

*An Interdisciplinary Look Behind the Top 100 International Universities
Recognized for Innovation: Geographically, Historically, and Financially*

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Abstract

The need for higher education institutions to strategically innovate proves no small feat given strong heritage and reputations for being slow to change. In fact, the international universities most recognized for innovation by Reuters (2018a) span distinctive eras from around the world with the oldest such as Oxford, founded in 1096, and Harvard, dubbed the oldest “corporation” in the United States, founded in 1636. Through an interdisciplinary examination of the top 100 innovation list for the international institutions recognized, the following research question was explored: How do international universities recognized for innovation compare and contrast geographically, historically, and financially? The research design focused on a content analysis by conducting an archival review of higher institutional data for high research universities. Geographic findings report international innovative universities primarily representing three continents (46 in the U.S., 27 in Europe, and 23 in Asia). Historically, most universities were founded over two hundred years ago yet the newest, National University of Singapore, emerged in 1980. Financially, all countries benefit from strong GDPs and institutional financial strengths – some with historically strong endowments to others with dedicated government appropriations. While the use of rankings has been cautioned if taken at face value, the Reuters listing represents a starting point to more closely examine institutions that have been recognized for innovating and adapting effectively to complex societal challenges. This presentation will close with identifying opportunities for further interdisciplinary study such as the grounding of institutional theory as a means for institutions to examine legitimacy and isomorphism.

Keywords: International, Innovation, Interdisciplinary, Universities, Geography History, Finance

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Introduction

Higher education in many parts of the world struggles with reputations as ivory towers closed off from the world with longstanding legacies that can make change difficult (Harris, 2013; Thelin, 2019). The need for universities to strategically innovate in light of mounting societal pressures proves no easy feat. Interestingly, history would actually suggest that while some of the oldest universities like Oxford founded in 1096, Harvard in 1636, and even Stanford in 1885, did not focus on research at their inceptions (Henderson, 1970; Thelin, 2019). In fact, research became a stronger premise within institutional missions in the twentieth century (Harris, 2013; Thelin, 2019) which suggests more substantial organizational change taking place in the higher education realm than conventional thought would suggest.

An international scope for this research work was selected intentionally in light of an increasingly global society and the opportunity to learn from institutions recognized for their innovation efforts around the world. Also, of importance, is to examine the context of innovative higher education institutions from an interdisciplinary perspective to provide more in-depth context beyond a singular lens.

The research question focuses on how international universities recognized for innovation compare and contrast geographically, historically, and financially in an effort to more deeply understand regional relationships, longevity, and resources that shape each institution.

It is important to acknowledge the researcher positionality given her experience in higher education, interdisciplinary studies, innovation, and corporate management and how this work may be impacted. She is a doctoral candidate in the Ed.D. program in higher education from the United States. She holds an interdisciplinary, Master of Liberal Arts degree as well as post-master's international study in areas such as anthropology (globalization and development, global cultures, humanities), business (leadership, international entrepreneurship), and engineering (innovation and design). To mitigate potential bias, she obtained advisor and peer reviews prior to presenting and publishing.

Research Design

An international comparative analysis from an interdisciplinary perspective examined geographic, historical, and financial contexts for the "Top 100" universities recognized for innovation (Reuters, 2018a). Rankings provided a jumping off place to examine the phenomenon of innovation in higher education worldwide. For reference, Reuters (2018b) utilized an algorithm to rank universities based on research expenditures, patent volume, patent impact, research published, research cited, and industry collaboration.

This research employed an exploratory approach focused primarily on qualitative techniques with some descriptive quantitative data to further illuminate findings. Archival documents were sourced to prepare a content analysis (Merriam & Tisdell, 2016) from the self-published information publicly available from the ranked universities as available in addition to macro-data (i.e., World Bank, etc.). For reference, figures were converted to U.S. currency for comparison purposes.

Additionally, a geographic mapping illuminated regional incidence of this qualitative and quantitative data which provided a spatial “birds-eye view” (Yoon, Gulson, & Lubienski, 2018, p. 53) of the international landscape. For instance, the Top 100 (Reuters, 2018a) institutions were plotted on a global map utilizing ATLAS.ti (2020) software. While ATLAS.ti is a CAQDAS qualitative research software program most known as for its robust coding capabilities (Miles, Huberman, & Saldaña, 2014), it also has geospatial features (ATLAS.ti, 2020) that are being used to integrate my broader qualitative coding work beyond this study in a master database.

Interdisciplinary Research Analysis

Interdisciplinary studies foster the opportunity to study complex topics from multiple perspectives (Holley, 2009). The increasing emphasis on innovation in an increasingly complex global society is one such topic that benefits from a deeper exploration beyond one discipline – in this case, by examining differing perspectives geographically, historically, and financially.

Geographic Dispersion

The analysis began with an overview geographically to provide incidence of the institutions at continent, country, and institutional levels. To create this map, all institutions were loaded into ATLAS.ti (2020) CAQDAS software (Contreras, 2017). Geographic findings report international innovative universities to primarily represent three continents (46 in the U.S., 27 in Europe, and 23 in Asia). Note that the U.S. is treated as a “continent” given the strong incidence within the country alone with only two universities represented in Canada. Figure 1 projects this spatial view showing the majority of highly recognized universities to be located in few concentrated areas – the northeastern United States, western Europe (Germany, France, United Kingdom, Switzerland, Belgium, Netherlands, and Denmark), and the Asian Pacific Rim (Japan, Korea, China, Singapore).

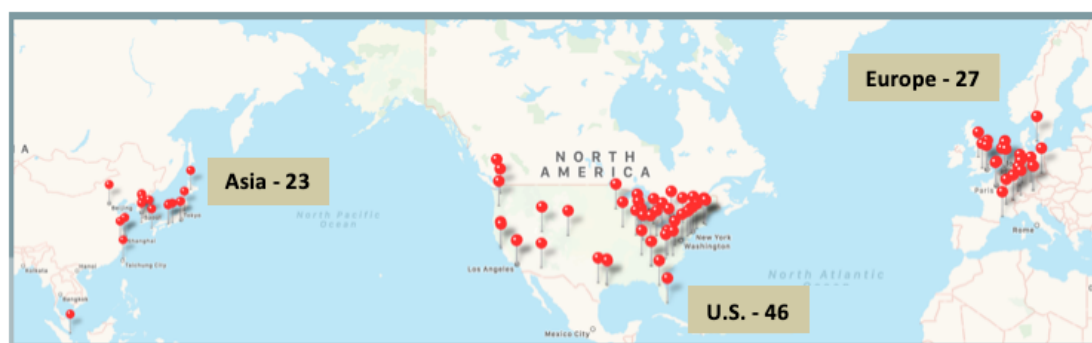


Figure 1: International Institutions Recognized for Innovation (Reuters, 2018a) – Geographic Dispersion Utilizing ATLAS.ti Software

Upon deeper exploration, geographic composition is examined by quadrants which showed some differing prominence across continents compared to the rankings list (Reuters, 2018a). For instance, the United States is not only recognized for the most institutions but also shows a disproportionately high percentage of top 25 institutions (68% of top 25 institutions versus 46% of top 100 institutions) versus Europe and Asia. Europe and Asia share equal presence in the top 25 ranking, Asia moves ahead of Europe in the second quadrant, while Europe moves ahead of Asia in the third

quadrant and over both the U.S. and Asia in the fourth. Note that “other” includes four universities in Canada and Israel (see Table 1).

Top 25			26-50			51-75			75-100		
Region	#	%	Region	#	%	Region	#	%	Region	#	%
U.S.	17	68%	U.S.	12	48%	U.S.	10	40%	Europe	10	40%
Europe	4	16%	Asia	7	28%	Europe	8	32%	U.S.	7	28%
Asia	4	16%	Europe	5	20%	Asia	6	24%	Asia	6	24%
Other	0	0%	Other	1	4%	Other	1	4%	Other	2	8%
Total	25	100%	Total	25	100%	Total	25	100%	Total	25	100%

Table 1: International Institutions Recognized for Innovation (Reuters, 2018a) – Geographic Composition by Rankings Quadrant

Historical Vantage

Most universities on the Top 100 list (Reuters, 2018a) were founded over two hundred years ago with a span of 900 years. As Henderson (1970) and Thelin (2019) proclaimed, the oldest universities continue to withstand the tests of time. The oldest institution in England is the University of Oxford (1096), Harvard University in the United States (1636), and Keio University in Japan (1858). Note that years founded are denoted in parentheses.

The Top 100 list (Reuters, 2018a) also includes some of the newest universities that were founded within the past forty years. The newest university overall and in Europe is Karlsruhe Institute of Technology in Germany (2009) that resulted from a merger, noting its origins in 1825 (KIT, 2020). The newest U.S. university is Oregon Health and Science University (1995) upon splitting from the state flagship originally founded in 1887 (Reuters, 2018a). The newest Asian university is POSTECH in Korea (1986). Also, of note, the newest university from the newest country to be recognized is the National University of Singapore (1980) resulting from a merger, while noting its original founding in 1905.

These universities represent distinct educational eras over the past nine hundred years (see Figure 2). Ancient higher education originated in Europe with three currently recognized as innovative leaders in higher education on the Top 100 list (Reuters, 2018a): University of Oxford (1096) and University of Cambridge (1209) both in the U.K., and KU Leuven in Belgium (1425). Institutions emerged in the United States during the Colonial period before the American Revolution in the late eighteenth century (Thelin, 2019) and include four institutions: Harvard University (1636), Yale University (1701), University of Pennsylvania (1740), and Columbia University (1754). The Colonial colleges emphasized strong legacies, traditions, and prestige which are still embodied to this day. These colleges built on the foundations of Oxford and Cambridge, however, embraced new governance, infrastructures, and curricular ideas, or innovations (Henderson, 1970; Thelin, 2019).

Also, of note, the highest ranked German university on the Top 100 list (Reuters, 2018a), University of Erlangen, Nuremberg, Germany, was founded in 1743. The German model trains students with more technical, utilitarian, and specialized curricula at the undergraduate, master's, and doctoral levels (Guruz, 2008; Henderson, 1970, Thelin, 2019).

The most significant emergence of Top 100 universities (Reuters, 2018a) occurred in the nineteenth century as a result of geographic expansion and the creation of land-grant universities in the United States (Geiger, 2016; Thelin, 2018); emerging nation-states in Europe and Asia (Guruz, 2008); and, the adoption of technology-driven universities inspired by Germany and France (Henderson, 1970). In fact, 53 of the Top 100 universities were founded in the 1800s (Reuters, 2018a).

The twentieth century was characterized by an emergence of international institutions from Asia on the Top 100 list (Reuters, 2018a): Kyushu University, Japan (1903); Tohoku University, Japan (1907); Tsinghua University, China (1911); Osaka University, Japan (1931); Seoul National University, Korea (1946); and the National University of Singapore (1980).

Figure 2 provides a visual portrayal summarizing the historical eras of higher education internationally and university examples founded during each timeframe.

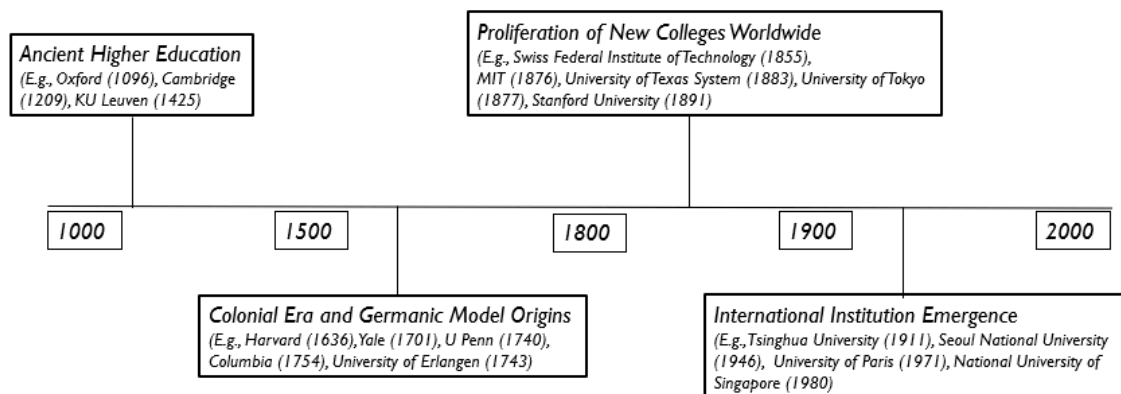


Figure 2: International Institutions Recognized for Innovation (Reuters, 2018a) – Historical Vantage by Era

To examine interdisciplinarily, historical descriptive statistics of university founding dates were added to the geospatial map. Of note, Europe spans the largest range of institutional origins, 1096-2009, with the oldest mean, 1716, and median, 1828. Moving west, the U.S. comprises the next broadest range, 1636-1995, and older mean, 1849, and median, 1861. Then, further to the west, Asia represents the smallest range, 1858-1980, with the newest mean, 1918, and median, 1905, dates (see Figure 3).

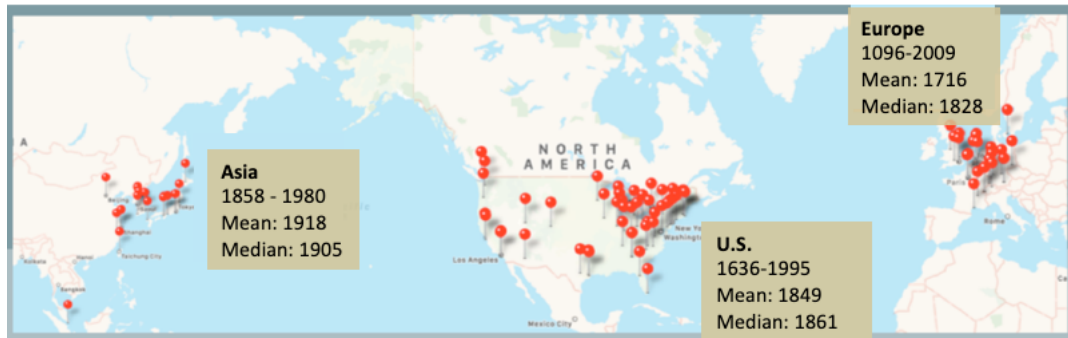


Figure 3: International Institutions Recognized for Innovation (Reuters, 2018a) – Year of Universities Founded by Region (Range, Mean, and Median) on Map Utilizing ATLAS.ti Software

Financial Comparison

Financially, all countries benefit from strong GDPs for their respective countries which is one measure of economic progress at the national level (Lange, Wodon, & Carey, 2018). The 13 countries represented in the Top 100 (Reuters, 2018a) account for roughly 60% of the world’s GDP based on the 2017 figures published by the World Bank (see Figure 4 for a GDP breakdown by country reported in U.S. billion dollars).

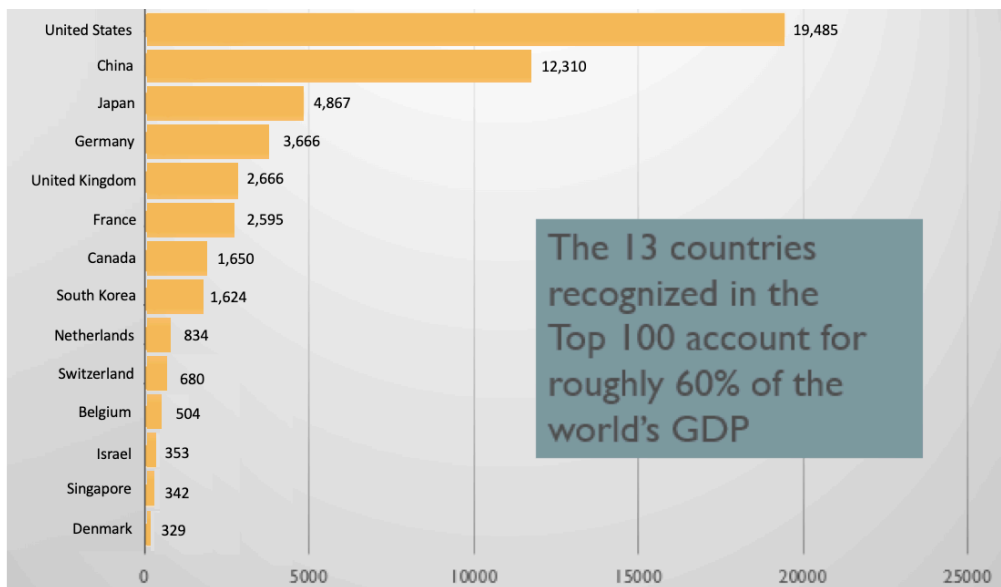


Figure 4: International Institutions Recognized for Innovation (Reuters, 2018a) – GDP by Country in Billions (World Bank, 2017)

The United States leads GDP at 38% for the countries represented on the Top 100 list (Reuters, 2018a) which is -8 percentage points less than the 46% of universities represented. Asia comprises 37% of GDP which is +14 percentage points higher than the 23% of universities represented. Europe’s GDP is 22% for the countries on the Top 100 list which is within 5 percentage points of the 27% of universities represented, the narrowest gap between GDP and university representation on the Top 100 list (Reuters, 2018a). Figure 5 overlays the total GDP figures for the U.S., Asia, and Europe on the Top 100 international institutions recognized for innovation (Reuters, 2018a).

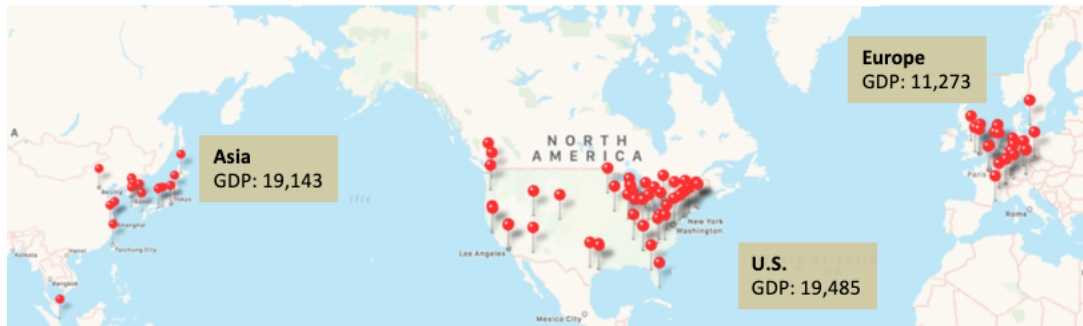


Figure 5: International Institutions Recognized for Innovation (Reuters, 2018a) – GDP by Region on Map Utilizing ATLAS.ti Software

For a closer look at institutional financial models, revenues and expenditures were examined for four universities spanning geographies and historical originations based on a quota sampling method (Miles et al., 2014) related to the Top 100 (Reuters, 2018a) distributions – two universities from the United States, Harvard University (founded in 1636, ranked #3) and Stanford University (founded in 1885, ranked #1); one university in Europe, the University of Oxford in England (founded in 1096, ranked #40); and one university in Asia, the National University of Singapore (founded in 1980, ranked #63). Data and charts were originally included in an in-depth financial study examining revenue streams and expenditures for the four institutions (Montgomery, 2020).

Revenue data was reported from annual financial reports for Oxford (2017) and NUS (2017) and from IPEDS data from the National Center for Education Statistics (2017) for Harvard and Stanford. Figures were converted into U.S. dollars for the University of Oxford from British pounds and for NUS in Singapore dollars (Federal Reserve System, 2017). Revenues per student for each institution were calculated by dividing revenue by the total number of students reported (Reuters 2018a).

Total revenues were lower for Oxford and NUS compared to Harvard and Stanford. Oxford sourced the highest composition of tuition and fees with Stanford and Harvard showing the highest revenue sourced from the “other revenue” category which could represent more innovative, diversified revenue streams beyond traditional funding sources. NUS received over twice the proportion of government funding relative to Oxford, Harvard, and Stanford (see Table 2).

Institution (US \$)	Tuition		Govt. Funding		Other Grants/ Gifts		Other Revenue		Total Revenue	
	\$K	%	\$K	%	\$K	%	\$K	%	\$K	%
Oxford	21	19%	13	12%	38	35%	38	35%	110	100%
Harvard	28	13%	20	9%	39	18%	126	59%	213	100%
Stanford	25	5%	77	16%	68	14%	305	64%	475	100%
National University of Singapore	11	17%	30	48%	14	22%	8	13%	63	100%

Table 2: University Revenue Comparison – Cost per Student

In reviewing expenses among the four universities, Oxford spent more on operating expenditures, Stanford led staff expenses, and NUS allocated more towards depreciation and finance costs (see Table 3).

When analyzing on a cost-per-student basis, Stanford spent significantly more per student than Harvard, Oxford, or NUS (see Table 3). Stanford, Harvard, and Oxford spent roughly two-thirds of revenue generated per student. NUS was the only institution that spent slightly more than revenues which resulted in a -1% deficit (see Tables 2 and 3).

Expenditure data was reported from annual financial reports for Oxford (2017) and NUS (2017) and from IPEDS data from the National Center for Education Statistics (2017) for Harvard and Stanford. Revenues per student for each institution were calculated by dividing revenue by the total number of students reported (Reuters 2018a).

Institution (US \$)	Staff Costs		Operating Expenditures		Depreciation/ Finance Costs		Total Expenditures	
	\$K	%	\$K	%	\$K	%	\$K	%
Oxford	35	51%	28	41%	6	8%	69	100%
Harvard	79	50%	60	39%	18	11%	157	100%
Stanford	183	60%	97	32%	27	9%	307	100%
National University of Singapore	31	49%	24	38%	8	13%	64	100%

Table 3: University Revenue Expenditure – Cost per Student

Note both tables 2 and 3 and corresponding explanations have been reproduced from the previous study to add financial dimension to this interdisciplinary work (Montgomery, 2020).

Discussion

This exploratory research intends to offer multiple opportunities for future studies such as longitudinal looks at rankings movement over the five years Reuters has been publishing their findings. There are also opportunities to ground studies through theoretical lenses such as institutional theory to look for evidence of legitimacy, and mimicking behaviors such as isomorphism. My dissertation examines the cross-section of traditional missions and the strategic use of innovation to assess mission alignment for the Top 100 list (Reuters, 2018a) through the lens of institutional theory with the anticipated defense and publication date in late 2020.

The use of rankings has been criticized for multiple reasons such as surface-level institutional assessments through aggregated scoring with less attention given to the algorithms and methodologies used (Soh, 2017). The Reuters (2018a) listing represents a starting point to more closely examine institutions that have been recognized for innovating and adapting effectively. This ranking acts as a sample of 100 universities to explore the phenomenon of innovation more deeply. Most university rankings examine comprehensive criteria which may or may not include innovation as a subset, such as the Times Higher Education World University Rankings, Quacquarelli Symonds World University Ranking, and Academic Ranking of World Universities, also known as Shanghai Ranking (Soh, 2017).

Innovation continues to be hotly contested in the higher education sphere as evidenced in a special edition of *The Chronicle of Higher Education* (2019) in which innovation was investigated as a mechanism for “high hopes or broken promises” (p. 59). In the current worldwide climate of the COVID-19 pandemic, we are seeing institutions innovate programming and policies in real time as a means to adapt to pressing challenges, and in some cases, to maintain existentiality.

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