus to provide sustainable energy for the development of HEIs in the long run.

This study has three main contributions. First, we provide a better understanding of the processes and rationales that underlie the development of an IR strategic agenda. By integrating systems thinking, IR and organizational interpretation theories, we present the first comprehensive conceptual framework to highlight how IR issues emerge, get prioritized, and become integrated into an HEI's major goals. Moreover, the systemic nature of the continuous process we imagined requires IR offices to design structured dialogues with their stakeholders and efficient monitoring systems if they want to implement IR strategic objectives. In accordance with Hebel and Davis (2005, p. 526), our framework emphasizes that at all points during the development process toward an IR orientation, "the requirements of the various stakeholders involved must be accounted for, matched or adapted according to need in order to achieve the required student learning outcome." Furthermore, we specify that IR offices must find ways to scan their own full-time analysts regularly to identify potential key issues, as well as institutional resource allocation and student learning outcomes. Second, we note the critical supporting role of administrative leaders during the development of a structured IR-related agenda. Together, these elements contribute to an innovative perspective on the development of IR strategic agendas. Third, the findings from the document analysis confirm that existing managerial knowledge and technological analysis within an IR office cannot be a strong basis for initiating a strategic agenda. Specifically, the results show how different perceptions about IR must complement one another if the HEI wants to identify its IR status comprehensively. Our findings further emphasize that IR issues systematically consist of two distinct groups pertaining to connecting student learning outcomes with individual data, and enhance well-established IR professionals' analysis skills and capabilities.

This study has the following limitations. First, our conceptual framework requires further empirical support, perhaps with more case studies. Second, by emphasizing the central role of administrative leaders' perceptions, we may limit potential constructive inputs from other stakeholders. However, this study conceives of IR development primarily as an institutional, strategic issue initiated by the IR office and the professionals who manage and analyze student data. This IR office may

be subject to multiple constraints and pressures from various actors, but its chief constraints involve its own resources and capabilities. Therefore, though our intent is certainly not to underestimate the power and influence of key stakeholders, our conceptual framework focuses on reaffirming the role of the subjective human factors and system factors in the dynamic processes of responding to the environment and developing IR initiatives.

In short, a successful process to develop IR office strategic initiatives and policies must rely on a comprehensive understanding of the issues that the office faces. In particular, such offices benefit when they achieve a cohesive definition of the issues they must consider (Jaques, 2006). Besides, developing IR involves a long, continuous process, and establishing a solid foundation for the coherent agenda represents a prerequisite for any constructive initiative.

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