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Public Use of IR data in the United States, and Applications to the Expansion of IR in the Japanese Higher Education System

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Abstract — This study examines the public use of IR data in the United States post-secondary education system and draws applications to the use of IR data in Japan. In the first part, it reviews the longstanding history of public data usage and analyzes the changes in public use of data from 1867 through current times. It summarizes the key changes and their implications for institutional researchers. The review shows the role changes in technology and access to data led the IR field to change its perception of information in a ‘close box’ to one that is widely, and readily accessible data for all users. As a result, new methods to employ the data for evaluation have been presented in the public sphere. Detailed comparisons of colleges and universities became feasible and met the demand for accountability measures from policymakers, administrators, faculty and students. Further linkage of large, administrative records enable policymakers to monitor changes in the job market and their applicability to the higher education sector. Those changes are demonstrated using the Data Feedback Report (DFR) and the Economic Development and Employer Planning System (EDEPS)— two widely accessible reporting systems that utilize IR data in the public sphere.

In the second part, the paper examines the applicability of the tools and policies developed for public use of IR records to the higher education system in Japan. It further suggest potential benefits for the expansion of IR at a campus level, and throughout consortium collaborations. Drawing on recent development in IR research at Hokkaido University and in Japan, I outline areas where linking existing administrative records may greatly support data completion, and complement information collected in existing surveys. Expanding on the promising work of Miyamoto et al. (2017) and Hosakawa et al. (2018), it shows adding administrative records to evaluate longitudinal student outcomes can enhance the IR research in Japan and support the findings of earlier studies in IR. This would enable a mass expansion of IR at the course, major and campus level assessment. It further aligns with the development of assessment policy crucial for institutional effectiveness. Applications to campus level and system-wide IR are further discussed.

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Introduction

This working paper was developed when I served as a visiting faculty at Hokkaido University’s Graduate School of Education. The research residency at Hokkaido University enabled me to collaborate several researchers and gain understanding of the changing dynamics in the

Japanese Higher Education system. I worked with researchers at Hokkaido University to better understand the challenges in the development of Institutional Research (IR) in Japan and the use of IR information in the public sphere. In particular, I found the challenges in mapping the use of IR data as a public record to be joint with the experience in the United States. In this working

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paper, I provide special focus on the data usage in the United States as part of the practical use of IR data. This working paper addresses the role of IR data as a public record in the decision-making sphere, and its changes over time. It provides a brief overview of the historical developments of postsecondary data collection in the United States, current trends and examples of public use of IR data. It closes with a discussion of the applicability of those changes to the development and expansion of institutional research and public use of IR data in Japan.

Public Use of IR Data in the US

During the early days of institutional research, Colleges and Universities referred to information pertaining to student enrollment, progress and completion as private or proprietary. The common policy pertaining to data access has not aligned with colleges' missions and charters. As public institutions, colleges and universities are required to share their information (within the limitations of the laws). Data policies restricting access to the data did not align with the requirements of common laws requiring colleges and universities to enable free access to the information under the Higher Education Opportunity Act (HEOA), and several other laws or executive orders.

Historical Development of Postsecondary Education Public Use Data Collection

The first law that administered the collection, analysis and dissemination of higher education data in the United States was written in 1867 (NCES 2012, 2017). The law formed an agency and mandate it to be in charge of

“collecting such statistics and facts as shall show the condition and progress of education in the several States and territories, and of diffusing such information respecting the organization and management of schools and school systems, and methods of teaching, as shall aid the people of the United States in the establishment

and maintenance of efficient school systems, and otherwise promote the cause of education throughout the United States.”

(NCES 2017, 150 Years of Federal Education Data Collection)

Following this law, the first data collection from higher education institutions took place in 1868-1869. This collection included basic data regarding the institutions, enrollment and degrees¹. Following the initial data collection, multiple collection systems have been developed through the 1960's. Afterwards, two major changes in the data collection mechanisms and laws took place: First, the Higher Education General Information Surveys (HEGIS). This collection began in fall 1968. HEGIS was designed to build a comprehensive picture of the postsecondary sector- across sectors and states. (United States Department of Education, National Center for Education Statistics & Higher Education General Information Survey (HEGIS) 1968). This collection was administered annually through 1986-7, and it was replaced with the Integrated Postsecondary Education Data System (IPEDS). IPEDS is currently used as a data collection system for nearly all colleges and universities in the United States. Reporting to IPEDS became mandatory in 1992, for all colleges and universities that are permitted to participate in Student Financial Aid program (Title IV need-based aid). Colleges and Universities that do not enroll in Title IV aid are also encouraged to report to IPEDS, and benefit from their participation². Universities that report to IPEDS allow for a public accountability to their performances, and increase their visibility to prospective students and policymakers.

Concurrently with federal reporting system to HEGIS and IPEDS, several state reporting systems were established in the 1950s/1960s. A key difference between most state-level systems and IPEDS is in the unit of reporting: HEGIS and IPEDS data collection is at the college or university level, while most state systems collect information at the individual student-level. In addition, most modern state collection system employ

administrative records in lieu of fillable surveys.

Changes in Institutional Research Pertaining to Data Access

Historically, IR offices retain the information in a ‘close box’--institutional research work has been limited by the information systems available to colleges and universities, and limited to the users who have been in direct access to such systems. Information has been mostly archival, snapshot based, used mainly for regulatory (mostly retrospective) reports for various governmental or accrediting agencies. Overtime, IR was assigned the responsibilities for knowledge management, commonly defined as “processes used to gather and transform data into information and knowledge; to collaborate in the creation and maintenance of an institutional official repository of data, information, and knowledge” (Serban 2002; Volkwein 1999). In its historical roles, IR data was rarely shared or publicly distributed, even within the college setting. As a result, it was commonly reported within a delayed cycle (sometimes up to two years delay), suffered from a limited review and was underutilized for analyses or accountability purposes. This practice did not align with three changes in the IR working environment

- (a) Technology-IR faces changes in IT settings, making information widely distributed and readily accessible in college settings. However, the practices of IR professionals did not change to accommodate those changes
- (b) Exponential growth of information-- IR’s working environment changed through the growth of Education Data Mining (EDM). EDM itself experienced near exponential growth since the early 2000’s (Baker, Pechenizkiy, Romero & Ventura 2010; Berland, Baker & Blikstein 2014; Heiner, Heffernan & Barnes 2007; Junco & Cotton 2011; Luan 2007; Peña-Ayala 2013, 2014; Cristóbal Romero & Ventura 2010). Ready access to data enhances its value, enabled fast turnaround from data gathering and analysis to utilization,

and by product the demands for information from IR professions.

- (c) The policymakers intentions — overtime, policy-makers increased their demand for data sharing and accountability. Laws and executive orders that encouraged data sharing, access, analyses and accountability. Changes in the legal environment led to growth in the proportion of the records and dataset that are considered (even if only partially) to be a public record.

In order to increase the exposure and usage of the data, several changes took place. In 2004, NCES introduced to all colleges and universities the Data Feedback Report (DFR). The report was is intended to provide institutions a context for examining the data they submitted to the Integrated Postsecondary Education Data System (IPEDS). The report was introduced to all participating Universities CEO’s and was intended to provide institutional executives with key data metrics, and to help improve the quality and comparability of IPEDS data. At the same time NCES, in collaboration with several reporting agencies introduced web-based distribution of the data through the Peer Analysis System (PAS), the Data Analysis System (DAS) 1.0 and 2.0. DAS provided an interactive, user friendly, public access to education survey data collected by the U. S. Department of Education. DAS allowed to conduct robust analysis, run reports using data collected and address education policy issues. The introduction of a public data interface allowed to distribute the data, while controlling for privacy concerns under the applicable laws. DAS was replaced with the IPEDS data center. The Data Center is part of multiple data tools provided by the US Department of Education and NCES under “DataLab.”

The increase in the exposure of colleges and universities public records were due to the structure of the dissemination system which ensures that:

- (a) Once information is submitted to IPEDS, the universities’ reports and summaries become a public record that is easily accessible and searchable.

- (b) The tools provided by NCES enable the information to be accessed by numerous agencies, researchers and data consumers. Furthermore, no fee or prior permission is needed to access the records.
- (c) The data may be post-processed, and/or linked to other information systems, data elements or other data collections that include colleges and universities records (e.g. job placements).

A major factor increasing the exposure of the public records to the consumers is the introduction of tools that enable public, free access to the information. The consumers of information using the data tools may be divided into three major groups:

- (a) Prospective and current participants in postsecondary education: High school and adult education counselors, prospective students, press agencies and mass media employ college-level data to explore postsecondary education options, develop collaborations between employers and universities and to hold universities accountable for the investment of public resources. Users in this group are very likely to use tools designed specifically for college search, i. e. College Navigator. Such tools enable prospective students to explore different universities independently, using official and auditable information provided by the colleges and universities.
- (b) Governmental agencies overseeing colleges and universities: The central data collection (IPEDS) is regulated by the Congress. The information collected is used for reporting to the congress, and by federal agencies, state governments, local governments, colleges and universities governing boards, and numerous policymakers. The data is further analyzed by colleges and universities' accrediting agencies. Governmental agencies employ public records to evaluate independently whether colleges and universities maintain access and performances in the standards expected by the agencies. For example, they may evaluate

whether the cost of attendance maintain the access to postsecondary education affordable, and whether student retention and graduation is within the expected standards from the institution. Users in this group are likely to use preset summary reports and tables prepared by NCES and the US department of education. At the same time, they may explore additional data as necessary through the data center.

- (c) Researchers, scholars in higher education, college guidebooks publishers, private data collection agencies, university data collaboratives (e. g. Common Data Set (CDS)), and others use the data for research or planning purposes. This group is likely to be deeply involved in the analysis and verification of annually released data, and will likely use the information for further analysis and comparison with additional reporting systems.

The introduction of the tools were associated with a direct increase in the quality of the data collected, and in the usage of the data collected for scholarly and policy planning purposes. By lieu of example, the usage of IPEDS information in scholarly publications has dramatically increased. In the early 1990's, IPEDS information was cited about 48 times a year in scholarly articles (1990-1995). Between 2001 and 2005, this rate has increased to an average of 181 scholarly articles per year; and by 2011-15 IPEDS information has been reported in approximately 720 scholarly articles per year. From 2016 onwards, the information has been reported on average in 848 scholarly publications per year. (Google Scholar: 2018³). The completeness and accuracy of the information collected in national reporting has increased as the information became widely distributed and accessible for data consumers.

Using Public Record Data for a Comparative Analysis of Colleges and Universities: The Data Feedback Report (DFR), and EDEPE

Enhancing the sharing of public record data is crucial to its accuracy and its utilization. The underlying assumption of public use data in higher education is that it is readily accessible, verifiable, updated regularly and is being used in means that information public policy and decision making in higher education. Historically, though, even public use data was not stored in easily accessible mechanisms. The inclusion of public record information in the public sphere discussion involved the introduction of several tools and reports that employ such information in the public sphere. Furthermore, it involved continuous reliance and exposure of the tools in the public discussion. Two features that utilize the public records files are very applicable to the growth in information usage in the postsecondary sphere in Japan—the data feedback report, and the occupational supply-demand system.

Creating a Common Language for Benchmarking: The Data Feedback Report

First introduced in 2004, the DFR was created with the vision that public record data should be utilized and shared in the public sphere to inform senior administrators, faculty and scholars of the college's performances. It aimed to encourage the use of public records data for actionable, decisionmaking processes. Currently, the DFR is accessible publicly through NCES' data center and sent directly to the chief (president or chancellor) of all academic institutions. It is an automatically generated report that shares statistics for the institution and similar institutions (comparison group). Colleges may create and request their own comparison group, or have one created automatically by NCES, referred to as a comparison group. There are two methods by which a comparison group can be established:

- (a) Self-reported comparison group —“An institution may choose its own custom comparison group”

(NCES 2018); or

- (b) Pre-generated automated group —“An institution may use the default option, which is the automatically generated comparison group determined by NCES” (NCES 2018).

Either selection may be useful for institutions.

Self-reported groups are useful when an institution conducted a detailed discussion of their needs and goals, which resulted in a short list of applicable comparable institutions. If a conclusive decision did not take place, then a pre-generated group can service as a reference group. The automated group employs an algorithm that takes into account several variables such as the institution level and control, major offerings, enrollment size, etc.

As noted, the underlying vision of DFR consists of three elements. First, to provide a useful report to institutional operations in return to their participation in IPEDS (that is on top of the regulatory commitment to participation). Second, to increase the exposure of IPEDS questionnaires data, specifically among senior administrators and decisionmakers in the higher education sphere. Third, to improve the quality, the understanding and the comparability of IPEDS data through increased use and discussion of the findings. DFR will compare the institutions across key critical areas, such as: Admission and enrollment yield, cost of attendance (tuition and net price), scholarships and aid, student outcomes, and college budgets and financial allocations. Figure 1 below provides an illustrative example:

Figure 1 is an example derived from a comparative analysis automatically generated for an institution. The institutional standing is reported in each year in relation to all comparison institutions. Summary statistics for the comparison group would consist of the median and not the mean to avoid data skewness, which may impact means. A detailed review of figure 1 shows that while the cost of tuition and fees for students in target institution increased over time, the tuitions and fees remained lower than the ones at 24 comparable institutions. At the bottom of the figure, further footnotes are included to clarify the information. In this case, the footnotes address the specific tuition rate charged for the students (local

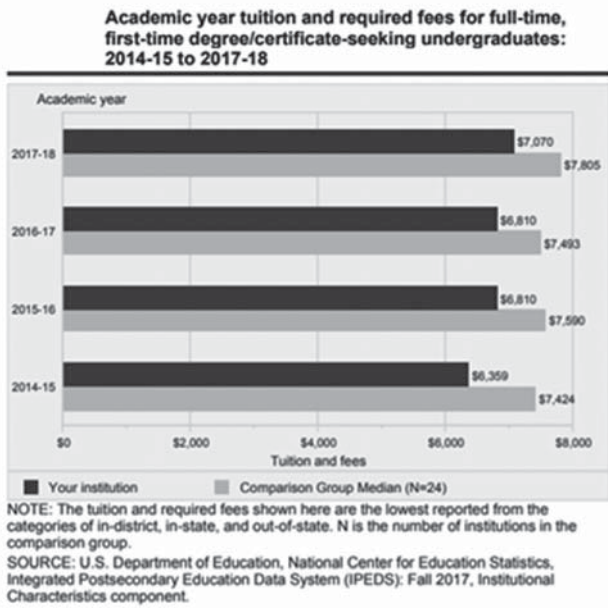


Figure 1. Student’s Academic year tuition and required fees for full time students: Four year trend between the target institution and the comparison group.

residents rates: In state, in district rate); in addition, the source of the information is specified such that researchers and policymakers can further inquire if necessary. The visual presentation of the information enables a discussion of the relative cost of education within an institution, and also increases the exposure of the data to policymakers in higher education. Figures included in the DFR were developed over time to address questions and inquiries presented by users of the public record data.

While the information provided in the DFR is summarized for all comparison institutions, if researchers or institutions are interested in specific college data, or in

other statistical summaries (e. g. the means for any category), they may be generated using NCES IPEDS data center- an interface that provides access to all IPEDS survey data. Figure 2 shows the ease of access to the list of comparison institutions:

Figure 2 presents three modes of comparison group selection. EZ Group allows to generate a comparison group using pre-set selection criteria, such as region, level of institution and enrollment. The automatic group pre-determined by NCES is accessible through the function “automatic group”; and the institutional saved comparison group is accessible under “saved group.” The reference institution is listed under ‘my comparison institution’. One may select any of the colleges and universities that reports to IPEDS (In figure 2, the author selected their home institution- E.L).

Evaluating the needs of the Job Market: Linking the Public Records to Employment Data

Several governmental agencies, research entities and non-profit institutions use the public record and link it to other public or privately held information. Student’s enrollment, majors and graduation are commonly linked with job market needs and growth. Entities and tools that link both the supply of qualified workforce (graduates from colleges and universities) with the demand side (employers needs for professionals currently and in the foresee future) allow both groups to plan ahead their actions: Colleges may increase the offerings of programs in high demand by employers; and employers may consider outreach to colleges that train individuals within their needs areas. Some states and regional governments

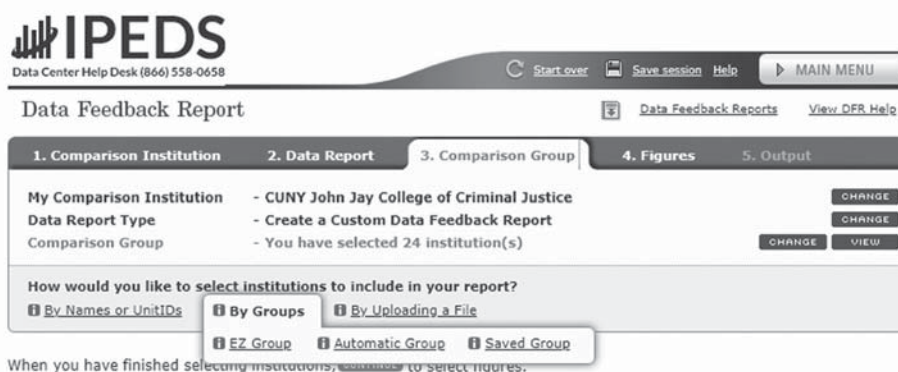


Figure 2. Access to the Data Feedback Report (DFR) comparison groups through NCES data center.

developed such systems that linked directly to local job market demands, and even to vacancy notices in major job search boards. One of the longest standing data linkages was first established in the early 1990's. by the national occupational information coordinating committee (NOICC). The system was first established as a regional tool, expanded to a national and state level tool on a later date. The system was known for several years as the Occupational Supply Demand System (OSDS) and in 2013 has been redesigned to its existing structure, and renamed Economic Development and Employer Planning System (EDEPS) -- a publicly available tool that links both ends: It uses public record information from colleges collected via IPEDS to address the supply of professionals in each discipline. It uses public record information from the US department of labor and the bureau of labor statistics (US DOL and BLS) to inform of the demand for trained professionals in each discipline. Figures 3 and 4 illustrate the data interface and the benefits of data linkage from colleges and universities, with labor statistics.

EDEPE's core interface (presented in Figure 3 above.) consists of four parts: Unit of analysis, occupations, program of study and training, and career clusters.. Selecting the unit of analysis would enable the user to select programs or professions as the unit of analysis.

Data users can further explore the information using the category "occupations," which would allow to examine the supply and demand in specific professions, using the standard occupational classification (SOC) as a reference point. Programs of study and training will allow researchers to explore the supply and demand for professionals and jobs using the Classification of Instructional Programs (CIP) codes. Lastly, on the right side, EDEPE enables users to explore career clusters: collection of close proximity professions with share training at the college level, and an overlap in the job market to allow students, college administrators, faculty and policymakers to evaluate trends in the applicable job markets.

The linkage of the US Department of Labor's records with the college's IR data allows to further estimate the demand for professionals by region in specific high wage (or living wage) career areas. Such analysis enables policymakers to focus on the development in academic areas that would support the student's sustainable success in the workforce, while maintaining the specialty training and research in the higher education sector.

For simplification purposes, figure 4 demonstrates the benefits of the system, using a single concentration in the unit of analysis. The unit of analysis selected for the demonstration is in the accounting profession, but several

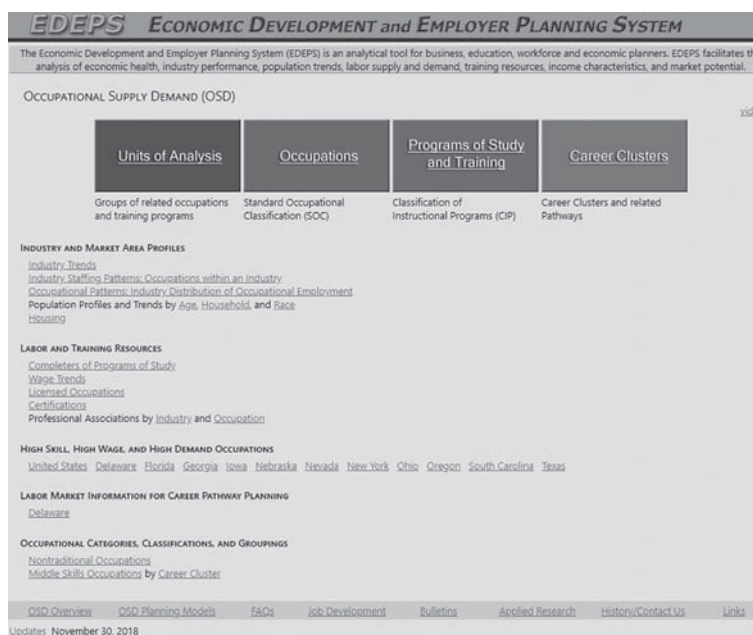


Figure 3. The public user interface of the EDEPS, Occupational Supply Demand (OSD).

The screenshot shows the EDEPS interface. At the top, it says 'EDEPS ECONOMIC DEVELOPMENT and EMPLOYER PLANNING SYSTEM'. Below that is a breadcrumb trail: 'Home > Select Unit of Analysis by Program > Unit of Analysis'. The main heading is 'OCCUPATIONAL SUPPLY DEMAND'. There are two buttons: 'Supply Indicators' and 'Demand Indicators'. Below these is a section titled 'Unit of Analysis' with the specific unit '5218A Accounting'. A table follows, with two columns: 'Program(s) of Study and Training' and 'Occupation(s)'. The table lists various accounting programs and their corresponding occupations.

Program(s) of Study and Training	Occupation(s)
52.0301 Accounting	13-2011 Accountants and Auditors
52.0305 Accounting and Business/Management	13-2061 Financial Examiners
30.1601 Accounting and Computer Science	13-2081 Tax Examiners and Collectors, and Revenue Agents
52.0304 Accounting and Finance	
52.0399 Accounting and Related Services, Other	
52.0303 Auditing	
43.0117 Financial Forensics and Fraud Investigation	
52.1601 Taxation	

Figure 4. The supply side and demand side of professional workforce linked through the unit of analysis at EDEPS. Occupational Supply Demand (OSD): Illustrative Example for the Accounting Professions.

other units of analysis are available:

EDEPS links colleges and universities supply (graduates and professionals) in each subject area with the demand and job growth in a particular field. Figure 4 illustrates the link between college and employment data using accounting related occupations. The location of the colleges, along with the locations of the available jobs and growth in the positions allows to map the information to the level of the state or the county/region. Such detailed mapping empowers employers as they plan their future recruitments: they may outreach to specific colleges and universities in their search for training entry level professionals. On the other hand, it informs colleges and universities of the demand for particular professional areas that allows them to further expand or revisit the curriculum in certain professions. For example, campuses that have special trainings in accounting for tax auditors may increase the course offerings in their elective if it proven to be beneficial for students in their job search. The state or regional government can evaluate colleges and universities contribution to the local job market trends, and request their assistance in addressing shortages in particular fields or professions.

Future Directions: the Benefits of Data Consortium Sharing Summary-Level Data for Colleges and Universities in Japan

Interactive web-based tools that simplify the access to IR data, and that link IR data to other public records are crucial in the expansion of data usage. Furthermore, they serve the intention of the lawmakers to ensure that information is not only readily accessible, but is also proactively shared and used in the public sphere. The Japanese higher education sector faces changes pertaining to variations in the support provided by regional governments, increase exposure to competition across the higher education sector, and a decline in the number of high school graduates entering higher education. In this dynamically changing setting, local governments and the national government request additional evidence and documentation of the positive contributions colleges and universities provide to the local markets. Joining public record data from multiple resources, and making the data accessible increases the ability of the higher education sector to advocate for its resources. For example, linking the number of graduates from a regional university to the tax records in local regions allows to demonstrate the positive revenue impact of the investment in the colleges: Increased professional training increases employment

rate, wages and by product- the tax base revenue.

Concurrently, the higher education sector in Japan still benefits from a higher response rate to student surveys and questionnaires compared with the United States. However, the introduction of data sharing tools can support the effort to reduce survey fatigue. Survey fatigue takes place when a particular group is presented with multiple surveys or excessively long surveys over a relatively short period of time (Adams & Umbach 2012; Porter, Whitcomb & Weitzer 2004; Sarraf & Tukibayeva 2014; Schuh 2011). Non-response, and partial response to student-level surveys has been a growing concern in higher education due to the growth in reported student survey fatigue. When presented with an ever-growing number of surveys, students are more likely to complete a survey partially or with perfunctory responses, or decide not to participate altogether (Dey 1997; Porter & Whitcomb 2005; Sax, Gilmartin & Bryant 2003). The Japanese higher education system enjoys a traditionally higher response rate to surveys. Furthermore, the Japanese higher education system benefits from access to college-based administrative data records that are at a higher completion rate compared with the United States⁴. Using the records to produce public record summaries of students, campus and system level performances would greatly reduce the reporting burden on colleges and universities. At the same time, it would increase the usage of the data for decisionmaking in higher education.

The changing face of the higher education in Japan increases the demand for accountability from prospective students, and from the parents. Increasing the access to the public records enhances data sharing with the public completes and complements large-scale student or campus surveys (e. g. Yumiori Shinbun ranking). It provides factual information that enables campuses to protect their reputation and operational decisions, and allows for independent evaluation of their performances across comparable categories. Increasing the usage of administrative records would greatly benefit the growth of IR in Japan. For example, a comparative analysis of teaching and learning processes can evaluate long term student outcomes based on the student-faculty interac-

tion. A recent informative study by Miyamoto, Lee, and Choi (2017) found that student-faculty interactions at Japanese universities exceeds the ones in Korean universities. Furthermore, the study shows that the interaction leads to higher scores in student learning outcomes. Given the growing interest in student-faculty interaction and learning outcomes, future studies can expand on the work of Miyamoto et al. and link the student records to evaluate long-term outcomes. A recent study by Hosokawa, Yamada and Miyamoto (2018) further expanded on the work developed by Miyamoto et al. and draw foundations for a comprehensive assessment policy (self-studies) that allow colleges and universities to evaluate their own curriculum and delivery, and to ensure that they maintain the highest standards in their educational program. In the paper, Hosokawa et al. proposed a checklist for assessment that includes surveying tools for students, and the important role of alumni survey.

Both Miyamoto et al. (2017) and Hosokawa et al. (2018) studies present viable and promising pathways for the growth of IR in the Japanese higher education system. Miyamoto shows that it is very likely that students with high interaction rates would achieve higher academic outcomes and have greater success rate in job placement (or graduate studies placement) post degree completion. Such a study would benefit from access to existing administrative records, as they would enable the measurement of student outcomes without the need to administer additional surveys. In turn, such studies will benefit schools such as Hokkaido University as they would highlight best practices to promote student outcomes. Hosokawa shows a viable pathway for comprehensive assessment, that is replicable across the Japanese higher education system. Such a study would also benefit from access to existing administrative records: It would empower colleges and departments within colleges to conduct self-assessment in key subject matter areas, using existing administrative records. For example, linking students records to existing administrative databases will enable departments to follow their students into advance courses or graduate studies even if

they did not respond to a student or alumni survey. It would further allow to verify self-reported information. The development of assessment policy enables the creation of cross institutional standards for self-assessment, such as the ones presented by regional accreditors in the United States.

By using administrative records, such studies will benefit schools such as Hokkaido University as they would highlight best practices to promote student outcomes. In addition, both studies are applicable not only for Hokkaido University, but across institutions in Japan. They present promising practices that can be adopted by other institutions in the Japanese higher education system. The collaboration of Hokkaido University's Office of Institutional Research and the Graduate School of Education, along with the work of the IR consortium will continue to grow the wealth of information available to Japanese Universities to promote their student successful outcomes.

Notes

1. The first Higher Education IR report was submitted to the US Congress in 1869-70; the first longitudinal data report in the US Congress archive was published in 1874. The report contained five-year trend analysis for student enrollment and the number of institutions.
2. In 2017, 456 institutions reported IR information to IPEDS, though they were not required to participate (IPEDS data center: Collection Year 2017). In 2016, 631 institutions reported IR information to IPEDS, though they were not required to participate (IPEDS data center: Collection Year 2016)
3. Citations were counted using five-year interval averages. The annual report is based on the annual average within each interval.
4. While int'l comparisons are not available, throughout my research at Hokkaido University I found that the missing data rate in key fields, e.g. high school history have been in near zero for Hokkaido University's students compared with notable missingness in ERP systems of large colleges and universities in the US. - E.L.

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