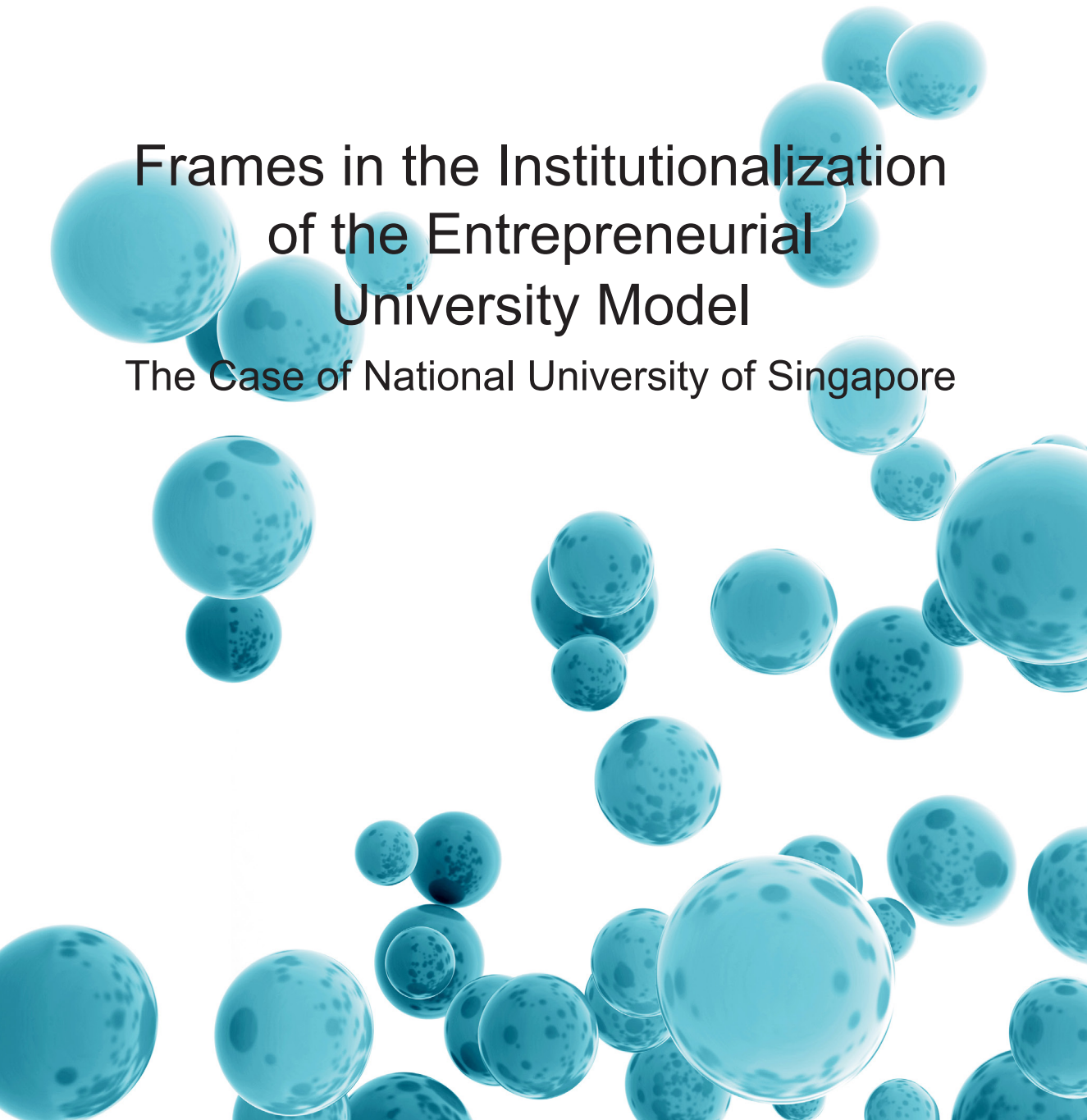


CHARISSE N. REYES

Frames in the Institutionalization of the Entrepreneurial University Model

The Case of National University of Singapore





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ACADEMIC DISSERTATION

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CHARISSE N. REYES

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ABSTRACT

Global trends influence many countries in introducing policies that enjoin higher education institutions as partners for economic growth. Entrepreneurship policies in particular, have shaped the transition of universities to become more proactive institutions and less dependent from government funding. The purpose of this study was to analyze the university's transformation in building up the entrepreneurial university model based on the government's policy framework in promoting entrepreneurship. In order to understand the drivers of transformation, the concepts of institutionalization and the entrepreneurial university were utilized in this research. The research questions were focused on determining the extent and factors that contribute to the institutionalization of the entrepreneurial university model by taking the National University of Singapore (NUS) as a case study institution.

In this study, institutionalization was defined as a condition confronting individuals of the need to accept and commit to certain practices that have been adopted by the university. The entrepreneurial university was tackled in terms of the transformation of the university which encompasses: 1) the behavior and practices within departments, faculties, and independent institutes concerning their approach to income-generating activities; 2) the institutional activities' link to the national policy on entrepreneurship; 3) the roles and contributions of various actors in cultivating entrepreneurial activities at the university; and 4) the commitment of the academic community to align the tasks, activities, and goals of the university with the government's policy framework on entrepreneurship.

The method of frame analysis was utilized in this study as a tool in interpreting complex issues and situations, including means to explore solutions in the course of entrepreneurial university transformation. Uncovering frames helped in examining the success of the government in implementing policies on higher education institutions in relation to embracing entrepreneurial ideals in their overall structure and management. This study has presented a multidisciplinary approach in analyzing various issues and situations in higher education: namely, the framework of institutionalization from the healthcare sector and the categories of frames from environmental conflict research. A qualitative approach to frame

analysis was applied to analyze the institutionalization situation at NUS. This study was guided by four categories of frames derived from environmental conflict research: identity frames, characterization frames, power frames, and risk and information frames. Empirical data for this study consisted of two main sources: interviews and documents. Eighteen interviewees participated in this study, which represent various disciplines - including science, engineering, business, social science, and the humanities. The interviews were mostly held at NUS's Kent Ridge and Bukit Timah campuses.

As an entrepreneurial university, NUS was found to be actively involved in commercialization activities and entrepreneurship education. Since the university's corporatization in 2006, massive changes have occurred to address issues of operational and financial flexibility. Documents revealed that the policies, resources, internal structure, and the support functions to complement entrepreneurial activities were earnestly planned and implemented throughout the transformation of NUS. Compared to European universities, the entrepreneurial transformation of Singaporean universities was not mainly caused by massive decrease in government funding. In fact, there has been continuous increase in resources to facilitate entrepreneurial activities, especially in disciplines that are aligned to Singapore's strategic growth areas (i.e., biomedical sciences, environmental and water technologies, and interactive and digital media). More importantly, the analysis of the data featured the myriad perceptions of institutional members on the institutionalization of the entrepreneurial university model at NUS. Frames were found to depict disciplinary differences, institutional arrangements, vulnerability of some disciplines in their role within the entrepreneurial university, and risk perceptions that reflected the choices of institutional members in supporting the entrepreneurial transformation. Institutionalization as a process typically involves stages or phases. The "spirit of enterprise" was a crucial statement in the vision, mission, and strategy of NUS because it depicts the varying and malleable notions of an entrepreneurial university and also affects the institutionalization of the entrepreneurial university model in terms of moving into another phase. As such, institutional members selectively adapt the meaning of entrepreneurial university that is more relevant to their intentions or initiatives. Overall, the current study found that the institutionalization of the entrepreneurial university model at NUS is something dynamic but is still in progress because of the need to address various operational barriers while working towards achieving entrepreneurial goals.

Keywords: institutionalization, entrepreneurial university, frame analysis, frames, National University of Singapore

TIIVISTELMÄ

Globaalien trendien vaikutuksesta on monissa maissa on harjoitettu politiikkaa, jonka mukaan korkeakoulut nähdään taloudellisen kasvun kannalta tärkeinä toimijoina. Erityisesti yrittäjyyteen liittyvät toimintapolitiikat ovat muovanneet yliopistojen kehittymistä kohti proaktiivisempia toimintatapoja ja vähäisempää riippuvuutta valtionrahoituksesta. Tämän tutkimuksen tarkoituksena oli analysoida muutosprosessia, joka liittyy yrittäjämäisen yliopiston toimintamallin kehittämiseen valtion yrittäjyyden edistämiseen tähtäävän toimintapolitiikan puitteissa. Muutosprosessin taustalla olevien seikkojen ymmärtämiseksi tässä tutkimuksessa hyödynnettiin erityisesti institutionalisoitumisen ja yrittäjämäisen yliopiston käsitteitä. Käyttämällä National University of Singapore (NUS) yliopistoa tutkittavana tapauksena, tutkimuksen tutkimuksessa keskityttiin niiden vaikuttavien tekijöiden ja niiden laajuuden tunnistamiseen, jotka vaikuttavat yrittäjämäisen yliopiston toimintamallin institutionalisoitumisen taustalla.

Tutkimuksessa institutionalisoituminen määriteltiin yksilöitä koskevaksi tilaksi liittyen tarpeeseen hyväksyä ja sitoutua tiettyihin NUS yliopiston omaksumiin käytäntöihin. Yrittäjämäisen yliopiston mallia käsiteltiin muutosprosessin kontekstissa sisältäen 1) laitosten, tiedekuntien ja erillisyyksikköjen toiminnan ja käytännöt liittyen tulonhankinta-aktiviteetteihin; 2) yliopistotason toiminnot jotka kytkeytyvät kansalliseen yrittäjyyden edistämiseen liittyvään toimintapolitiikkaan; 3) eri toimijoiden roolit ja kontribuutiot yrittäjämäisten toimintojen kehittämisessä ja 4) akateemisen yhteisön sitoutuneisuuden yliopiston tehtävien, aktiviteettien ja tavoitteiden yhdistämisessä valtion yrittäjyyden edistämisen toimintapolitiikkaan.

Tutkimuksessa hyödynnettiin metodina kehysanalyysiä. Tätä käytettiin välineenä monitulkintaisten kysymysten ja tilanteiden tulkintaan, mukaan lukien keinojen etsinnässä yrittäjämäisen yliopiston muutosprosessin haasteisiin. Kehysten tunnistaminen toimi apuna valtion korkeakouluihin kohdistaman politiikan toimeenpanon onnistuneisuuden selvittämisessä etenkin sen suhteen missä määrin yrittäjyyden edistämiseen liittyvän toimintapolitiikan ideaalit toteutuvat yliopiston rakenteiden ja johtamisen tasolla. Tutkimuksen lähtökohtana oli myös tuoda esille monitieteistä lähestymistapaa korkeakoulukontekstiin liittyvien asioiden ja tilanteiden analysoinnissa soveltamalla erityisesti terveydenhuoltosektorin

kontekstissa kehitettyä institutionalisoitumisen viitekehystä sekä ympäristökonfliktien tutkimuksen piirissä kehitettyjä kehyskategorioita. Tutkimuksessa hyödynnettiin laadullisen kehysanalyysiin lähestymistapaa institutionalisoitumisen asteen selvittämiseksi NUS-yliopistossa. Seuraavat ympäristökonfliktien tutkimuksesta johdetut kehyskategoriat ohjasivat analyysiä: identiteettikehys, karakterisointikehys, valtakehys sekä riski- ja informaatiokehys. Tutkimuksen empiirinen aineisto koostui kahdesta aineistotyypistä, haastatteluista ja dokumenteista. Kaikkiaan tutkimuksen puitteissa toteutettiin 18 eri tieteenalojen (luonnontieteet, tekniset tieteet, liiketalous, yhteiskuntatieteet ja humanistiset tieteet) edustajien haastatteluja. Haastattelut toteutettiin etupäässä NUS-yliopiston Kent Ridgen ja Timahin kampuksilla.

Yrittäjämäisenä yliopistona NUS-yliopiston voitiin todeta osallistuvan aktiivisesti kaupallistamistoimintoihin ja yrittäjyyskoulutukseen. Yliopiston vuonna 2006 tapahtuneen yhtiöittämisen jälkeen yliopistossa on toteutettu laajamittaisia muutoksia jotka ovat kohdistuneet yliopiston toiminnallisen ja taloudellisen joustavuuden lisäämiseen. Dokumenttiaineiston perusteella yliopisto on huolellisesti suunnitellut ja toimeenpannut useita yrittäjyyttä ja yrittäjämäisyyttä täydentäviä toimintamalleja, resursseja, sisäisiä rakenteita ja tukitoimintoja muutosprosessin yhteydessä.

Toisin kuin eurooppalaisten yliopistojen osalta, singaporelaisten yliopistojen yrittäjämäistymiseen liittyvä muutosprosessi ei johdu etupäässä valtiorahoituksen merkittävästä vähentymisestä. Itse asiassa yrittäjämäisyyttä tukevien toimenpiteiden resursoinnissa on ollut jatkuvaa kasvua erityisesti niillä tieteenaloilla, jotka kytkeytyvät Singaporen strategisille kasvualoille (mm. biotekniikka, ympäristö- ja vesitekniikka sekä interaktiivinen ja digitaalinen media). Mainittavaa on, että tutkimusaineiston analyysin perusteella voitiin osoittaa suuri määrä erilaisia henkilöstön käsityksiä yrittäjämäisen yliopistomallin institutionalisoitumisesta NUS-yliopistossa. Kehysten avulla voitiin kuvata tieteenalakohtaisia eroavaisuuksia, institutionaalisia järjestelyitä, joidenkin tieteenalojen haavoittuvuuksia liittyen näiden rooliin osana yrittäjämäistä yliopistoa sekä riskikäsitteitä, jotka heijastelivat NUS-yliopiston jäsenten yrittäjämäistymisprosessin tukemiseen liittyviä valintoja. Institutionalisoituminen prosessina sisältää tyypillisesti vaiheita tai kehitysasteita. Erityisesti NUS-yliopiston visiossa, missiossa sekä strategiassa ilmenevä ”yrityshengen” käsite on tutkimuksen kannalta erittäin keskeinen, koska se havainnollistaa yrittäjämäisten yliopistojen muuttuvaa ja mukautuvaa luonnetta monimutkaisina toimijoina ja koska se on myös vaikuttanut yrittäjämäisen yliopistomallin institutionalisoitumiseen siirryttäessä vaiheesta toiseen. NUS-

yliopiston henkilöstö valikoiden soveltaa yrittäjämäisen yliopiston merkityksiä tavalla joka on heidän omien tavoitteiden ja aloitteiden kannalta relevanttia. Kokonaisuudessaan tämän tutkimuksen perusteella voidaan todeta, että yrittäjämäisen yliopistomallin institutionalisoituminen NUS-yliopistossa on dynaaminen mutta edelleen käynnissä oleva prosessi. Tämä johtuu siitä, että NUS-yliopistossa on tarve käsitellä toiminnallisia haasteita samaan aikaan kun se pyrkii saavuttamaan yrittäjämäisyyteen liittyviä tavoitteitaan.

Avainsanat: institutionalisoituminen, yrittäjämäinen yliopisto, kehysanalyysi, kehykset, National University of Singapore

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1 INTRODUCTION

1.1 Policy Background: Entrepreneurship in Singapore

There is an increasing interest in the promising outcomes of entrepreneurship as observed in most countries around the world. Economists and policymakers have looked to entrepreneurship as an important driver for national economic growth, in which the willingness of individuals to consider viable career options, engagement in venture creation (Baughn et al., 2006), and other types of profit-seeking activities have emerged. Individuals and institutions are now becoming involved in finding creative, innovative, and entrepreneurial solutions to deal with global social change, economic precariousness, environmental challenges, and a burgeoning international knowledge-based economy (Meyers & Pruthi, 2011: 349). Central to the role of higher education institutions (HEIs) in the past few years is the redirection of academic work to commercial applications, and the recognition of having a dynamic interaction with the government and industry (Benner & Sandström, 2000: 291).

Since the late 1990s, entrepreneurship has particularly caught the attention of researchers, who have examined its link to HEIs that have taken onboard the “third mission” task¹ (Lyytinen, 2011: 58). New structures and innovations, the inclusion of accountability, and other changing functions that affect academic work were either accepted, opposed, or continuously deliberated within the university community. Efforts to avoid lagging behind have concentrated on the massive transformation of traditional universities, especially those that are longstanding teaching-focused institutions. Innovations in this sense have had diverse emphases, which has led to a broadening of the access and scope of operations of traditional universities. These activities may include the creation of distance teaching programs and faculty/student exchange programs with overseas partners; the teaching of on-campus students as individual learners (Curran, 1997); the

¹ Other than teaching and research, the “third mission” of universities is to play a role in innovation and social change. This term may refer to commercialization of science that has implications on universities’ funding structure, the emergence of programs in line with entrepreneurship and rules in IP (see Etzkowitz, 1998; Gulbrandsen & Slipersæter, 2007: 113).

promotion of entrepreneurship education across disciplines (Kretz & Sá, 2015); and the intensification of collaborative research. As such, modified university curricula and programs have mostly attracted students with interests in entrepreneurship and new-venture creation (Kuratko, 2005: 577), which extends to those who aim to address social problems and help build enterprises to sustain communities (Tracey & Phillips, 2007).

In Europe and the United States, the idea of the entrepreneurial university has led to various studies that describe the choices, motivations, processes, and practices in order to understand the transformation and challenges that universities experience. The practical aspects of managing tensions and conflicting priorities have been tackled most especially in cases where funding is dependent on the state, and there are additional expectations from other interest groups (Sotirakou, 2004: 358) contingent on the university's perceived role in a given context.

Recognizing the relevance of entrepreneurial activities of universities to support countries' economic growth is well established in the literature (Raposo & do Paço, 2011: 453). Earlier studies acknowledged the entrepreneurial university as a global phenomenon, in which countries tend to take "an isomorphic development path even with different starting points and modes of expression" (Etzkowitz et al., 2000). In view of this idea, the successful experiences of entrepreneurially oriented universities are not immune to criticism. Claiming that entrepreneurship in educational institutions is not considered strictly commercial, and is defined by educational objectives (Chambers, 1999), may result in various interpretations (e.g., individual constructs of an entrepreneurial institution). Likewise, actors who deal with the university—particularly the government—are sometimes forgetful that they are imposing different requirements on different cultures (Caplan, 1977) (e.g., cultures within institutions or disciplines) in terms of their agenda.

The changes experienced by university systems around the world have placed tremendous pressure on the traditional beliefs, values (Coaldrake, 2000: 8), and general set-ups of the university. Comparable to entrepreneurs in business, universities are often questioned about their motives in being entrepreneurial, which leaves people with the impression that pure economic motives dominate, rather than the desire to make a profound difference in society. Even with the intention that behaving in an entrepreneurial manner means engaging in a process that creates value (Chell, 2007: 13), universities have to justify their purpose and elaborate on the meaning of their own "entrepreneurial university" model.

In the context of Singapore, the focus on entrepreneurship started as a renewal strategy. The Asian financial crisis that started in 1997 tremendously affected the

Singaporean economy. Starting from the localized currency and financial crisis in Thailand, the situation produced a contagious effect in countries such as Singapore, South Korea, Malaysia, Indonesia, and the Philippines. Due to debts, currency depreciations, and the rise in interest rates, most Asian financial institutions and corporations have either terminated employees or have decided to shut down their operations. Singapore experienced financial collapse despite having massive foreign exchange and fiscal reserves and a solid financial sector (Lee, 1998). There was pressure to catch up after the 1997 financial crisis; the country aspired to expand into and penetrate the European and North American markets. Singapore had to decide either to continuously rely on existing technologies or combine these existing technologies with new ideas that would lead to the creation and commercialization of innovations (Edquist & Hommen, 2009). It took the opportunity to work on its higher technological competitive edge and to develop a knowledge-based economy. The situation was depicted as urgent, which forced the country to move out of the low-wage and low-cost league to concentrate on “people, their ideas and capabilities as the key source of wealth and opportunities” (Yue, 2001: 169).

In 1999, the government of Singapore launched *Technopreneurship 21* (“T21”) as its new economic development plan. This initiative identified education, facilities, regulations, and financing as four areas that shape high-tech entrepreneurship. By including entrepreneurship in schools’ and universities’ curricula, the country aims to have more entrepreneurial graduates, in addition to training employees. New facilities that are conducive to promoting innovation, stimulating entrepreneurship, and attracting international talent begun operating at the R&D complex called One North. Rules and regulations that may hamper “technopreneurship” were assessed, and a budget of more than USD 1 billion was released to support entrepreneurship activities and the venture capital industry in Singapore (Wong & Singh, 2009). Apart from the T21 initiative, the government accepted the Economic Review Committee’s (ERC’s) policy recommendations for assisting Singapore’s renewal strategies in 2003. The recommendations aimed to remake Singapore into:

- a globalized economy where the country is the key node in the global network, linked to all the major economies;
- a creative and entrepreneurial nation that is willing to take risks to create fresh businesses and blaze new paths to success; and
- a diversified economy powered by the twin engines of manufacturing and services, where vibrant Singapore-based companies complement

multinational corporations (MNCs), and new start-ups co-exist with traditional businesses by exploiting new and innovative ideas (ERC, 2003).

While most Asian countries made cuts in higher education expenditures during the financial crisis, Singapore was unique in its response to the situation. Even when the global financial crisis affected the economy in 2009, the government continued with its commitment to strengthening entrepreneurship. Ng (2012: 345) describes that the political climate in Singapore has led to a variety of productive innovation and entrepreneurship activities because of the solid financial backing from the government. This has been what Ng calls the “modus operandi” of Singapore: to successfully implement policy reforms and institutional initiatives related to entrepreneurship. Similarly to the case of R&D initiatives during the global financial crisis, the government raised the budget for its agency (the “A*STAR Foundation,” short for “Agency for Science, Technology and Research”) to facilitate research in various areas instead of reducing expenditures, as per typical austerity measures.

In addition to analyzing “entrepreneurship” as an activity where firm formation is mostly a common endeavor, Singapore’s case informs us that the term denotes organizational behavior. Individuals in the organization exhibit the willingness to take risks, and they have to be proactive and innovative. As these attitudes cannot guarantee success, having cultural and organizational supports to enhance such behavior are both significant (Zhao, 2005: 26). It is apt to argue here that policies in entrepreneurship and innovation go hand in hand. Both inherently combine management practice, and they create change (Bessant & Tidd, 2007). Having an environment with bounteous support to facilitate entrepreneurship activities is something that Singapore is trying to maintain in order to catch up to its Western counterparts. Innovation would not be possible without ample dynamism, risk-taking, and resources to create or add value to knowledge, products, and services. The closest definition of “entrepreneurship” to apply to Singapore’s case would be “a process of enhancement of wealth through innovation and exploitation of opportunities, which requires the entrepreneurial characteristics of risk-taking, autonomy, and proactiveness (Nasution et al., 2011: 337). Entrepreneurship is considered a process, because different types of organizations take different routes in achieving the goals of entrepreneurship. As in the context of universities, they take various routes in managing behavior, institutional priorities, and entrepreneurial practices. The timing may not be similar to how industry would

quickly look into entrepreneurial opportunities, but in Singapore's case, universities started to explore opportunities once the government was on its way to recovery.

The success of entrepreneurship endeavors have had a significant effect on Singapore's goal of becoming a global hub in education. Singapore decided to become less dependent on foreign direct investments and to concentrate on research-intensive industrialization. The country's efforts to boost high-technology entrepreneurship require an emphasis on both research and development, and the ability to exploit new technical knowledge. Compared to European Union countries, where EU structural funds are able to support such initiatives, Singapore has done it through its own fiscal policy, despite being an active member of the Association of Southeast Asian Nations (ASEAN) (Low, 2005: 123). According to Parayil (2005: 51), both the public and private sectors were targeted to invest in higher education and to make the country an important hub in the field of research, specifically in biomedical R&D, drug discovery, genetic medicine, pharmaceutical production, and health services. Singapore's road to recovery has identified other areas for research where it is possible to bring new ideas, attract talent, and build the foundation for scientific excellence. Entrepreneurship has been the preferred approach for upgrading most institutions in the country to keep up with international developments and to sustain economic growth over the long term (International Business Publications, 2011).

Singapore has identified the biomedical sciences, interactive digital media, and environmental and water technologies as strategic growth areas for research. The country had been highly dependent on IT/electronics manufacturing for years (Wong, 2007: 371). The National Research Foundation (NRF), described below, only recently included other research programs that will establish new industries and facilitate high growth rates in the country. These research programs are in the areas of marine and offshore engineering, satellite and space, and cyber security. Since 2006, the government has earmarked funds in the area of biomedical sciences for developing translational and clinical research. ("Translational medicine" is a field within public health and biomedicine that seeks to "translate" study findings into various methods to help people.) The allocated funding also aims to bring basic research discoveries into clinical application. In environmental and water technologies, there is potential for developing innovative/breakthrough technologies from infancy to the commercialization phase; funds for this strategic growth area aim to develop experts and talents, support start-ups, and establish world-class research centers. The programs under interactive and digital media aim to foster an ecosystem that will generate innovation through various initiatives

promoted by government agencies. Interactive and digital media is anticipated to influence the advancement of information and communications technology (ICT), as well as the competencies related to the growing film and animation industry in Singapore (Wong, 2008).

There was a twenty percent increase in funding provided by the Singaporean government for research and innovation, on top of the amount received from the years 2006–2010. The government had planned to release 16.1 billion Singapore dollars (SGD) for the Research, Innovation and Enterprise (RIE) 2015 Plan. This generous amount demonstrates the considerable actions of the government to develop the R&D ecosystem in the country, in which public research institutions, universities, and various industrial sectors are expected to work together. The long-term goal is to become a research-intensive, innovative, and entrepreneurial economy, similar to the performances exemplified by Sweden, Finland, and Israel. Various plans have been made over the years to support research and development, since this is Singapore's foundation for economic development. The current prime minister, Lee Hsien Loong, leads the national drive for promoting research and enterprise through the RIE Council. The council advises the cabinet on strategies related to national research and innovation policies. It is clear in the RIE 2015 Plan how universities will support the government's enterprise and innovation efforts through entrepreneurial activities. Multidisciplinary research and the establishment of Centres of Excellence are among the endeavors in which universities are involved (RIE Secretariat, 2011).

The Singapore government is the most influential institution in developing and promoting entrepreneurial initiatives in the country. Since 1959, the People's Action Party (PAP) has been the ruling political party; it is known for its strong, centralized, and pragmatic governance approach. Survivalism, as a way of thinking, is reflected in the logic of governance of most politicians and policymakers in Singapore (Lee & Gopinathan, 2004: 129). In terms of running state affairs, PAP is generally concerned with activities that produce realistic, useful, and practical outcomes, rather than actions that rely on theories and speculations (Mauzy & Milne, 2002). From the very start, the government has been hands-on to all political and economic activities. It foresaw that long-term survival first requires the modification of the public sector. With or without the Asian financial crisis issue of 1997, the concern shown at all times appears to be globalization's impact on the city-state. Given this situation, civil servants were made to be aware of the importance of creativity and innovation. For example, Singapore's Public Service Division previously focused on the theme of promoting the culture of

entrepreneurialism; its aims were to achieve total organizational excellence in public service; foster a culture of innovation and enterprise; and cultivate a spirit of openness, responsiveness, and involvement (PS21 Office, 2001; Mok, 2008). These initiatives also shaped higher education development in Singapore (Mok, 2006).

The governmental research system was reorganized to enable collaboration with firms, statutory boards, academic research groups, and university spin-off firms (Parayil, 2005: 56). The aforementioned A*STAR was formed during the process of restructuring, with the goal of flexibly addressing the entrepreneurial initiatives connected to scientific research and talent development. This agency was tasked with monitoring and extending support for any external research undertakings conducted by universities, hospitals, and other research institutes, and with local and overseas partners. These strategies, which aimed to make Singapore a global hub for business and investment, were designed and executed by the Economic Development Board (EDB), while enterprise issues related to financing, capacity, and technology management are handled by SPRING Singapore.² All three agencies are statutory boards³ of the Ministry of Trade and Industry.

Under the prime minister's office, another important agency in Singapore's national innovation system is the NRF. Among its tasks is to provide direction for implementing a national R&D agenda and developing national research, innovation, and enterprise strategies (Ng, 2012: 340). The lack of domestic and foreign venture capital firms in the country paved way for the government to introduce numerous measures to create such an industry. The Singapore government introduced fiscal and other incentives to invite and back up venture capitalists; it was eager to promote entrepreneurship and start-ups through education and communication endeavors. The government was also responsible for directly creating and sponsoring venture capital funds. Without the presence of venture capitalists in Singapore, it would be difficult to launch promising companies and ensure a stable infrastructure for promoting entrepreneurship (Bruton, Ahstrom, & Singh, 2002: 199). For the 2015 budget, the government allocated funds to finance entrepreneurship; the money to support entrepreneurship activities of businesses came through various grants and programs (e.g., Grant Support for Innovation and Catalyse Enterprise Financing). HEIs receive funding for commercialization through government agencies that support the inventions of researchers, faculty, and students (e.g., Spring

² SPRING stands for Standards, Productivity and Innovation Board

³ These statutory boards of the Ministry of Trade and Industry are autonomous agencies addressing specific policies and goals for economic development. It was described that statutory boards are usually expected to generate their own funds from their activities (LePoer, 1991).

Technology Enterprise Commercialization Scheme and Ministry of Education Translational R&D and Innovation Fund). Immigration policies became lenient, as it is generally believed that the decreasing population in the country affects entrepreneurship endeavors. The recruitment of international talent is assumed to increase vibrancy vis-à-vis new research ideas, technological skills, and new businesses for Singapore (Liu, 2012; Leong, Wee & Ho, 2008; Pen Wai, 2006). Government intervention in this case would like to guarantee an environment that will successfully implement entrepreneurship initiatives: not only by way of steering activities at each stage, but by providing adequate resources at each stage to achieve the purpose.

Industry plays a significant role in promoting an entrepreneurial society. In the past, most companies' collaboration with the government and HEIs involved research activities and consultancy. For years, multinational companies have supported Singapore's economy, with the anticipation that local industries will also contribute and sustain long-term growth. At the moment, several local industries have benefitted from the government's incentive programs for technological advancement and planned expansion outside the country.⁴ Family-run businesses are common in Singapore, and there is evidence that individuals' entrepreneurial intentions are influenced by this factor, apart from people having a university education (Wang & Wong, 2004).

Local and international HEIs participate in Singapore's entrepreneurship initiatives. Major universities in Singapore have their own entrepreneurship programs that encourage young citizens to bring out new ideas, products, and services that could have commercial potential. The interaction of local HEIs with industry includes internships, technology licensing, and adjunct appointments at academic departments (Kway, 2007). Academics who are engaged in entrepreneurial activities are mostly trained abroad, and have both practical and theoretical knowledge. As observed in the performances of HEIs during the past few years, they were able to contribute to the production of successful entrepreneurs in Singapore. Some founders of local spin-off companies and start-ups are current students, graduates, and academic staff of HEIs in the country. Their contributions have been recognized in the healthcare, ICT, telecom, consumer products, and service sectors. A number of university researchers play crucial roles in providing policy recommendations to the government in relation to

⁴ Information on Singapore's key industries and industry incentive schemes are described on the following links: http://www.contactsingapore.sg/key_industries/
http://www.strb.com.sg/pdf/Tax_and_Financial_Incentive_Schemes_Available_in_Singapore.pdf

successful entrepreneurship undertakings. Partnerships with international HEIs contribute to enhancing entrepreneurship in terms of research collaborations, joint entrepreneurship programs with local institutions, student-faculty mobility programs, and special events in which there are opportunities for networking and exchange of best practices. Efforts to encourage more people (particularly students) to become entrepreneurs have been visible in the courses that are offered by HEIs. In recent years, the target of most higher education programs and R&D activities are emerging businesses such as the automotive industry, lifestyle products and services, natural resources, space and safety, and security industry. It is generally believed that the nurturing of talent for entrepreneurship will lead to a boost of more jobs in Singapore.

1.2 Research Purpose and Research Questions

Although HEIs may exhibit similar characteristics that stimulate and support entrepreneurial activities in a given setting, there is no consensus on how an entrepreneurial university should be defined (Yusof & Jain, 2010). The depiction of entrepreneurial universities in Europe and other contexts faces similar challenges, however: there is a demand to act more like open and responsive organizations in relation to their environments (Lyytinen, 2011). Given the policy background of Singapore in developing entrepreneurship, the purpose of this study is to analyze the university's transformation in building up the entrepreneurial university model based on the government's policy framework. In order to understand the drivers of transformation, the concepts of the entrepreneurial university and institutionalization are chosen as the research approach. While Singapore's national policy has been influential in the process of promoting entrepreneurship there, the goal of embedding the entrepreneurial university model in all programs and activities of the university appears to lack investigation. This study therefore aims to cover additional details about academic fields, institutional arrangements, actors, and events behind the institutionalization of the entrepreneurial university model. In addition to those important elements, the actual practices of institutionalization (Yarime et al., 2012) will be addressed by considering the experiences of the National University of Singapore.

A qualitative approach to frame analysis is applied in exploring the case study. At present, only a few studies have used frame analysis as a tool for investigating higher education activities (e.g., Pick, 2003; Pick, 2006; Reyes, 2016). Frame

analysis will lend support for determining the implications of the government's policy goals on universities; a multidisciplinary approach to view the situation of universities that adopt the entrepreneurial university model is featured here.

This study aims to clarify inquiries into the way in which the case study institution presents itself as an entrepreneurial university; it considers the interpretations presented in the documents and the perceptions of institutional members. The results should provide additional insights into the meaning and relevance of the entrepreneurial university within the ambiguous setup of a Singaporean university, which previous studies have neglected to discuss. Furthermore, the study investigates the commitment of individual members of the university to entrepreneurial activities, and how they interpret the goals of the government to sustain entrepreneurship for long-term growth. This research assumes that the way in which actors perform tasks that are connected to pursuing an entrepreneurial mission depends on the frames they mobilize. This study is guided by the two following research questions:

1. *How and to what extent is the entrepreneurial university model institutionalized at the National University of Singapore (NUS)?*
2. *What factors contribute to the institutionalization of the entrepreneurial university, based on the perceptions of NUS's institutional members?*

1.3 Significance of the Study

The study is intended for university administrators, faculty members, and university staff members who are currently experiencing (or in the past have experienced) transitions similar to the case study covered by this research. Empirical findings can provide recommendations for refining certain approaches in carrying out entrepreneurial activities at universities.⁵ The pertinent aspect of the higher education field is its multidisciplinary character (Maldonado-Maldonado, 2014: 200).

In this study, it becomes possible to consider collective approaches that will help understand the multifaceted realities affecting university operations. Although research in the field of higher education already covers a vast range of themes (e.g.,

⁵ I had published an earlier study connected to this monograph which mostly includes Chapters 5 and 6. The article is cited as: Reyes, C.N. (2016). Framing the entrepreneurial university: the case of the National University of Singapore. *Journal of Entrepreneurship in Emerging Economies* 8 (2), 134-161.

curriculum, institutional development, course design) (Tight, 2013), it is still considered an emerging field that fails to provide a coherent theoretical and methodological framework (Teichler, 2000). Higher education researchers can gain from this multidisciplinary approach to investigating the phenomena, particularly in understanding how the entrepreneurial university model affects flagship universities in small-country settings (Edquist & Hommen, 2009), and the model's implication on the behavior of university actors. The framework of institutionalization from the healthcare sector and the categories of frames from environmental conflict research are utilized for the purpose of highlighting common issues encountered in various disciplines. Likewise, even if the theories being developed or applied are often fairly low in terms of sophistication, it is the aim of the higher education field for it to expand and improve practice (Tight, 2014:107). The study would like to contribute insights about a case that covers disciplinary differences, challenges, barriers, and actual situations that affect the university, which may not be limited only to the adoption of the entrepreneurial university model. On the practical side, the study hopes to emphasize how frame analysis can help in providing solutions other than interpreting complex issues and situations that affect universities. The exploration of frames can benefit policymakers in assessing policy issues connected to entrepreneurship and entrepreneurial practices at HEIs.

1.4 Structure of Dissertation

This study consists of seven chapters, including the contextual background, the research approach, and empirical results. Chapter 2 presents the higher education setting in Singapore in which the transformation of universities under the Corporatization Act is discussed. The entrepreneurial university concept is introduced in Chapter 3, including the various models and rationales that influence HEIs to engage in income-generating activities. Chapter 4 focuses on the institutionalization concept, with the purpose of providing a better understanding of how HEIs respond to policy frameworks that affect their operations and contributions to economic development goals. Chapter 5 explains the methodological choices, particularly the use of frame analysis as a tool for analyzing the phenomena. The National University of Singapore as a case study will be addressed in the same chapter. Chapter 6 presents the empirical results that were derived from the documents and interview data; the frame categories that

guided the analysis of the results form part of this chapter. Finally, Chapter 7 discusses the implications of the major findings, and concludes the study by addressing the main research questions. The last part of the chapter provides suggestions for future study.

2 HIGHER EDUCATION IN SINGAPORE

This chapter provides information about the higher education system in Singapore. The functions, funding, and governance of higher education are described. It offers important insights on how global trends affect countries like Singapore in order to introduce policy frameworks in entrepreneurship and consider higher education institutions (HEIs) as partners for economic growth. The entrepreneurial activities that universities engage in are later explained in Chapter 3.3 with the intention to establish the notion of an entrepreneurial university based on previous studies about Singapore.

2.1 Higher Education Institutions in Singapore

The number of HEIs in Singapore is relatively small for a population of 5.4 million.⁶ These institutions consist of five autonomous universities, five polytechnic institutes, and the Institute of Technical Education (ITE). The National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore Management University (SMU), Singapore University of Technology and Design (SUTD), and Singapore Institute of Technology (SIT) specialize in various undergraduate and graduate programs that are relevant to Singapore's economy. NUS and NTU are branded as world-class research universities, with engineering among their key strengths. SMU concentrates on business and social science programs. SUTD is a new university that was formed in 2009 in collaboration with the Massachusetts Institute of Technology (MIT) and Zhejiang University. Architecture and design programs should contribute to the development of infrastructures and other strategic needs for a sustainable city-state. SIT is the latest university to be granted autonomous status; it specializes in programs in the areas of health sciences, interactive and digital media, education,

⁶ As of 2014, this is the total population recorded by Singapore's Department of Statistics. The rest of the information provided here about Singapore's higher education institutions can be accessed at Education Statistics Digest 2014: <http://www.moe.gov.sg/education/education-statistics-digest/files/esd-2014.pdf>

and hospitality. All of these universities have strong cooperation agreements and dynamic collaborative activities with HEIs outside Singapore.

Polytechnic institutes offer diploma courses in areas such as business, chemical and bio-sciences, communications, and manufacturing. These institutions provide continuing education training via advanced and specialist diplomas. Due to the changing nature of technology and workforce demands, polytechnic institutes seek industry advice during curriculum development. Polytechnic graduates are expected to enter the workforce with well-developed skills and high levels of technical and professional knowledge. The function of the ITE is “to provide students with technical skills and knowledge that meet the workforce needs of the various industry sectors and to build a strong foundation for the future upgrading of skills” (Ministry of Education, 2014). It has three campuses in the country, with a focus on hands-on training for students between 17 and 20 years of age. The ITE also offers continuing education and training for working adults. Table 1 (below) presents the number of students who were enrolled in universities, polytechnic institutes, and the ITE in 2013.

Table 1 Number of enrolled students in Singapore’s HEIs

Type of Institution	Student Enrolment in 2013
Universities	59,748
Polytechnic institutes	79,970
Institute of Technical Education (ITE)	26,288

Source: Ministry of Education, 2014

In addition to these institutes, offshore campuses also have a presence in Singapore. For instance, Australia’s Curtin University of Technology and France’s École Supérieure des Sciences Économiques et Commerciales (ESSEC) Business School have been operating in the country since the mid-2000s. Due to high tuition fees and high living expenses in the United States and Europe, education reforms in Singapore has opened possibilities for foreign higher education institutions to establish branch campuses in the country (Sato, 2007; Shams & Huismann, 2014). Offshore campuses or international branch campuses (IBCs) of foreign universities were foreseen to drive the knowledge economy through their expertise. They are expected to bolster competition among local higher education institutions and to attract more international students to come to Singapore. However, not all IBCs are successful in establishing their presence in the country.

Some of the challenges include difficulties in maintaining global standardization and pursuing local strategies in relation to staffing and curriculum. While most of the IBCs in Singapore are owned by research intensive universities in Australia and United Kingdom, there is few empirical evidence that proves the dynamic engagement of IBCs in research activities (Shams & Huisman, 2014). Regardless of the huge investment from the Singapore government, some IBCs like John Hopkins University (USA) and University of New South (Australia) closed down due to failed student enrolment targets and supposed relocation concerns of faculty and staff from the home campus (Croom, 2010).

Singapore started to welcome foreign talents when a couple of policies were implemented in the 90s. Whether these talents are foreign sports professionals or foreign students under Singapore government scholarships, they are assumed to be crucial in stabilizing economic growth (Yang, 2014: 410). In 2016, the Ministry of Manpower reported that the foreign workforce in the country has reached more than 1.3 million. Around 992,700 work permits were issued in the same year.⁷ The government's intention to become the "Boston of the East" was stated in a report published in 2002 concerning the "Global Schoolhouse" initiatives (Tan, 2016; Lee, 2016). This initiative has attempted to increase the number of foreign students coming to Singapore. At that time, the target was to attract 150,000 international full-fee paying students by year 2015 (Tan, 2016). Despite of virtuous intentions in policies to develop Singapore's knowledge-based economy, it has been challenging to disregard the public's concern on the contributions of foreign talents over its citizens (see Sidhu et al., 2011). Local students' admission to public universities is very competitive in order to prevent high dropout rates, waste of public funds, and delivering poor quality education (Sam, 2016: 58). Furthermore, there is anticipation that Singaporeans will be re-engineered as ideal type citizens contributing to the country's economic growth through their intellectual, cultural, and social capital (Sidhu et al., 2011).

The medium of instruction in HEIs is English, although the general education system promotes bilingualism "to equip students with the language competencies to access Asian cultures and develop a global outlook" (Ministry of Education, 2014). Singapore's other official languages are Malay, Mandarin, and Tamil.

⁷ Information on foreign workforce numbers from years 2012-2016 can be downloaded from the Ministry of Manpower website. Link at: <http://www.mom.gov.sg/documents-and-publications/foreign-workforce-numbers>

2.2 Financing Higher Education

The universities, polytechnic institutes, and the ITE receive funding from the Ministry of Education (MOE). For the year 2014, the projected budget for MOE was SGD 11.49 billion, in which SGD 2.93 billion was proposed for the university sector. (As of December 2015, 1 SGD equals .71USD or .64 euro.) The amount will take in hand the workforce training needs of students and university research activities. Likewise, the number of students supported by the MOE via subsidies has reached 75,100.⁸ The MOE reported that it has reached a publicly funded cohort participation rate for the university sector, in which an anticipated increase of 30 percent for year 2015 was reported. By the year 2020, the government's target is to have 40 percent cohort participation rate, or an estimated increase of three thousand student places. Since 2008, the government has also provided subsidies to the Singapore Institute of Management (UniSIM), a private HEI. Other private institutions (such as Lasalle College of the Arts and Nanyang Academy of Fine Arts) receive public funding in selected diploma and degree programs. Singapore's priorities for the coming years include enhancing applied degree education and addressing the increasing demand for skills upgrading. In addition to covering 75 percent of the cost of a degree education, the government also offers various financial assistance programs to students. Government financial aid and loans are obtainable for students from low income households. Student loans are means-tested, and financing programs are available even to students who study at private institutions' full-time programs (e.g., students enrolled at UniSIM) (Ministry of Education, 2012).

Students who are admitted to Singaporean universities pay different levels of tuition. This fee differentiation between Singaporean citizens, permanent residents, and international students is in line with government policy that exemplifies the privileges of citizenship. For instance, Singaporean citizens in the bachelor's degree or higher qualification programs are automatically entitled to a Tuition Grant (a tuition subsidy managed by the MOE), while international students who are ineligible must pay the full amount of the tuition fee. Usually, the Tuition Grant covers a considerable portion of the full tuition up to three or four years (depending on the duration of the program). A service bond of three years in Singaporean companies or five to six years in the Ministry of Health is required

⁸ Details on Singapore government's budget for the Ministry of Education (for the year 2014) can be downloaded from http://www.singaporebudget.gov.sg/data/budget_2014/download/27%20MOE%202014.pdf

within the Tuition Grant agreement.⁹ Undergraduate tuition fees follow a cohort-based fee structure, which means that the fees due for an enrolled cohort in the particular year will be fixed until that cohort finishes the program. Every year the government reviews the fees and makes the necessary adjustments, which provides information on the new cohort regarding the exact fees for the entire duration of the students’ studies.¹⁰ Both the Tuition Grant and the cohort-based fee structure are applicable to students who are enrolled at polytechnic institutes. HEIs collect additional fees (such as examination fees, insurance fees, sports fees, and student union fees), which are paid either annually or on a one-time basis.

2.3 Governance of Higher Education Institutions

The University Autonomy, Governance and Funding (UAGF) Steering Committee recommended the granting of autonomous status to the three publicly funded universities in Singapore—NUS, NTU, and SMU. In 2005, the government granted this request in order for the three universities “to exercise greater flexibility to make far-reaching changes to create a unique educational experience for their students, as well as compete in the global university landscape” (Ministry of Education, 2005). The set-up has allowed the universities to operate as not-for-profit companies limited by guarantee under the Companies Act. They have autonomy in internal governance, budget utilization, tuition fees, and admission policies. A university’s Corporatization Act states the function of the institution as a university company. The Act includes clearly stated provisions related to accountability, evaluation, funds, and any decisions that require the education minister’s consent for (and access to) financial statements. Based on the Corporatization Acts of NUS and NTU, Table 2 below provides several common details in the provisions related to university companies.

Table 2 Several provisions related to university companies

Function of university company	“To pursue, within the limits of the financial resources available to it, the objects provided by its constituent documents and, in particular, the university company may confer and award degrees, diplomas and certificates, including honorary degrees and other distinctions.”
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⁹ The service obligation is not compulsory for Singaporean citizens.

¹⁰ Universities in Singapore provide updates on fees per program or per cohort in their respective websites.

Accountability and evaluation	<ul style="list-style-type: none"> —Compliance with the accountability framework based on the agreement between the university company and MOE minister —Participation during periods of evaluation processes, as conducted by external review panel
Appointment to board	<ul style="list-style-type: none"> —The board will consist of a number of trustees, who may be appointed by the minister —Removal or replacement of any trustee (and the appointment of new or additional trustees) is decided by the minister
Written consent of minister	<ul style="list-style-type: none"> —Admission and removal of person as a member of the university company —Disposal of university company’s undertaking or property —Voluntary dissolution of the university company —Any modification done in relation to the memorandum of association and articles of association of the university company (termed “constituent documents” in the Corporatization Act) —Elimination of any trustee from the board
Provision of funds	<ul style="list-style-type: none"> —Funding will be disbursed by the minister according to the budget set by parliament
Access to accounts, and summary of financial statements	<ul style="list-style-type: none"> —Full and free access to all accounting and financial transactions of the university company by the minister or any of his or her authorized personnel —Availability of the financial statements to the public

Source: Singapore Statutes Online (NUS and NTU Corporatisation Acts revised edition 31 December 2006)

The MOE’s Implementation Steering Committee monitored these universities closely throughout the process. The steering committee was assigned to deliver information about new funding and tuition fee setting frameworks, including mechanisms to support student financing. The Higher Education Division (HED) of the MOE monitors the overall operations of both tertiary and technical education, including the registration of private institutions in the country. The HED has nine statutory boards that includes the five polytechnic institutes, the ITE, the Science Centre Singapore (SCS), the Institute of Southeast Asian Studies (ISEAS), and the Council for Private Education (CPE). Any issues related to publicly subsidized places at the Singapore Institute of Management, Lasalle

College of the Arts, and Nanyang Academy of Fine Arts are directed to the HED. Other functions of HED pertain to the following:¹¹

- Planning and overseeing policies for developing the operations of HEIs, including the needs of the post-secondary education sector.
- Managing academic and educational research funds.
- Administrating funding policies and frameworks for post-secondary education institutions.
- Formulating and evaluating financing policies, financial assistance, and loans programs, including the Tuition Grant program.
- Leading quality assurance (QA) systems in post-secondary educational institutions and benchmarking the results with higher education systems in other countries.
- Handling human resource policies that cover the statutory boards of the HED.
- Coordinating the appointment and renewal of statutory boards' members.

The governance changes in Singapore's higher education system are not to be considered something unique in the Asian context. Singapore's move to modify its governance approach to HEIs is an indication that the government is fully aware of the possible changes that will affect the economy, since it is a small city-state. The past crises signalled the proper timing for its higher education system to be diversified and responsive to socio-economic changes. Entrepreneurship and innovation initiatives are both regarded as strengths for enhancing the global competitiveness of its higher education system. Thus, education reformers in Singapore expect that students will be more encouraged to unleash ideas that contribute to innovation and have opportunities to develop their entrepreneurial abilities. These reforms have heightened cross-disciplinary research, and learning is no longer teacher-focused. The education reforms emphasize the need to produce graduates that are creative and critical thinkers. Because globalization is inevitable, Singaporeans must be equipped with knowledge and skills that could shield them, even in times of uncertainty. Universities were given more leeway to address these

¹¹ These functions are assigned to the eight sections within the HED: 1) Policy Section, 2) Planning and Research Section, 3) Skills Development Office (SDO), 4) Academic Research Section, 5) Private Schools Section, 6) Higher Education Quality Assurance Section, 7) Human Resource Section, and 8) Operations Section. Further information can be found at: <http://www.moe.gov.sg/about/org-structure/hed/>

concerns through corporatization. By modifying the governance approach, universities would have more opportunities to attract better students, expand research, explore sources of financing, and acquire entrepreneurship skills (Pillay, 2011: 13).

Mok (2008) observes that most schools and universities all over the world are reforming their systems and are adopting governance models to fit the demands of the socioeconomic and sociopolitical environments; the corporatization of public universities is an example. Even in Singapore, the move requires greater accountability to various stakeholders, albeit with the emphasis that these universities will have more autonomy in any decisions related to various administrative and financial aspects. At the same time, universities are expected to develop internal QA measures and to give more power to deans, department heads, and faculty members. While the government has guaranteed that it will continue to invest in public universities (Ministry of Education, 2005), the entrepreneurial feature is also present, since these governance changes necessitate corporatized universities to be more resourceful (Mok, 2008).

2.4 Quality assurance in Higher Education Institutions

Quality assurance is relevant in the transformation of universities in Singapore. Global trends have influenced universities to improve their quality, with respect to value and condition of teaching and research activities. HEIs had become mindful of the best practices adopted by universities in other countries in order to compete globally and transform into world-class universities (Curie, Vidovich & Yang, 2008). Collaboration activities with other HEIs outside Singapore, as well as monitoring, measurement and rewarding of outcomes related to both teaching and research are among the concerns of the quality assurance initiatives in the country.

The government is strategic and conservative with regard to establishing private universities in the country. Thus, the more practical approach to invite world top universities to have branch campuses in Singapore was decided particularly by the Economic Development Board (EDB) and not the Ministry of Education. Some institutions were allowed to operate because of the programs in cooperation with Singaporean universities. In private higher education, quality assurance development is connected to industrial policies rather than the education policy framework. EDB and Spring Singapore¹² suggested following the practice of

¹² Spring Singapore is the industrial sector's quality assurance agency.

effective organizational management at private HEIs instead of solely focusing on accreditation standards or education-led quality assurance activities observed in other countries. In public universities, they conduct self-evaluation activities under the Quality Assurance Framework for Universities (QAFU) introduced by the Ministry of Education (Yonezawa, 2007: 133).

Quality assurance measures have significant impact on entrepreneurial HEIs in Singapore and other Asian countries to improve global competitiveness and focus on various indicators that will help them achieve high rankings on the league tables. Some HEIs demonstrated concentration of research funding and priority to publications in English language journals (Deem, Mok & Lucas, 2008). Lee and Gopinathan (2008: 575) describe quality assurance's role in Singapore universities as an instrument for monitoring universities to ensure that they are managed wisely due to the increasing pressure for accountability and efficiency. The authors' study on quality assurance as part of restructuring the university sector can be linked to entrepreneurial university transformation because of the introduction of business management concepts and practices. Lee and Gopinathan believe that in practice, quality assurance in universities is partly achieved by strategies such as recruiting talented local and foreign academic staff. Quality assurance provides proper accountability for utilizing public money and supports the upgrading of facilities and staff. More importantly, the quality assurance framework of the government has entailed public universities in Singapore to become more active, responsive, and resourceful in their operations. Rewards, feedback system, and performance indicators were set to improve the performance of universities.

2.5 Entrepreneurship Ecosystem

Singapore still faces challenges in its shift to a knowledge-based economy. These transformational challenges include the lack of an entrepreneurial culture and mindset among Singaporeans; the need to have a more balanced national innovation system that supports the innovation activities of both foreign MNCs and local enterprises; the lack of highly skilled professionals, especially scientists and engineers; and an underdeveloped technology commercialization ecosystem (Wong, Ho & Singh, 2011: 166-167). The country was successful in developing manufacturing capabilities that provided employment for most of its citizens, but somehow failed to create homegrown entrepreneurs and corporations that were

comparable to Toyota (Japan) and Samsung (South Korea) (Sidhu, Ho, & Yeoh, 2011: 24).

Singapore's policymakers and experts had openly expressed concern on the environmental dimension of entrepreneurship, specifically on ways various institutions are being honed to provide multi-faceted support in entrepreneurial activities and produce interactive effects within communities (e.g., entrepreneurs, academics, students) (Bettcher, 2014). An entrepreneurship ecosystem refers to creating an environment in which there are interaction of people, roles, infrastructure, organizations, and events to intensify the levels of entrepreneurial activity (Regele & Neck, 2012: 25). In building an ecosystem, Nadgrodkiewicz (2014) explains that the attention and resources of institutions should be toward systemic change rather than singular interventions. Similar to business, the operations of an entrepreneurial university should exemplify a healthy ecosystem that encourages institutional members to actively support entrepreneurial intentions and actions (Kerrigan, 2014). Other than the establishment of entrepreneurship centers, HEIs in Singapore took the opportunity to focus on entrepreneurship education as a strategy for fostering an ecosystem. In the case of Singapore polytechnics, improving the ecosystem means to discover niche disciplines that will introduce specialized programs and opportunities to attract and collaborate with non-local students (e.g., entrepreneurial activities at Ngee Ann Polytechnic) (Cheung et al., 2011: 149). At universities, students, faculty, and staff members are given the opportunity to be oriented with terminologies, projects, process, and procedures related to entrepreneurship. They also learn about ecosystem differences to understand that not all policies and practices are applicable to Singapore or in other settings. Since the entrepreneurship ecosystem is being improved through the formation of start-up companies within HEIs, individuals are learning techniques on the development of products and ideas, expansion, leveraging, networking, and proper utilization of resources. However, in a recent study, Ng (2015) reported that HEIs in Singapore including some private universities prefer to gain entrepreneurial knowledge from experienced entrepreneurs instead of pure academics. Ng added that institutional members of HEIs endorsed team-based activities to help finance and sustain start-ups. Even with the heavy investment on research and seed funding provided to nascent firms formed at HEIs, the author's findings indicate that only a few institutional members had some knowledge of government assistance programs provided for entrepreneurship activities.

Engaging in entrepreneurial activities does not always guarantee success stories. Wong (2007: 171) explained that it is challenging for Singapore to transform the people's social and cultural attitudes toward entrepreneurship, to consider non-traditional values, and more importantly, to have tolerance of failure. This is the reason why various reforms were introduced not only to universities but also in the primary and secondary institutions in order to overcome challenges while infusing more entrepreneurial activities in the coming years. Documents about HEIs emphasize the relevance of financing entrepreneurial activities, educating members about entrepreneurial trends and practices, and dynamic interaction among student and academic entrepreneurs. Nonetheless, a clearer picture on how HEIs attempt to integrate the business environment pillar into the ecosystem (Bettcher, 2014) remains elusive especially when institutional strategies on entrepreneurial activities are challenged by individuals' conflicting motivations, goals, actions, interests, notions of risk, and disciplinary orientations.

2.6 Conclusion

In summary, the MOE is responsible for implementing policies and the provision of funding to HEIs in Singapore. The autonomy granted to universities in 2005 through corporatization has allowed these universities to manage and decide on any matters that pertain to their operations and institutional resources. Corporatization also integrates alterations in the financial decision making of universities as part of income diversification initiatives (Koryakina, Sarrico & Teixeira, 2015; Ziderman & Albrecht, 1995). Universities continue to fulfill the requirements and agreements with the MOE in relation to accountability measures, other conditions related to funding, and any modifications in the structure of the corporatized university. Lee and Gopinathan (2004) found that governance reform in the past was not meant to decentralize power, but rather to let universities take charge of their own management and budgetary allocations; this is consistent with the present study's claims about the government's hands-on approach within Singapore's higher education system. Singapore's governance model for higher education can be traced from the way in which Anglophone countries have adopted the concepts of efficiency and effectiveness as the core values of new public management. Lee and Gopinathan explain that because the country's resources are limited, it would be impossible for the government *not* to take measures to ensure that these resources are utilized efficiently. The government

continues to serve as the primary financier and planner of its HEIs. This is also visible in the way in which the Corporatization Acts of the two main universities in the country have been drafted. Greater flexibility can be exercised in managing the university, but approval from the minister is still part of the procedure when making any key decisions.

3 THE ENTREPRENEURIAL UNIVERSITY

This chapter examines the entrepreneurial university concept based on its utilization in various studies in the literature; the chapter will cover entrepreneurial activities in the Asian context, as well as the conduct of such activities among Singapore's HEIs. The chapter will also examine criticisms that pertain to different entrepreneurial university models: specifically, the limitations of entrepreneurial practices that universities adopt in order to enhance their operations and to address other changes that affect their environment.

3.1 Entrepreneurship in Higher Education

The concept of the entrepreneurial university was first discussed by Burton Clark (1998a) in his book *Creating Entrepreneurial Universities: Organisational Pathways of Transformation*, which studied five European universities: the University of Warwick (England), the University of Twente (The Netherlands), the University of Strathclyde (Scotland), Chalmers University of Technology (Sweden), and the University of Joensuu (Finland). The use of the word *entrepreneurial* connotes the characteristics of these social systems: specifically, the entire university and its internal departments, research centers, faculties, and schools. Clark writes that the nuances of the term *enterprise* in this concept are important in institution building, because the entrepreneurial university takes the risks that are involved when introducing new practices and actively seeking to innovate in how it conducts its business. He adds that the entrepreneurial universities in his study aimed to become "stand up" universities that would be significant actors on their own terms.

In the entrepreneurial university concept, institutional entrepreneurship can be seen as both a process and an outcome. The five universities involved in Clark's study have experienced their own pathways of transformation. Clark mentions five elements in this transformation: 1) a strengthened steering core, 2) an expanded developmental periphery, 3) a diversified funding base, 4) a stimulated academic heartland, and 5) an integrated entrepreneurial culture. Each university presented a

distinct approach to these elements, but they all exemplified a reputation of coherent competence in terms of gathering their assets, staff, and students to address the demands of modern higher education. Overall, the study offers a formula for institutional development that places autonomy on a self-defined basis in terms of the following:

- Encouraging income diversification, and moving away from governmental dependency.
- Creation new units for enhancing new environmental relationships and new modes of learning.
- Ensuring that “heartland” departments commit to combining their new administrative capabilities and outreach mentalities with traditional outlooks in their fields.
- Having an evolving set of predominant beliefs that lead and justify the structural changes for a stronger response capability; and
- Establishing a central steering capacity to consider major choices that will help the institution to focus.

The five elements found in Clark study’s are based on the open categories that he utilized while conducting his interviews. He investigated respondents’ personal backgrounds, the overall characteristics of the case study institutions, the nature of past and current leadership, the links between the academic and administrative functions, the sources of financial reports, and research and advance training profiles (Clark, 1998a; Finlay, 2004). Despite of the distinct characteristics of the five European universities covered in Clark’s study, they had experienced the same challenge that “market oriented values and entrepreneurial values represent an intrusion to academic practices and standards” (Kretz & Sá, 2015: 84). Other than survival, the universities’ response in taking the entrepreneurial path had aimed to address local and regional needs.

Rhoades and Slaughter (1997) argue that HEIs are becoming entrepreneurial because of increased academic capitalism. Slaughter and Leslie (1997) used the term “academic capitalism” to describe the changes in national higher education policies that predominantly affect access to higher education, teaching programs, research, institutional autonomy, and financing. The authors examined the higher education trends in Australia, Canada, the United Kingdom, and the United States to determine the pros and cons of academic capitalism, various technology transfer strategies, the extent of faculty involvement in entrepreneurial activities, and the

shifting values, norms, and beliefs of faculty in public research universities. The study covered the faculty within professional fields that are close to the market, and resource-dependent academics in the techno-science field.

The authors attempted to expand their study concept by linking the issue of student recruitment in order to highlight the ways in which HEIs take advantage of market opportunities by developing and selling their products and services to students and parents, whom the institutions recognize as customers and clients. In addition to suggesting that decreases in public funding trigger academic capitalism, the authors acknowledge that the adoption of academic capitalism by various institutions is prompted by factors such as external and internal mechanisms, changes in organizational structure, managerial rewards and incentives, and ideology.

It is important to note that the drive for national policies to reallocate priorities from basic (academic) research to commercial strategic research has become a cause of concern for academics. Various mechanisms introduced by the state (e.g., privatization, commercialization, and the deregulation of public entities) have opened opportunities for university actors to deal with the market. In this way, faculty and professional staff are expected to utilize their “human capital” stocks in competitive environments. Likewise, the presence of market-like behaviors in academic capitalism is characterized by institutional and faculty competition for funding in the form of applying external grants, engaging in contracts, creating partnerships with industry, introducing (or increasing) tuition fees, institutionally investing in spin-off companies, and pursuing other income-generating activities. Efforts to incorporate market functions within universities have turned some academics into “capitalists from within the public sector or state-subsidized entrepreneurs” (Slaughter & Leslie, 2001).

Additional findings have highlighted the shift of some professors from a “public good” model to an academic capitalism knowledge regime. The values of the public good regime are still discernable: specifically, the importance of publishing and the relevance of a free flow of information. Academics have expressed willingness to adjust to these values when needed, however. In line with their role as state-subsidized entrepreneurs, academic capitalism has shown evidence of how university employees think of their situations as corporations that seek profits in new and promising areas; launching plans from which the institution, the state, and the professor gain from patenting activities is one example (Slaughter & Rhoades, 2004). In another view, Ntshoe (2004: 141) reflects on the growth of academic capitalism as being embedded in support for “Mode 2”

knowledge production, which encourages cross-disciplinary research and considers the role of universities as “linking the requirements of industry, technology and market forces with the demands of citizenship” (Delanty, 2001: 113). The increasing infusion of business practices that affect HEIs means that universities ought to move away from Mode 1, where the condition of knowledge production is linear and classified into separate disciplines and subjects (Robertson, 2000; Ntshoe, 2004). Other than academic capitalism, the description of entrepreneurial activities in higher education also strikingly demonstrates the significance of Mode 2, in which knowledge production assumes the interaction and involvement of many actors. The diversity of potential sites where knowledge can be created, and how the experiences and skills of people contribute to the process (Lyytinen, 2011: 64), are also ascertained by various entrepreneurial university concepts mentioned in the present study.

The “triple helix model” recognizes the role of universities for promoting innovation in increasingly knowledge-based societies (Etzkowitz & Leydesdorff, 1997; Etzkowitz & Leydesdorff, 2000). Having a close interaction between the university and the government, and the ongoing transformations that take place within these spheres, is important. In essence, entrepreneurial universities in this model realize the increasing demand for knowledge transfer to industry, government, and society. Industry and the government provide their share of opening gateways for knowledge-based growth opportunities through research funding, promoting collaboration among the three institutional spheres (industry, government, and universities), financing infrastructures (such as incubators and science parks), and cultivating academic entrepreneurship¹³ skills and funding (Cooke, 2005: 1130). In the triple helix model, the university is treated as a natural incubator that presents a support structure for academics and students to start new ventures. Requirements to pursue new ventures include time and space, physical and social factors, and the groundwork (political, intellectual, and commercial) that is transferable across extremely fluid boundaries. The cross-fertilization of new scientific fields and new industrial sectors is promoted in this model, thus making the university the primary source for developing and facilitating the process. The entrepreneurial university is thus responsible for putting knowledge to use, and for expanding the creation of academic knowledge. The ability to attract funding and other types of support depends on the entrepreneurial university’s strategy to

¹³ *Academic entrepreneurship* may refer to a few types of entrepreneurial activities that teaching and research staff may engage in, such as patenting, consulting, licensing, and forming spin-off companies (Abreu & Grinevich, 2014: 456).

identify promising research and teaching areas that will benefit society at large. Fostering an entrepreneurial culture means assisting academics in examining the commercial and intellectual capabilities of their research. The model recognizes the role of technology transfer offices (TTOs) in educating university members to “take [an] interest in the utilization of their research when an entrepreneurial attitude is weak or non-existent” (Etzkowitz, 2010).

Marginson and Considine (2000) use the term “the enterprise university” in their book of the same name to signify both economic and academic dimensions, claiming that universities experience complex situations due to new systems of competition and these systems’ ability to accomplish realistic outcomes. The authors’ study focused on higher education governance and institutional cultures, mainly from the perspectives of executive leadership, decision-making systems, and research management. From the seventeen case studies of Australian universities, the authors observed the diversity and convergence within and between individual universities, and they reflected on the different forms of institutional identity and incessant reinvention. Marginson and Considine argue that the enterprise university represents the emergent institutional type, because the necessary changes that are taking place are shaping the arrangements and methods of work within the institution; this is manifested by a strong executive control that now defines the purpose of the university. Market elements are becoming visible in certain activities, and are generally believed to be driven by commercial and entrepreneurial spirit (e.g., the education of international students). Various departments and disciplines have started to question the purpose of establishing institutes and other interim groups funded by “soft money” (i.e., money of a temporary nature). In this regard, the basic frame of academic work now outlines a dual structure within the university. Being open to the idea of rummaging around for funding—and the competition that comes with the process—are both tantamount to “a restricted menu of commercial options and strategies” (Marginson & Considine, 2000: 4) for universities to consider.

Likewise, universities that have moved into an enterprise framework have activated quality and lines of accountability in their activities for gauging institutional effectiveness. Marginson and Considine’s study treats the terms “corporate university,” “entrepreneurial university,” and “academic capitalism” as only describing a one-dimensional institution that is merely overshadowed by profit-seeking behaviors. Accordingly, these terms portray the organizational culture of the university as being entirely beholden to the business form. The authors believe that in an enterprise university, money is a prime objective; the vital

mission is “to advance the prestige and competitiveness of the university as an end in itself” (Marginson & Considine, 2000: 5).

Deem (2001) has examined the relevance of global and local factors in the transformation of universities in Western countries. In addition to the concepts of the entrepreneurial university and academic capitalism, the author covers new managerialism models to elucidate new discourses of management that have originated from the for-profit sector. Deem argues that not all of the theoretical and empirical work on the concept clearly fits the situation in higher education.¹⁴ Nevertheless, various organizational changes that are characterized by new managerialism ideologies resemble some of the attributes mentioned in other studies about entrepreneurial universities and academic capitalism (see Clark, 1998a; Rhoades & Slaughter, 1997; Slaughter & Leslie, 1997). Among the examples she includes are the emphasis on competition, the creation of internal cost centers, the introduction of targets, the significance of teamwork, the adoption of technologies, and the efforts to change the organizational culture and staff values to be more like those in the private sector. In her study, Deem mentions that adopting new managerialism ideologies could include other factors, including cultural (e.g., new ideas about knowledge) and social factors (e.g., increasing diverse student groups). She similarly discusses the reduction of public funding as an economic factor. Interestingly, Deem associated other factors that contribute to the adoption of new managerialism ideologies to sensitizing factors that are universal in nature, including natural disasters, economic recessions, and new technologies (although local settings may vary in addressing these factors). Deem argues that most of the literature discussing new managerialism clearly suggests hybridization, which is not found in the analysis of academic capitalism and entrepreneurial university concepts. The purpose of hybridization is to balance the competing logics of action that influence higher education activities; the discourses, beliefs, and practices within the new managerialism concept have also resulted in limitations on the modes of engagement of academics. Academic tribes’ attachment to their disciplines is apparent, since resistance to embracing this idea is already expected of them (Deem et al., 2007).

¹⁴ Deem (2001) considers the entrepreneurial university and academic capitalism as universally suitable concepts for describing the transformation of higher education institutions in Western countries.

Williams and Kitaev (2005) reviewed seven national reports¹⁵ on national policies that described entrepreneurialism in universities. The authors write that the entrepreneurial university is a generic appellation that has represented the transformation of many universities in Europe for the past few decades, during which universities have experienced changes in mission, management, and funding. From the countries that participated in the EUEREK study (a shorted version of the study's name, "European Universities for Entrepreneurship—Their Role in the Europe of Knowledge"), the authors classified five main drivers of entrepreneurialism in HEIs: ideology, expansion, globalization, the knowledge society, and financial stringency. The idea of a unified Europe is an example of an ideological shift that has several implications on university entrepreneurship in a knowledge society. Some of the implications are the configuration of joint programs, student mobility and research consortia. Additionally, the convergence or Europeanization of higher education reflected in the Bologna-Bergen-Lisbon processes had resulted to the modification of courses and diplomas and the presence of foreign universities utilizing English as the medium of instruction. The authors observed from the EUEREK study that expansion may be accompanied by diversification, in which universities operate as commercial entities in order to maintain and intensify their position in the market. The influx of students also influences universities to introduce innovative and entrepreneurial approaches to recruitment and the delivery of new programs in various fields. The "knowledge society" factor explains that knowledge has economic value; governments have expressed growing interest in exploiting opportunities and focusing on how universities might play an important role in economic development. Likewise, the authors point out that entrepreneurial activities could address challenges related to the rapidly changing knowledge society, since potential target groups that are essential to universities grow much faster than the traditional student body. The authors also identify globalization as a driver of entrepreneurialism due to most countries' ambition to have competitive universities and to meet the standards of leading universities in Western Europe; a concrete example of this driver from the EUEREK study is Sweden's aspiration to become the most competitive and knowledge-based economy in the world. Among the five drivers, financial stringency, because of budget cuts, has greatly affected the most universities in Europe. The universities that were included in the

¹⁵ The study was part of the project titled "European Universities for Entrepreneurship—Their role in the Europe of Knowledge" (EUEREK). Additional details and the full report are accessible at www.euerek.org.

EUEREK study revealed that they had been actively securing additional funding from other sources since 1990.

Mautner (2005) analyzed the entrepreneurial university discourse by tracking the themes and rhetorical devices utilized by various authors and HEIs; the author found several institutional discourses related to self-promotion, in which support for academic entrepreneurship was emphasized. In other situations, a leadership discourse was present; this type of discourse recognized the role of university actors for changing the organizational culture and building institutional images. The study found that discourses about the entrepreneurial university provide justifications that activities that the university engages in are not only limited to commercialization and profit making; some university leaders and administrators also use the strategy of forcing the discursive alignment with business, but this strategy can lead to the failure to obtain support during reform plans. In the conclusion of Mautner (2005: 111), the “entrepreneurial university stands out as an iconic representation of the coming together of business and academia, two hitherto separate but now increasingly intertwined social spheres.”

Gibb (2012) proposed a framework for entrepreneurial university development that intends to provide a normative guide for HEIs to build “real time” entrepreneurial strategies. The key areas to work on in order to add value and innovation to a university’s activities include working on the university’s internationalization; its entrepreneurial education; its stakeholder engagement; its mission, governance, and strategy; and its knowledge transfer, exchange, and support. Universities that include the words “enterprise” or “entrepreneurship” in their mission statements are commonly associated with institutional commitment. According to Gibb, these involve commitment to several contexts, including the pursuit of the university’s goals to develop enterprising students via its employability agenda, the securing of revenues from other sources, the pursuit of knowledge exchange and transfer, engagement with the community, and the need to cope with international competition and the demands of the global operating environment. Organizational design may indicate that a university is committed to facilitating and supporting bottom-up entrepreneurial and innovative behavior. The members of the board, councils, and executive teams are expected to understand the entrepreneurship/enterprise concept and its related agenda. Universities’ strategies that define the enterprise or entrepreneurship mission are concerned with measuring excellence through public value. An entrepreneurial university may not only measure its performance in delivering actual services and achieving social

outcomes: the vision, mission, strategy, and process should reflect how a university would like to enhance its legitimacy and visibility with its stakeholders.

Finally, Gibb stresses that it is important that members of the university community embrace and accept the notion of enterprise. “Stakeholder engagement” recognizes the level of engagement of the university: particularly its relationship with the region and city, ties with alumni, partnership with industry, and cooperation with entrepreneurs. The university’s focus is on creating value in society through linking its goals with societal needs and areas of priority. Stakeholder engagement relies on the strength of the alumni office for organizing networking activities across the university, and its ability to identify and establish connections with local, national, and international entrepreneurs. Gibb includes engagement with social enterprises in this key area, because of its potential participation in knowledge transfer and exchange activities, and for supporting university projects that aim to benefit the community. Through dynamic engagement with stakeholders, universities can enhance their reputations in the community and create opportunities to expand their networks. Researchers will be able to increase their visibility in the community if they wish to explore research topics that have societal impact. The benefits of stakeholder engagement extend to students, as such engagement will help them to explore the value of their disciplinary knowledge in society and to assess other possibilities for developing their careers in various sectors. In his framework, Gibb (2012: 6) defines knowledge transfer as “the formal and informal transfer of new discoveries and innovations resulting from research (usually scientific) conducted at universities to the commercial and non-commercial sector for public benefit.”

In an entrepreneurial university, knowledge transfer and exchange is deeply rooted in departments and faculties. For this key area, the issues to consider are the openness of the university’s intellectual property (IP) and licensing policies; the extent of personal entrepreneurialism in TTOs; the contribution of spin-off activities, not only in knowledge transfer and IP but also in bringing internal practices to the university; reward systems for knowledge transfer activities; and the active collaboration of students and staff with companies that are located in science parks. Entrepreneurial capacity creates strong support systems for academics and students. Support comes in the form of mentoring, business services, loans, and equity financing to initialize start-ups and spin-offs. According to Gibb (2012: 11), internationalization activities in higher education are “a key part of the scenario of the entrepreneurial university.” The pressure to enhance the delivery of higher education products and services according to global standards involves risk,

initiative taking, and finding and grasping new opportunities (Shattock, 2009, cited in Gibb, 2012). Entrepreneurial attributes are therefore required to successfully initiate internationalization strategies. Internationalization activities pose a major challenge for students and staff as they adapt to different cultures. Embracing the knowledge and useful practices that people gain from international experience is relevant for observing an entrepreneurial university's concern for staff and student mobility, partnership, and network building; the development of overseas campuses; and other relevant factors for achieving successful international processes (e.g., international faculty, new income streams, and new forms of accreditation and assessment).

Entrepreneurial activities in HEIs may entail pressures from stakeholders to heighten (in particular) the development of entrepreneurship education. It is challenging for administrators to plan the entrepreneurial programs and teaching approaches across the university, because they have to be congruent with institutional strategies, missions, and goals. Administrators also face issues related to how the planned programs will create value for the existing activities of the university and the work of individual faculties and departments. Gibb emphasizes the significance of entrepreneurship education being embedded in each department's curriculum. Developing entrepreneurship education should take into account innovative pedagogical approaches. In this sense, staff training is required, as they have to teach students to stimulate and simulate the entrepreneurial practices adopted by most firms.

In another study, Gibb and colleagues (2013) associated several finance and autonomy issues in relation to managing an entrepreneurial university. By referring to Lesley and Ramey (1988), Gibb et al. raised the idea that funding from other sources may result in additional demands and expectations from stakeholders. Funding arrangements may also affect strategies for pursuing the institutional mission, designing the curriculum, appointing university staff, and balancing teaching and research.

Models that depict the entrepreneurial university generally characterize the acclimatization of universities to conform to internal and external environmental demands. The entrepreneurial concept addresses actions that are triggered by uncertainty and complexity (Casson, 1982) in the changing environment of HEIs. Because most universities are also faced with decreasing public funding, they are concerned about reputation and adding value to their educational products and services. Developing entrepreneurial activities (as mostly covered in the literature included in the current study) concentrates on the commercialization of research

and an emphasis on the ideal mindset of academics as entrepreneurs who take risks and attempt to create value in their activities. The importance of entrepreneurial culture may also be observed through the way in which the entrepreneurial mindset is being enhanced and passed on to students through entrepreneurship education. The embeddedness of entrepreneurship education provides the opportunity for other members of the university to see the potential value of their research through additional customized programs and trainings that are not just organized by specific departments assigned to conduct specific tasks. If entrepreneurship education is accepted across disciplines, it means that the university strives to encourage multi-disciplinary applicability of entrepreneurial practice and thinking (Kretz & Sá, 2015: 95). The present study is open to the idea that whatever driving forces influence HEIs to pursue entrepreneurial activities, they normally demonstrate both proactive and reactive approaches to any decisions that affect their environment (Vesalainen, 1995: 31).

Actors within the university must make strategic choices when dealing with pressure. They can manipulate and scan the environment to see whether certain arrangements will fit their present condition and affect future organizational performance. These strategic choices may also involve the assessment of risk that influences actors to find options and to determine the boundaries of their actions (Lyytinen, 2011; Child, 1997); these strategic choices are performed by power-holders in organizations (Child, 1997). In the context of HEIs, particularly in this study, those in the university administration (e.g., the president or the vice president, deans, department heads, and heads of institutes/groups) have the capacity to evaluate the position of the university and other matters of importance related to their environment. The strategic choices that actors make concerning different targets, resources, and mechanisms; missions and organizational designs; the establishment of roles; and the commitment to intensify entrepreneurial activities are all connected to ways that enable the entrepreneurial university model to become fully accepted and permanent within the institution.

3.2 Entrepreneurial Universities in the Asian Context

Zhou and Peng (2008) studied some of the factors that shape entrepreneurial activities within Chinese universities. Thirty-four universities in China were involved in the study; the authors arrived with the assumption that three *internal* factors were important for the transition to the entrepreneurial university model:

research, technology transfer, and entrepreneurship capabilities. For *external* factors, it is essential that the government should enact policies and funding to support entrepreneurship and funding through venture capital and collaboration with industry. In China, most universities start from a university-run enterprise model, in which firms are formed within the university. Similar to Williams and Kitaev's (2005) observations in the EUERЕК project, Zhou and Peng (2008) stated that one of the characteristics of an entrepreneurial university is that entrepreneurship is broadly accepted ideologically, and is supported systematically by the government, including university administrators.

As a Special Administrative Region (SAR) of China, Hong Kong may have a different situation from the mainland, as the government of Hong Kong chose to play a facilitator role in setting up a favorable policy framework for fostering entrepreneurship (Mok, 2005). Business firms received state support in entrepreneurial activities through strengthened policies in funding, innovation, and technology development; the government also considered the University Grants Committee's (UGC's) recommendation that HEIs should take on more applied research and commercialization of research products. The government advised HEIs to seek funding from various sources other than the UGC research grants. Universities eagerly responded to this move by establishing TTOs, extending research to be based outside Hong Kong, and changing their curricula to be more entrepreneurship-oriented. Mok (2005) also notes that the rise of the entrepreneurial university model (similar to Hong Kong's case) is not just pure higher education reform, but a fundamental change in the relationship between the state, university, and industry.

Chan and Lo (2007) describe the privatization and corporatization of higher education as the current trends in Hong Kong. The authors attempted to link the connection of university entrepreneurialism to the goals of the city, which aspires to become a regional higher education hub. Sharif and Baark (2011) examined the entrepreneurial university model in Hong Kong by utilizing the Hong Kong University of Science and Technology (HKUST) as a case study. HKUST's entrepreneurial activities are geared toward helping Hong Kong both economically and socially. The university has initiated several programs in high technology entrepreneurship, including seminars and courses for developing start-up companies. Patenting activity, collaborative R&D, and contract research are highly encouraged among faculty members. The authors claim that HKUST's activities are close to the definition of the entrepreneurial university in the aforementioned triple helix model (Etzkowitz & Leydesdorff, 1997, 2000), although Hong Kong

universities in general still need to overcome a few challenges. Due to private enterprises' lack of capacity to commercialize university knowledge, HEIs are expected to prioritize commercializing their inventions through spin-offs. Another issue is the need to look beyond the role of technology commercialization in order to boost entrepreneurial culture.

Universities in Taiwan are generally recognized for building an innovative system (Hu, 2009). From 1999 through 2006, the government enacted four major policies to transform HEIs from a traditional, education-based orientation to becoming innovative, entrepreneurial universities. These policy changes drove universities to establish their own business incubators and technology licensing offices. A strong entrepreneurial culture can be gauged according to the number of academic collaborations, granted patents, technology licensing revenues, and incubators and technology transfer services that are present. Taiwan also considers itself a latecomer in transforming institutions so that they focus extensively on innovative performance. In addition to the national government's work, municipalities have also become hands-on in developing high-tech entrepreneurship. Firms are encouraged to support public universities through donations in order to nurture university-industry partnership and to gain access to universities' basic research resources. Most of the public universities that have a strong focus on engineering and sciences benefit from this arrangement. The government devised incentives to encourage universities in developing patents and other IP, forming spin-offs, and increasing on-campus incubators. Universities adjusted their policies on technology transfer and enterprise creation in response to the government's framework for improving innovative capacity. The public-private interaction models that shaped Taiwanese universities' policies on entrepreneurial activities were in fact adopted from more developed countries (Matthews & Hu, 2007).

For other Asian countries, a few studies have discussed governmental interest in promoting entrepreneurship by way of enhancing entrepreneurial education at universities. Yusof et al. (2008) and Keat et al. (2011) both studied the entrepreneurial inclination of university students who attend Malaysian universities. Abduh et al. (2012) evaluated (and offered recommendations for improving) entrepreneurship education programs in the Indonesian context.

In Japan, national universities were corporatized in 2004. Entrepreneurial activities are encouraged through collaboration with industry and the government, the creation of international research centers, applications for competitive funding, and incentives for research outputs (Oba, 2007: 294). Japan's informal gift-

exchange system was replaced with a US-style model involving formal contracts between scientists and firms. The government carried out initiatives to change the policies that regulate the commercialization of university research and took measures to encourage academic entrepreneurship (Kameo, 2015: 178). These “state-guided” regimes that were in line with corporatization and privatization also occurred in Malaysia and Thailand (Mok, 2007). Very few studies appear to have been conducted on the entrepreneurial activities and entrepreneurial university models that have been adopted in Asian countries, particularly those in emerging economies such as India and the Philippines. Even if policies do exist that encourage universities to become entrepreneurial, it is not clear how far these governments have monitored HEIs’ progress in these fronts. Asian regions with well-known universities have yet to be explored in depth in terms of institutional and individual-level entrepreneurial practices.¹⁶

3.3 Entrepreneurial Activities among Singapore’s Higher Education Institutions

Several recent studies have focused on entrepreneurial activities that were mostly driven by local universities in Singapore (e.g., Ng, 2011; Wong et al., 2011; Sidhu et al., 2011; Mok, 2013). NUS, NTU, and SMU currently maintain their own innovation and entrepreneurship centers. These centers offer support for finding angel investors and venture capitalists, business incubators, and industry liaisons; managing IP; teaching entrepreneurship programs; and conducting R&D programs with other HEIs and enterprises. The innovation grant of the NRF and other private funding bodies initially financed the respective activities of these centers. All five of the main universities in Singapore—NUS, NTU, SUTD, SUM, and SIM—are open to the idea of giving; various activities and infrastructures at these universities were made possible through philanthropic support. The donations of private individuals, companies, and organizations are intended to improve the student experience through scholarships, financial aid, and innovation programs. Donors are entitled to tax reductions (of up to 2.5 times their usual tax amount), which enables the university to apply for the prevailing matching grants from the

¹⁶ For example, in the Philippines, the Higher Education Modernization Act of 1997 encourages higher education institutions to pursue income-generating activities. There is a lack of information and studies about any plans to revisit this reform or that would describe the response of higher education institutions, including universities that could make potential contributions to regional development.

government. Other universities state that the gifts they receive are utilized for infrastructure, faculty research, curriculum improvement, library development, internship opportunities, support for promising students who have financial difficulties, and other initiatives. At NTU, for instance, donors can give gifts of cash, securities, art, and other gifts (e.g., jewelry and real estate).¹⁷

Entrepreneurial activities at Singapore's polytechnic institutes remain underexplored; very few studies have cited collaboration with industry for programs aimed at manpower development (e.g., Gopinathan, 2007) or the exposure of students to entrepreneurship education (San Tan & Ng, 2006). This could be a challenge in monitoring or evaluating the impact of the broader policy framework in entrepreneurship, because countries with binary education systems (such as Finland) consider the effects of polytechnic institutes' entrepreneurial activities on regional development. With almost the same population as Singapore but covering a much greater land area, Finland expects its polytechnic institutes to provide science and technology-related (S&T) services in regions of Finland that do not have universities of their own, or that have limited "knowledge-intensive business services" (KIBSs) (Marttila et al., 2008).

Ng (2013) states in his study that the adoption of an entrepreneurial model by local universities encourages them to build partnerships with foreign universities; they will then pursue a multi-disciplinary approach to learning, research collaboration, and the response to the global war for talent. With the support extended by the government, however, these initiatives were made possible through generous research grants and attractive remunerations for foreign talent in various fields who were willing to come to Singapore. Academic entrepreneurship is visible among HEIs in Singapore. The profiles of most academics state their involvement in research collaborations with local and international HEIs; grants that have been applied for (or received) for conducting teaching and research projects; and their numerous publications, consultancies, and experiences in managing start-ups and spin-off companies. Some academics are considered key persons behind the establishment of research groups/institutes/centers within these universities. Here we see a few similarities with Clark's (1998a) notions of the academic heartland and the expanded developmental periphery, in which self-sufficiency, flexibility, and differentiation are reflected in the traditional departments and autonomous institutes' set-ups.

The aspect of the traditional disciplines' performance in entrepreneurial activities remains scant in studies on the Singaporean context, however. Etzkowitz

¹⁷ Universities in Singapore provide information on gift giving in their respective websites.

et al.'s study (2000) emphasized the entrepreneurial university's tasks as the commercialization of knowledge and the active contribution to the development of private enterprises. Wong and colleagues (2011) argue that these tasks should not be the only focus of entrepreneurial universities in Singapore, due to the small population of the country and its status as an emerging economy. They suggest instead that adding the role of attracting foreign talent and fostering the entrepreneurial mindsets of students correspond more to the situation of Singapore and other newly industrialized economies.

While the topic of national innovation systems is beyond the scope of this study, such systems emphasize the role of institutions (like universities) in the process of creating, diffusing, and exploiting innovations (Chung, 2002). The transformational challenges mentioned by Wong et al. (2011) also explicitly clarify the applicability of the triple helix model in Singapore's context. The urgency to consider the entrepreneurial path as a more feasible option for Singapore is addressed in Chapter 5. Wong et al.'s study is helpful in supporting claims that entrepreneurial university ideals are present in the Singaporean context. Universities' performance in spin-offs, their formation of start-ups, and their involvement in entrepreneurial education—in addition to the structures proposed by various actors to emphasize the visibility of entrepreneurial activities (e.g., the establishment of TTOs)—are all strong indications that Singapore is critical of entrepreneurial university development (Gibb, 2012). While the government and university administrations have good intentions to implement change by intensifying entrepreneurial activities, some observers believe that several of their actions contradict other institutional members' views on a range of priorities, funding, management issues, and the “required” behavior when carrying out such activities. The ways in which institutional members understand the strategic direction of the university and harmonize that vision to become entrepreneurial are quite unclear.

I will extend Wong et al.'s inquiry (2011) into the same case study covered by the present research: “To what extent has the university moved toward the entrepreneurial university model?” The transformation highlighted in Singapore's case needs to focus more on the documents and direct insights of those who are involved (and who are affected by the need to engage) in entrepreneurial activities, because these two important sources offer various issues and situations that affect the university's operations and future undertakings. Since the matter may entail compliance and further effort to meet expected outcomes, all information that is gathered for this study should attest to the aim of establishing the entrepreneurial

university as an accepted paradigm for fulfilling the demands of the internal and external environment.

3.4 Criticisms of the Entrepreneurial University

As described in the literature, universities are good about demonstrating various ways to encourage their members to seize opportunities that will benefit a variety of institutional undertakings. Whatever universities can do for current and long-term goals (including how stakeholders recognize their proactive measures) is significant for their survival. While adopting the entrepreneurial university model may solve some of the most common problems that universities face in terms of funding and enhancing university operations, many scholars question the entrepreneurial university as observed in practice.

Six years after Clark's release of *Creating Entrepreneurial Universities: Organisational Pathways of Transformation* (1998a), Finlay (2004) tested the reliability of Clark's findings from Strathclyde University. He concluded that few perceptions were gathered from the case study, despite the variety of cultures that operated in the university setting. Clark's study has failed to address the possibly competing views of senior staff and others over the university's entrepreneurial transformation and response. Few senior staff participated in the 1998 study, and the findings were insufficient to reflect the management of change and how the university could be characterized. In other words, there were empirical and methodological weaknesses in Clark's study. Finlay suggests that various concepts from organizational and social theories could support some of Clark's claims. Although Clark described Strathclyde's trajectory as an interesting case study on the structures and management of an entrepreneurial university, his findings only took the monocultural perspective, meaning that the cultural images presented by senior managers was the view that was portrayed most often.

The recognition of leaders' agency is among the strengths of Clark's study, but the results imply that leaders have limited choice: "Either they structure their universities around five irreducible elements or else they fail" (Finlay, 2004: 432). In a related view, Deem (2001) writes that since Clark focused on a limited number of participants, the results did not provide wide-ranging explanations for the impact of global pressures. Likewise, the study did not actually present extraordinary cases of interaction among various economic, social, cultural, and material factors and HEIs. Smith (1999) argues that risk is a key component of

entrepreneurship, though it is a challenge to address this matter in examining various governance and accountability aspects at universities. Even if certain institutions are confident that entrepreneurial activities will offer large payoffs (as Clark emphasized), it is important to think about these two questions: (1) “How are risks assessed in such settings?” and (2) “What happens if risk fails to pay off?”

Armbruster warns that once a government or university institutionalizes entrepreneurialism as a strategy, “all manner of things start to go wrong” (2008: 372). The author argues that the concept of the entrepreneurial university is still vague and subject to interpretation. Policy and academic discourses seem to influence many HEIs, so the transition to becoming an entrepreneurial university is widespread and will continue to take place in the future. Armbruster raises the concern that it is difficult to determine which university activities fall into the category of observable entrepreneurial activities that bring at least steady additional income, more so than the line item budgets dispensed by government ministries. This situation extends to some universities’ claims that they have successfully implemented the entrepreneurial university model through various internal and external activities, while they have no supplementary financial data to prove that the model has made their institutions any wealthier.

Another issue related to the entrepreneurial university model has to do with financing knowledge and technology transfer activities. Influenced by the success of Boston’s Route 128 and California’s Silicon Valley in many cases, universities generally concentrate on patents for two reasons. The first is that patents are beneficial for entrepreneurial universities that intend to capture knowledge. The second pertains to retaining graduates (specifically, doctoral graduates). Armbruster refers to the United States, the United Kingdom, Australia, and Canada, where universities are prepared to invest a great deal of money to establish their own TTOs in order to make additional profits and to build strong networks with industry; Armbruster reported an increase in the number of TTOs since 1980. Unfortunately, more than half of the TTOs did not bring sufficient profit to justify their existence. He observed that these offices were more or less concerned with licensing only, instead of wisely utilizing the commercial value of patents.

Most researchers and doctoral students normally work under fixed-term contracts. They are expected to contribute to projects or to produce research that has some commercial value over the course of three to four years. Such people have no guarantees that they will be able to renew their contracts once that period is completed, due to funding uncertainties or the availability of post-doc positions after the completion of their PhD studies. Funding bodies may have their own sets

of criteria for renewing project financial support. Another issue raised by Armbruster is on the productivity of doctoral programs that in effect will help retain graduates, and how these programs evaluate their graduates' contributions during their stays. Armbruster stresses that being entrepreneurial may soon involve reckoning and justifying expenses due to the large expenditures given to researchers for specific projects that in the end do not actually produce sufficient output, nor do they become beneficial to society: "If PhD programs fail to capture knowledge, should they be shut down? The question is absurd—but should not be absurd for a supporter of the idea of the entrepreneurial university" (Armbruster, 2008: 381).

Armbruster's statement provides reflection for analyzing the entrepreneurial character of universities. Either universities have the tendency to move on easily and apply to other funding bodies after unsuccessful PhD programs, or they will initiate an agreement with funding bodies about deliverables during the funding period, which may increase the chances for renewal if they are able to achieve them. This viewpoint is tantamount to resource dependence due to the need to have secured finances in carrying out university programs. Resource dependence theory (Pfeffer & Salancik, 1978) examines organizations' ability to acquire and maintain resources that are relevant for their survival. This theory is not within the scope of the current study, but some of its elements may reflect the views of the respondents in how they attempt to secure and navigate resources connected to teaching, research, and other projects they perform.

Several studies have discussed the difficulties that academics encounter in the entrepreneurial university environment. Data derived from the United Kingdom shows that even if entrepreneurial initiatives are actively promoted on campus, not all faculty members have high levels of expertise with financial activities such as spin-offs and consultancies (Tunnainen, 2005; Deem & Johnson, 2003). Philpott et al. (2011) similarly conducted a study that remarked on the attitudinal split in understanding the entrepreneurial university's ideals. Their study examines universities' failure to determine academics' attitudes about pursuing entrepreneurial activities, in terms of how they understand objectives based on economic development, the financial condition of the university, and the financial condition of its staff. In such situations, the views of the academic community should not be neglected; these views allow universities to assess their own capacity for contributing to entrepreneurial outputs, and they can encourage ideas about trainings programs and other types of support that will be aligned both with their activities and with the entrepreneurial mission.

In an earlier study, Subotzky (1999: 413) explained the implications of budget devolution to a university's operating units. If members of the university are very much concentrated on solutions "towards the greater good of the organization," (Subotzky, 1999: 415) the concept of the university as a community is waning. Some of the other implications that he analyzed include the following:

(1) Changes in the form, focus, and dissemination of knowledge that involve:

- the commodification of knowledge, and the shift toward "Mode 2" knowledge;
- research that is increasingly funded by non-statutory, privately commissioned sources;
- new forms of quality and evaluation, including performance indicators;
- an emphasis on science and technology fields, rather than on non-commercializable research;
- technology transfer through business–university research partnerships, consortia, and specialist units that lead to proprietary IP rights; and
- the fragmentation of teaching and research.

(2) Changes in the control and governance of higher education that involve:

- increasing corporate influence, and the changing role of the state in relation to higher education; and
- alternative funding sources: bidding for state funding and contracts on the basis of institutional competition, entrepreneurialism, and managerialism.

Tuunainen (2005) discusses research approaches and engaging in hybrid practices in his case study of a Finnish university's research group. Biotechnology is a key research agenda for Finland; the government has been keen to advance the level of research in this area since the mid-1980s. One university had the opportunity to introduce genetic engineering that coincided with plans to modify its scientific research and teaching tradition. The university established an embryonic biotechnology group, but many people questioned the group's focus on genetic engineering (which involved plant breeding). Some faculty members had doubts if plant breeding was being done in the right department. The research group was aggressive in seeking external funding to expand its research within the

department, but many still doubted the general focus of the department's activities. Tuunainen (2005: 290) writes that this is one example of the "ethical and ideological disputes" over research approaches within the genetic engineering in Finland and other European countries that took place in the late 1990s.

Tuunainen also adopts the concept of "boundary work" from Gieryn (1999) in explaining problems related to commercialization and entrepreneurship within universities. A lack of clear-cut rules and regulations for commercialization-related activities can create tension between faculty members (those who serve as principal investigators or group research leaders) and people from the administrative side of the university. In the same study, among the controversies that came up were the bureaucratic accountability (and teaching performance) of the faculty members; the loaning of the university's research materials and instruments to the faculty members' research groups or firms (in the case of start-up companies); and the ownership of IP rights.

Other sources of conflict in the operations of an entrepreneurial university include the TTO managers' aggressive negotiating, or operating in a bureaucratic manner (Siegel et al., 2003; Martinelli et al., 2008), and the attitudes of members toward entrepreneurial activities. Trust issues and the willingness of members to engage in collaborations are often influenced by individual perceptions of potential risks; often, not based on staff members' knowledge or understanding of university policies pertaining to collaboration activities (Louis et al., 1989; Martinelli, Meyer & von Tunzelmann, 2008).

3.5 Conclusion

This chapter has discussed the different models and conceptualizations of an entrepreneurial university. Despite the varying urgencies and strategies in the manner in which universities respond to their environments, we can see similarities in the factors that influence entrepreneurial activities. For instance, in the Asian context, government-led initiatives have influenced the transformation of universities; the frameworks that have been applied were adopted from other settings. The different approaches to government intervention all have the common goal of intensifying universities' contributions to teaching, research, and service to the general economy via entrepreneurship activities (Zhou, 2008: 110). We can see, however, that when looking at the management of the entrepreneurial university, the various factors that influence entrepreneurial behavior and practices,

and (most importantly) the possibilities and consequences of embracing entrepreneurial ideals appear to be missing in the Asian context, and specifically in Singapore. A framework that mainly concentrates on institutionalizing the entrepreneurial university is lacking because previous studies only focused on identifying the elements that contribute to the formation and ways to develop an entrepreneurial institution. There is a need for a comprehensive study that will look into the distinction between elements that promoted the entrepreneurial university and those that helped sustained it (Colyvas & Powell, 2007: 219). While most of the studies on entrepreneurial universities that have been conducted have concentrated on Europe and the United States, the situation of Singapore can further develop the entrepreneurial university concept based on the attributes mentioned in this chapter.

The literature has not provided comparative perspectives on the nature of entrepreneurial activities, which makes it difficult to see whether patterns only affect public (national) universities because of the expected response to economic development goals. Since the term “entrepreneurial” is tied into a business orientation, it is necessary to look beyond cultural differences and across countries. For example, examining academic institutions versus business institutions, as suggested by Rothaermel et al. (2007), can be beneficial for researchers to understand the large body of knowledge on business institutions in contrast with academic institutions. In this way, we will have the opportunity to learn about the transition of business institutions and the value of an entrepreneurial culture. The variety of ways in which business institutions come to survive and endure entrepreneurial ideals is also important to know. As a conclusion, it can be summarized that the entrepreneurial university in this study refers to the transformation of the university that accounts for 1) the behavior and practices within departments, faculties, and independent institutes concerning their approach to income-generating activities; 2) the institutional activities’ link to the national policy on entrepreneurship; 3) the roles and contributions of various actors in cultivating entrepreneurial activities at the university; and 4) the commitment of the academic community to align the tasks, activities, and goals of the university with the government's policy framework on entrepreneurship.

4 INSTITUTIONALIZATION

This chapter discusses the concept of institutionalization as a way of understanding the emergence of several issues and situations that are connected to Singapore's context of adopting the entrepreneurial university model. The literature on institutionalization and how the concept was utilized in various fields are presented. Furthermore, the concept of institutionalization in this study aims to focus on the condition that facilitates and hampers the goals toward the entrepreneurial path, beyond discussing the phases of achieving successful transformation.

4.1 The Concept of Institutionalization

In simple terms, the intention to institutionalize means “to cause (a custom, practice, law, etc.) to become accepted and used by many people” (*Merriam-Webster Online*). According to Selznick (1957), institutionalization is an adaptive process that takes place in the organization over time. The purpose of institutionalization is “to infuse with value beyond the technical requirements at hand” (1957: 17) and to uphold stability. At this point, organizations begin to show concern for self-maintenance by building their respective identities and preserving a set of unique values (Scott, 1995: 18). Commitment is more importantly valued during institutionalization, because it brings out the distinct character of an organization (Selznick, 1957; Scott, 1995: 19). Goodman et al. (1980: 221) argue, however, that commitment *may* be present during institutionalization, but it should not be treated as a prerequisite. And although commitment may result from persistence, it is not demarcated by persistence. Both terms similarly emphasize behavior and resistance to change by demonstrating a high level of commitment to a particular act; or, if an act happens to be institutionalized, it reduces the odds of changing that act. In differentiating the two terms, Goodman et al. stress that commitment denotes a psychological process, while institutionalization concerns the meanings of social facts.

Stinchcombe (1968) acknowledges the role of power in institutionalization; he focuses on identifying the conditions “in which power holders are able to preserve their power by way of controlling the selection of their successors and general instruments of communication and socialization” (Stinchcombe, 1968: 111; Scott, 1995: 20). Salancik (1977), referring to the impact of power on organizational members, writes that organizational members tend to show commitment to decisions and strategies that have been espoused earlier, and they carry on courses of action long after they have served their usefulness. Rather than questioning the distribution of power and influence, members characterize the distribution of power as forming the organization’s way of operating. They come to accept the power as an intrinsic part (or function) of that organization (Boeker, 1989).

In describing the roots of institutionalization, Berger and Luckmann (1967) emphasize that individual undertakings are susceptible to habitualization. When someone repeatedly performs a particular action, it becomes a pattern and leaves a meaningful character for that individual. Institutionalization also transpires when there is the presence of “a reciprocal typification of habitualized actions by types of actors” (Berger and Luckmann, 1967: 72). This means that actors are involved in the development of shared meanings that are connected to persistent behaviors. Institutions are also capable of influencing the emergence of reciprocal typifications of actions because of their history and capability for controlling “predefined patterns of conduct” (Berger & Luckmann, 1967: 72; also in Tolbert & Zucker, 1996). As we commonly associate and comprehend institutions through their respective histories, it is likely that they will have mechanisms for regulating the creation of new patterns and arrangements that are not compatible with their goals and missions (Berger & Luckmann, 1967). Conley and Enomoto (2005: 10) argue in the same vein that whatever changes in patterns that institutions initiate could also affect individual organizational members. Berger and Luckmann also directed their main inquiry into how “intentional social actors” construct reality. They treat institutional patterns both as human products brought about by face-to-face personal interactions and externalization. The way in which individuals understand these interactions becomes intersubjective and then objectified, externalized, and taken for granted (Colignon, 1997: 41). Thus, institutionalized patterns provide a groundwork for order and predictability.

In response to Berger and Luckmann’s study, Meyer and Rowan (1977) were among the first to raise the issue of organizational legitimacy, in which members attempt to integrate structures and procedures that fit widely accepted cultural models (Ruef & Scott, 1998: 878). Follow-up studies (Colyvas & Powell, 2006;

Thune & Gulbrandsen, 2011) recognized that the presence of habitualization and reciprocal typifications of actions can contribute to analyzing the manner in which language, concepts, and categories are shared, and how practices become entrenched in organizational routines.

Zucker's study defined institutionalization as both a process and a property variable; she explains that institutionalization:

is the process by which individual actors transmit what is socially defined as real and, at the same time, at any point in the process the meaning of an act can be defined as more or less a taken-for-granted part of this social reality. Institutionalized acts, then, must be perceived as both objective and exterior. (1977:728)

Objective institutionalized acts are potentially repeatable, whereas exterior acts are reconstructed to be seen and understood as part of the external world. Nevertheless, Zucker's study focuses on varying levels of institutionalization only in a small-groups setting; the process-based approach to institutionalization has not been pursued in other studies on organizational analyses (Tolbert & Zucker, 1996: 175). The regulative and normative elements serve as carriers of institutionalization. Legal provisions and other structural arrangements behind the creation of mandatory practices are related to the regulative element, whereas the codified rules, standards, and sanctions that professions implement are connected to the normative carriers (Jepperson, 1991; Zucker, 1991; Leca et al., 2008; Pinheiro et al., 2012). As a follow-up observation, Tolbert and Zucker (1996) argue that institutionalization mostly deals with the qualitative state: the notion that structures are either institutionalized or not institutionalized.

Institutional theory offers a variety of insights on how institutions are shaped by their internal and external environment, particularly the underlying elements that take place during institutionalization (Mugabi, 2014: 33). According to Scott (2005: 2), institutional theory pays attention to the multifaceted and more robust characteristics of social structure: the theory "considers the processes by which structures, including schemas, rules, norms and routines, become established as authoritative guidelines for social behavior." There was increasing interest among scholars to examine the elements connected to the creation, diffusion, adoption, adaptation, declination, and disuse of institutionalization over space and time.

The three pillars that make up or support the institution are the cognitive, normative, and regulative elements (Scott, 1995: 33). Institutions are transported by

cultures, structures, and routines—exemplified as carriers that operate at multiple levels of jurisdiction. The regulative pillar is comprised of rules, laws, and sanctions. For instance, Kostova (1997: 180) classified the prevailing “laws and rules in a particular national environment which advocate certain types of behaviors and restrict others” in the regulative pillar. The prescriptive, evaluative, and obligatory dimensions depict the normative pillar. Meticulousness in achieving standardization and in promoting practices that are appropriate according to the values and norms shared (or carried out) by members of the institution are among the circumstances that may affect individual and organizational actions in normative processes (Trevino et al., 2008). The basic goals and purposes of the institutions, as well as having an integrated culture, are found within the dimensions of the normative pillar (Seippel, 2001: 125). For example, in the higher education context, this can be explained by the efforts of various disciplines to modify their concepts, methods, and topics in order to legitimize their activities and address professionalization requirements (Brown, 1993). Finally, the cognitive pillar is culturally supported vis-à-vis what is conceptually correct (Scott, 1995), or for situations where some individuals may contest that “this is the right way because there simply is no other way” (Powers, 2000: 2). According to Scott (2013), institutional maintenance involves cultural-cognitive mechanisms in which processes like “mythologizing” work is involved. People who strive to institutionalize certain actions can look back to iconic early leaders who were responsible for setting up routines and structures within institutions. The central elements of the cognitive dimension of institutions are the shared conceptions that form the nature of social reality, and the emergence of frames through which meaning is made. Scott has argued that this is also the point of departure for sociologists such as Peter Berger, Paul Di Maggio, and even Erving Goffman, who wrote a major contribution to frame analysis.¹⁸ Cultural-cognitive mechanisms can be examined for the way in which terms (e.g., business terms) are modified or reframed (Jallat, 2004) in order to understand the development of meanings that are successful or unsuccessful in establishing certain practices, structures, and regulations within institutions.

¹⁸ Goffman’s work illustrates how frames can structure an individual’s perception of society (see Goffman, 1974).

4.2 Interpreting the Concept of Institutionalization

Clark (1968) contributed to the understanding of institutionalization in higher education studies; she defined the institutionalization process as the cultural elements or objects that are embraced by actors in a social system. As a process, institutionalization is considered essential to all social organizations, specifically formal organizations. Clark's research concentrated on the four models that account for the institutionalization of innovations in higher education: the organic growth model, the differentiation model, the diffusion model, and the combined-process model.

The organic growth model encompasses the development of professional activities particularly the clarification, regulation, support, legitimation and transmission of activities and other social arrangements. Differentiation model is grounded on activities that were introduced and institutionalized within universities. This model also explains that innovations introduced by people inside the university are often based on bodies of knowledge that are already institutionalized. As a result, most university decision makers treat these innovations as legitimate because it cultivates the creation of new entities (Clark, 1968: 9). In the third model, diffusion considers knowledge, information collection, evaluation, trial, and adoption as vital programs of institutionalization. When introducing innovations inside the university, Clark points out the need to aggressively seek relevant knowledge, to consider evaluating information by means of acquiring personal views, to conduct pre-testing, and to continuously re-evaluate the innovation (even after its adoption) until it becomes accepted on a permanent basis. Lastly, the combined-process model is generally thought to be more appropriate in various situations. In this model, innovation is characterized as developing simultaneously both outside and inside the university. As Clark writes,

The ideas diffuse back and forth, and versions from both inside and outside stimulate one another. If they are not institutionalized inside the university, this may reinforce institutions developing outside since they will receive support (intellectual attention, student, financial contributions etc.) that would otherwise have gone to the university. (Clark, 1968: 12-13).

In another context, Seippel (2001) focuses on the institutionalization of social movements, specifically Norwegian environmental organizations. He proposes a framework in which institutionalization is considered to be a historically open and

three-dimensional process that incorporates structural, normative, and cognitive elements. The author reflects on gauging the three elements based on indicators that are defined by various patterns of interaction within the organizations. Seippel found that the institutionalization of social movements is driven by the different roles that the participants assume (i.e., the division of labor), the cognitive framing of environmental problems (i.e., measuring the degree of importance of environmental problems), and ideological orientations. Seippel's study provides a basis for understanding that the dynamic process of institutionalization has to address multidimensionality, because social movements have different ways of approaching environmental problems, different influences that characterize their institutional forms, and different meta-frames (or prevailing ideologies) in which environmental issues can be linked. Previous research on the institutionalization of interorganizational alliances and networks (Osborn & Hagedoorn, 1997) has looked at multidimensionality in the analysis of institutionalization processes by examining stakeholders' mixed expectations about institutions. For example, the patterns of activities found in institutions may be assessed based on strengths and weaknesses to assist stakeholders in deciding on possible collaboration.

In Youtie et al.'s (2006) study of the institutionalization of university research centers, the authors presented a cross-case analysis of three centers that were involved in infertility research under a national program initiated by the United States Congress. The study discussed the ways in which the research centers were assessed according to the authors' institutionalization criteria. Some of the examples that the authors included in the criteria focused on the research centers' resources, structure, objectives, and external recognition. The authors found that gauging the accompanying characteristics of the research centers related to grants and contracts, personnel policies, interorganizational ties, and the diversity of stakeholders was beneficial in determining how the formalization and institutionalization of a fully articulated research center is solidified. The authors concluded that "institutionalization is not a value to be approached without limit" (Youtie et al., 1062). They believe that if university research centers have articulated a degree of institutionalization based on the given criteria, they can flexibly respond to challenges in obtaining external funding and can be successful in achieving other large-scale targets.

In her study on two well-known companies in the electrical industry, Fleck (2007) argued that institutionalization processes have a significant impact on long-term organizational success. Though institutionalization processes are geared toward promoting stability, they can also trigger inflexibility and resistance to

change. Based on historical studies and an examination of the longitudinal perspective of institutional theory, Fleck identified two distinct modes of organizational institutionalization: reactive and proactive modes. Structure prevails in the reactive mode, and institutionalization is an “organizational fact of life that imposes itself on the organization” (Fleck, 2007: 78). In the proactive mode, the role of agency is highly recognized; Fleck cites as an example the strong “visible hand” of significant actors in building organizational character and in managing structure and relations with the environment.

Thune and Gulbrandsen (2011) studied the institutionalization of university-industry interaction in Norway. In the context of inter-organizational relationship, the authors argue that formalization differs from institutionalization. Citing Vlaar et al. (2007: 1619), *formalization* can be defined as an organizing process, and also an apparatus for controlling and coordinating collaborative relationships. The organizing process is found in contracts that specify the formal nature of relationships: the descriptions of roles, key undertakings, commitments, organizational structures, coordination procedures, and other courses of action that will facilitate the execution of contractual agreements. In defining institutionalization, the authors refer to Ring and Van de Ven’s study: “Institutionalization is a socialization process that transforms an instrumental transaction into a socially embedded relationship by infusing it with norms and values that permit the relationship to be reproduced and perpetuated beyond the immediate tenure of its founders” (1994: 102). Thune and Gulbrandsen explain that the interplay between the two processes develops over time; collaborative relationships, for example, may go through informal to formalized to institutionalized phases. Within these phases, “formal procedures of control and coordination might be relaxed as repeated interaction between partners develops into new organizational routines and thus become institutionalized (Thune & Gulbrandsen, 2011: 101-102).

In another study, Colyvas and Jonsson (2011) differentiated diffusion from institutionalization. *Diffusion* refers to how things flow or spread, whereas institutionalization looks at “stickiness” and stability. While the process of diffusion requires contagion and reinforcement, in which alignment with existing cultural and cognitive frames is expected, institutionalization relies on actual integration into modes of reproduction. In diffusion, feedback involves information and exposure, while institutionalization stresses feedback in higher- and lower-order links that become mutually reinforcing. The authors underscore the importance of clearly identifying the practice or structure that is becoming

diffuse and institutionalized. They argue that most studies fail to explain the properties of social settings by which something spreads or sticks: “This limitation often leads to mis-specification of institutionalization, either as a characteristic of the field through which something is introduced, or as an attribute of the object that flows or stick” (Colyvas & Jonsson, 2011: 47). Here, it is important to reflect whether institutions are in the stage of diffusion or have already achieved institutionalization; the lack of feedback (Coleman et al., 2007) from actors involved in the process may in effect discard underlying problems and ways to resolve issues on that particular stage (Reyes, 2016: 136).

4.3 Institutionalization in the Entrepreneurial University: Approaches from the Healthcare Sector

This study gathers ideas from the institutionalization of quality assurance (QA) in the healthcare sector. Institutionalization in the healthcare context looks at “the process through which a set of activities, structures and values becomes an integral and sustainable part of an organization” (Franco et al., 2002: 5). This means that people are exactly aware of the requirements to make things happen: the appropriate skills and commitment they need to sustain activities (such as QA undertakings) over time. The healthcare and higher education sectors are predominantly non-profit sectors. In terms of societal mission, both sectors provide services to the people (i.e., related to health and well-being and college access) and strive to have competitive organizations. They try to manage their shrinking budgets, while advocating quality and serving the increasing and changing needs of the people. These common issues in management affect the conditions of universities and hospitals in providing better education and health services to the public. Similar to the experiences of the healthcare sector, the higher education sector will have to encounter the various organizational boundaries when veering away from the norm and implementing actions outside the current practice framework (Heinonen, Hytti & Vuorinen, 2013).

In this study, utilizing the elements within the process of institutionalizing quality assurance in the healthcare sector is necessary because the issue of adopting the entrepreneurial university model at universities originates from the state. In the same way, the state is the carrier of ideas in health policy reforms that aim for organizational renewal of public hospitals and other health providers (Pineiro et al., 2017). Successful implementation of quality assurance initiatives requires

investments in technical assistance, education, information sharing, analysis, and coordination (Sari, Firat & Karaduman, 2016: 330). These types of investments are also significant in achieving the purpose of institutionalization within an entrepreneurial university environment. Both quality assurance and entrepreneurial university activities involve collective action as well as individual risk-taking, with the intention to achieve institutional development rather than merely complying government requirements.

It is important to note the difference between healthcare organizations and HEIs for this study. Healthcare organizations' participation in various types of linkages requires them to engage in slightly looser and more malleable interactions. Despite the growing number of multihospital chains and the development of integrated healthcare systems, healthcare organizations are considered to be tightly coupled (Scott et al., 2000: 62) because policies and standards about patient care, medical treatments and innovations, medical practitioners, and health facilities and services are strictly monitored by governments or by professional bodies (e.g., Ministry/Department of Health, hospital associations). In publicly funded healthcare organizations, the desire to institutionalize certain practices (which are commonly supported by healthcare reforms) is meant to ensure that citizens receive proper medical attention. Franco et al. mention that other specific reasons (2002) for the desire to institutionalize include reducing medical errors, increasing attention to patient safety, and attempting to minimize surplus and inefficiency, given that some countries have limited resources for attending to healthcare needs.

Autonomy-related issues can challenge the institutionalization of such practices, however. For example, medical practitioners often complain about how institutional structures (Levay & Waks, 2009) affect the autonomy of their clinical or professional practice, particularly in any decisions that have to do with patients' conditions (Kramer & Schmalenberg, 2008). In contrast, HEIs are often negatively perceived as being too loosely coupled (Bess & Dee, 2008: 225). Some HEIs are characterized by a fairly homogenous structure and arrangement. If, for instance, a set of criteria will be utilized for examining the degree of institutionalization in a particular university, it can be challenging to interpret the results. This is because not all of the identified criteria will apply to the sub-systems within the institution, since those are often autonomous (Cameron, 1978: 610). Hence, advocating tight coupling can immobilize universities in times of uncertainty, because formal leaders will have the final say about what members need to do (Birnbaum, 1988; Pfeffer & Salancik, 1978; Bess & Dee, 2008). In terms of institutionalization, tight coupling in HEIs can affect self-reproduction, because organizational members are expected to

act collectively toward a common purpose in given situations (Colyvas & Powell, 2006: 5).

Silimperi et al.'s study (2002) discusses the essential elements that are required for implementing and sustaining QA through a framework that can be applied to the quality efforts that health ministries in Latin America and Africa initiate. It is not far off from the case of investigating the institutionalization of the entrepreneurial university model; in both, the outcomes will have a significant impact on maintaining and sustaining any activities connected to university development and, more importantly, on Singapore's nation-building agenda. The authors group the most important elements of institutionalizing QA into three categories: the internal enabling environment, the efforts that are made to organize for quality, and the supporting functions.

Similarly to the case of the healthcare sector, the present study accounts for the amalgamation of the entrepreneurial university model in the selected case study's programs and activities. I consider Silimperi et al.'s (2002) framework as a starting point for analyzing the basic elements of institutionalization found in the case study. The elements mentioned in their study can assist in taking into account certain objectives and requirements that are essential in the case study's current situation of institutionalizing the entrepreneurial university model. As discussed in the next chapter, the frame analysis method can validate the extent of institutionalization by considering the institutional members' perceptions of reality: particularly the ambiguous setup of an entrepreneurial university.

4.3.1 Internal Enabling Environment

Silimperi et al. (2002) suggest that an environment for institutionalizing QA should include the policies, leadership, core values, and resources that support the process. Most importantly, a policy environment is necessary for sustaining activities, because it encompasses plans and strategies for realizing organizational goals. In the healthcare sector's case, policy environments can provide support, guidance, and reinforcement for various actors to implement QA initiatives. Policies may consider a range of organizational directives, such as mission statements and human resource management policies (broad policies) or standard operating procedures (narrow policies). The laws, regulations, plans, and strategy statements can be considered policies, since these are official statements that describe how an organization operates and provides services (Franco et al., 2002: 14). In other

situations, policies involve an agreement between parties concerning rights, duties, and responsibilities in order to guarantee the fastest possible integration of certain activities (Laville, Lemaitre, & Nyssens, 2006: 282).

Entrepreneurship in Singapore has presented a great deal in introducing and modifying government's policies. The government's immigration policies to attract foreign talent, the transparency rules related to IP, and cluster strategies at one-North (a business park) are a few examples. In this study, the focus is on the internal policies of the university that were set in place to guide institutional members in achieving the entrepreneurial mission. The formulation of policies can assist in the formalization and institutionalization of activities (Anguelovski & Carmin, 2011: 170) related to the entrepreneurial university model. As observed in the institutionalization literature, individuals tend to show concern about the appropriateness of their actions based on governing policies (Colyvas & Jonsson, 2011: 40). Likewise, the legitimacy of policies presents a situation in which such policies exhibit the incorporation of the adopter's preferences (May, 2013) in pursuing certain actions. This could help in gaining support from other members as they find policies that are suitable for their respective roles and tasks. Though policies are usually top-down in nature, these can challenge institutionalization if the policies fail to understand the characteristics and attitudes of followers or adopters (Wang & Wong, 2004: 165). Policies require occasional review to find the compatibility with the current state of activities.

Leadership is the second element of the internal enabling environment. Leaders are generally seen to be visionary, heroic, transformational, transactional, charismatic, inspirational, flexible, sensitive, and innovative (Lawler, 2008 cited in Currie, Lockett, & Suhomlinova, 2009: 1738). In the healthcare sector, leadership is crucial for the institutionalization of QA, because its successful implementation requires a change in people's way of doing their work. Leadership considers individuals' personal qualities and actions toward other members. Leaders are generally expected to support their staff members' ability to continually enhance the quality of healthcare (Franco et al., 2002: 15). Silimperi et al. (2002) write that the role of leadership is essential in the organization's readiness to sustain practices. Good leadership exemplifies the ability to implement small-scale activities or experiments and to anchor existing activities. At the same time, a leader ensures that other members may participate in discussions over missing or lagging activities and corrective actions. In Clark's (1998b: 8) entrepreneurial university framework, leadership pertains to "strong-minded change agents who wished to break the cake of custom," which is similar to Schumpeter's statement (1934: 92) that the

intention is to break up the old and create new traditions. For Etzkowitz (2003), leadership in entrepreneurial undertakings is relevant in the changes that have taken place in academic production. The definition of a strengthened steering core stresses the dimension of leadership that can be highly personal, highly collective, or group-based. Dictators, tyrants, and authoritarian figures cannot be permanent qualities of entrepreneurial universities. Clark (2001: 15) reminds reader that given the power of faculty, “based upon their professional expertise and disciplinary competence—the *we* has to dominate the *I*. Entrepreneurialism in universities has to be seen as collegial entrepreneurialism” (emphasis is in the original). From an institutionalization perspective, leadership can serve as the foundation of adaptive behavior, and in so doing promote change.

Core values are vital to acknowledging staff members’ contribution and desire to be part of institutionalizing certain initiatives (Silimperi et al., 2002). An organization can distinguish its culture by setting core values that are shared among its members. Core values drive the behavior of organizational members and reflect “what people believe is most fundamental” (Franco et al., 2002: 16). From the experience of institutionalizing QA in the healthcare sector, core values are directly linked to the elements of leadership, policy, and resources; such values require leaders to set the tone for organizational values by demonstrating respect, caring, and teamwork, and communicating the goals of achieving quality. Core values essentially foster a setting in which members will “feel that they are doing something that matter[s], both to them personally and to others” (Franco et al., 2002: 15). As observed in Ylijoki’s study (2005: 557), university transitions may intensely alter the core values and basic beliefs of academic work. The core values set by the university that stress the importance of entrepreneurial undertakings promote commitment and guide institutional members’ daily practices.

Successful implementation and institutionalization involves an investment in resources. In Silimperi et al.’s study (2002), the resources that are allocated for QA include staff time, communication, resources for capacity building, and other key support functions; in essence, the element of QA covers human, material, and financial resources. While initiatives are being developed, the amount of resources that are needed may change over time. Initiatives that have achieved institutionalization signal organizations to start designating funds, dedicating materials for data collection, and providing continuing education for their members (Franco et al., 2002: 17). In the entrepreneurial university setting, most of the cases that have been presented in previous studies (e.g., Clark, 1998a) had difficulties in sustaining their resources due to decreases in government funding;

they found it to be a challenge to engage in various activities, because they could only attend to those that fell within their current means. The issue of resources affects the institutionalization of the entrepreneurial university model, because remaining traditional is somehow a safer response for most universities, due to the uncertainty of the resource base. As Clark (2001: 17) emphasizes:

A few universities are blessed with money: they will try to live well until rich donors fade away or the oil money runs out. Or, short of resources, some universities will still prefer to wait for the golden goose to lay more golden eggs and pass them around. Surely (so goes the refrain) “the government” will have to come to its senses, realize that the universities must always have first priority, and send full funding for all the things we want and need to do. But stand-pat postures are clearly an unattractive alternative for an increasing number of universities who have learned the hard way that no one else is going to save them and give them the many capabilities they will need to prosper in the environments currently unfolding. Like democracy, university entrepreneurship can be unattractive until you consider the alternatives. Doing nothing poses very large risks.

4.3.2 Structure for Organizing Activities

In the healthcare context, organizing for quality involves setting down the responsibilities and accountability for oversight, coordination, and implementation of QA in the organization, or throughout the health system. Silimperi et al. (2002) state that this element requires structure, which is not synonymous with the usual organizational chart or hierarchies. Organizations all operate in distinctive manners, and there is no required or best structure to organize QA functions. Whether the structure is centralized or decentralized, QA will function differently. Specialized units, improvement teams, or committees from various divisions can address significant functions that will facilitate the institutionalization of QA. In those situations related to the initial phases of institutionalization, individuals may be assigned only to examine QA and promote its awareness and relevance to the organization (Franco et al., 2002: 18).

This element is not something new in the entrepreneurial university context; various scholars have provided a normative approach to how structure influences the daily operations of the university. For example, Schulte (2004) has discussed the relevance of structure in achieving the aims of the entrepreneurial university. In

Germany, the promotion of entrepreneurship is not usually considered to be a university-related task, but one applied sciences university took the initiative of finding an independent company to monitor graduates' and students' business ideas and the creation of a new master's program. For Nelles and Vorley (2010), entrepreneurial architecture-related structures include TTOs, industry liaison offices, professional development, incubators, and business parks; these are examples of structures that help to focus and channel entrepreneurial activity. Pilbeam (2008) contributes to the organizational configuration perspective by featuring the role of Mintzberg's "technostructure" (1992) in the organizational design of entrepreneurial universities. Pilbeam explains that the technostructure element operates through standardization of processes, outputs, or skills. More importantly, this element focuses on the task of effectively managing the interface between the university and its environment. In the technostructure, Pilbeam emphasizes the relevance of staff overseeing the boundary between the university and state, because they ensure the continuous flow of resources into the university.

4.3.3 Support Functions

The implementation of QA in the healthcare sector requires support in the form of capacity building, communication, and information and rewards (Silimperi et al., 2002). In the context of universities, solid support functions are likely to increase the level of trust, which in turn will assure institutional members of the benefit of participating in entrepreneurial undertakings. Trust exists when the people who are behind the successful transition to the entrepreneurial university model have extensive knowledge about organizing activities. The essential elements within this category should alleviate any fears and should address institutional members' concerns that the transition will be too abrupt (Hadden & Davies, 2002).

Silimperi and colleagues (2002) suggest that capacity building is an ongoing process of supporting staff in having the technical, managerial, and leadership knowledge and skills necessary for performing their responsibilities; they should be ready to demonstrate these skills at any time. Capacity building in the institutionalization of QA covers formal training, coaching, mentoring, self- and peer appraisals, performance improvement, and supervisory activities. People or groups are assigned in these tasks to support organizational members in the demanding work that is involved in QA efforts, as well as when these efforts begin to mature. Because QA entails radically different attitudes and skills compared to

healthcare sector workers' usual tasks, having the appropriate training and coaching that are required for any situation can assist them during the institutionalization process. In addition to the entrepreneurial university model, the institutionalization of internationalization activities can be a good example for capacity-building activities. Conducting intensive English language courses for staff and students, from basic to intermediate-level courses, can be advanced through academic writing or academic presentation courses in English, in preparation for staff members' mobility exchange programs. In the context of entrepreneurial activities, capacity building is crucial for those disciplines that are not fully oriented toward business concepts and practices. Capacity building is essential for elucidating people's views and attitudes about entrepreneurial undertakings.

Sharing, learning, and advocating QA is a two-way interaction between staff and target stakeholders. According to Silimperi et al. (2002), the institutionalization of QA requires both communication and information elements, and involves the following tasks:

- Recording improvements and changes, and using data to demonstrate results and stories, and how these results were achieved;
- Sharing what has been achieved, and how it was achieved, with the organization's staff, the community it serves, and any others who might learn from the experience and thus become motivated to improve their own services; and
- Using the results for advocating policy changes and resource allocations.

Silimperi et al. emphasize that the task to promote QA as an acceptable activity in the health sector should be everyone's business. Whatever achievements and actions that are undertaken should be shared; lessons can be learned from such experiences, even when things do not go quite as planned. Moreover, the development of information technology is significant in strengthening the support functions of institutions due to the increasing number of communication devices and people using online platforms for disseminating information.

Institutionalizing activities suggests that rewards should be part of the process. Silimperi et al. (2002) found that rewards can foster employees' commitment and motivation in the institutionalization of QA in the healthcare sector; staff members will be more encouraged to promote QA endeavors. Recognizing such efforts can "facilitate alignment of staff with organizational values" (Silimperi et al., 2002: 70) According to Franco et al. (2002), organizations have implied, although not always

clearly, incentives that can prompt staff behavior. The act of institutionalization itself should have mechanisms for stimulating and rewarding workers, which can be either material (e.g., vehicles, bonuses, gadgets) or non-material (e.g., staff recognition during annual office events or conferences) in nature. This does not mean that expending additional resources is always necessary in rewarding people: it is possible to recognize people's active engagement during performance appraisal periods. Identification is another type of reward; it involves an individual choosing to adopt a behavior for the purpose of sustaining a pleasant relationship with the person who is requesting that behavior (Kelman, 1958; Goodman, Bazerman, & Colon, 1980: 224).

In relation to rewards in the conduct of entrepreneurial activities at HEIs, O'Shea et al. (2007) write about rewarding academic entrepreneurs as part of the culture at MIT. Faculty members are aware that they need to be self-sufficient, because the institution cannot provide all the support that they need in their research activities, other than the start-up support that is offered for new faculty members. The authors point out that MIT has an open environment in which collaboration with companies or taking on new ventures are seldom criticized, since entrepreneurial undertakings can result in opportunities for conducting research that will have societal impact and that can enhance students' education. Nonetheless, the granting of rewards at MIT is a concern among researchers, academics, and the university in general because of the formal ownership of patents (Etzkowitz & Viale, 2010: 605).

4.4 Conclusion

This current study defines institutionalization as a condition confronting institutional members of the need to accept and commit to certain practices that have been adopted by the university. The efforts that contribute to the institutionalization of the entrepreneurial university model such as collaboration activities at the faculty level, institutional members' awareness of the goals of the university and the government, the active participation of stakeholders, and the monitoring of the coordination of tasks and progress of entrepreneurial undertakings are assumed to be present in the blueprints of universities that are moving toward an entrepreneurial route. If universities aim to institutionalize the entrepreneurial university model, related activities should be continued as part of standard operating procedures, and accepted and supported by the majority;

otherwise, the institutionalization will fail (Wagner & Garden, 1996). The literature presented here consistently mentions institutionalization as a process that typically involves stages or phases. Institutionalizing entrepreneurialism in higher education at some point poses several problems. The main considerations here are the university's internal structures, processes, functions, values and norms, behavioral patterns, and academic identities (Pinheiro, 2016). Likewise, the complex situation of universities—particularly the differences in traditions, history, and roles—has major implications on every innovation or reform that is about to take place. The urgency to become an entrepreneurial university does not promise a set of best practices that will perfectly suit all HEIs. Foss and Gibson (2015: 276) are realistic in their assessment that policies directed at universities, such as the implementation of the entrepreneurial university model, “is often interpreted and employed differently across and within university colleges and departments.”

The current study involves the analysis of the extent of institutionalization at the “organizational field” and individual levels (Grandien & Johansson, 2012). In the literature, the term “organizational field” covers those values and beliefs that are external to the organization. The issue of conformity is relatively important for enhancing legitimacy, resources, and survival. DiMaggio and Powell (1983: 148) define organizational fields as “those organizations that, in the aggregate, constitute a recognized area of institutional life.” Scholars have utilized this concept to study how organizations identify themselves, and how they pursue imitating others. The approach of the current study, however, is more concerned with the organizational field as a system of relations in which these relations have been developed “among the actors who define their activities as being concerned with similar issues” (Sahlin & Wedlin, 2008: 224). At the individual level, the present study is similar to that of Grandien and Johansson's study (2012). The individual aspect here will not focus on the active agency or treatment of each interviewee as a separate unit. Addressing the institutionalization of the entrepreneurial university model involves the actions of each participant from the university; these actions should be analyzed as being institutionally embedded. The construction of meaning is still a work in progress in understanding institutionalization (Reyes, 2016). Frame analysis (Chapter 5) can focus on the multiple meaning systems, the multiple actors who possess multiple interests, and the multiple contexts (Zilber, 2008: 159) that depict the entrepreneurial university model.

This study will seek to address shortcomings in the lack of attention given to underlying issues and situations that hampers the progress of institutionalization, and explain how it will lead to resolving tensions and dilemmas facing

contemporary universities (Pinheiro, 2016) based on a single case study. According to Curry (1992: 27), institutionalizing reforms or innovations at universities will be successful if there is a common purpose to fit the change into an organization's life. The concept of institutionalization in this study can practically deal with the question on how the idea of the entrepreneurial university can be a vital and sustainable action of universities, rather than focusing solely on questions like "how to do" ¹⁹ entrepreneurial activities or "how to be" an entrepreneurial university.

The framework for institutionalizing quality assurance in the healthcare sector has been applied and recognized in other countries. However, its application in the higher education context particularly in this study, should also examine other aspects that induce institutionalization. The term "entrepreneurial" has various meanings for university actors. Entrepreneurship also encompasses categories such as the economy, public policy, education system, cities and communities, and not-for-profit organizations (Ewing Marion Kaufman Foundation, 1997 as cited in Neal, 1998). Institutionalization in this study realizes the need to consider the vagueness and imprecision (Abdous, 2009) of the entrepreneurial university concept because the expected outcomes and agreement among university actors on the characterizations of entrepreneurial process differ (Bygrave & Hofer, 1991). From the viewpoint of institutionalization, the manner in which meanings are supported or contested is critical to the reproduction of entrepreneurial activities (Colyvas & Powell, 2007). It is important to analyze the situation of the case in terms of who specifically adopts, influences, or abandons (Colyvas & Jonsson, 2011) entrepreneurial practices. Commitment may not be a requirement for achieving institutionalization, but it can serve as a criterion or marker for determining how participants in the study portray any behaviors that are necessary for achieving desired changes in the institution; this is especially the case in Singapore, where the entrepreneurial university model represents the transformation of the university toward better harmonization of activities, tasks, and institutional priorities. Commitment may pertain to loyalty, compliance, feelings of attachment (i.e., being socially affiliated with an organization and its members), and integral values (i.e., the internalization of values) during transformation (Armenakis & Bedeian, 1999). Involvement, adaptability,

¹⁹ In the study of Silimperi et al.(2002), they originally stated the following about the institutionalization of quality assurance in the healthcare sector: "However, experience has often shown that the key question is not so much a technical one—how to 'do' QA activities—but rather, how to establish and maintain QA as an integral, sustainable part of a health system or organization."

consistency, and sense of mission are also essential in the analysis of institutionalization (Santoro & Gopalakrishnan, 2000). These are cultural traits that convey members' responsibility, commitment to growth and survival, openness to ideas, and their level of conformity to collective behaviors and systems, rationale, and direction. In this study, I want to stress that choosing to embrace the entrepreneurial university model is a voluntaristic approach, and that some universities will treat this as an option in order to survive by means of manipulating the environment and proactively embarking on business-like activities (Pilbeam, 2008: 402). Governments, however, typically provide "either regulative frameworks or normative ideals establishing the discretionary space and room for strategic actions by universities" (Frølich et al., 2013: 90). In this chosen context, reckoning on the potential benefits of entrepreneurial activities when they are adopted by the higher education sector reflects the Singaporean government's method of devising issues related to economic growth. The current study will explore the role of various players who are directly affected by the entrepreneurial university model. Universities are connected with socially constructed players [who are] endowed with differing capacities for action and parts to play. Accordingly, these players are relevant people to examine, because they can define what they see as their best interests (Scott, 1995:43) in any transformations that affect the institution.

5 METHODOLOGY

This chapter presents the methodological choices of the study. The focus is on the use of the frame analysis method, used in the context of the National University of Singapore as the case study institution. The final part of the chapter presents an illustration of the research approach that was used to guide readers in how general inquiries will be addressed.

5.1 Frame Analysis: An Overview

In this study, frame analysis was utilized to assist in answering the research question on the perception of institutional members about factors that contribute to the institutionalization of the entrepreneurial university model. Frame analysis suggests that people make sense of activities and situations by framing what is said and done in certain ways (Goffman, 1974; Lantz-Andersson, 2009: 16). As applied in the field of sociology, Goffman's work (1974) on frame analysis emphasizes how we seek to answer the question "What is it that's going on here?" in order to understand the situations that we encounter. The method focuses on the organization of experience, comparable to how we often see ourselves trapped in specific situations (Gray, 2003; Raitio, 2008), or how we think of politicians who address issues related to poverty, education, and the protection of citizens. Frame analysis has traditionally provided different examples (including using card games, theater, and news clippings) to illustrate people's ways of perceiving reality, how they interpret relevant events, and under what frames these events should fall (Mills et al., 2009). In this sense, words and non-verbal interactions are analyzed to aid people in negotiating meaning through the lens of existing cultural beliefs and worldviews (Goffman, 1974; Nisbet, 2009).

To Nylander (2001: 294), Goffman appeared to be avoiding complete relativism, and seemed to prefer the multiple realities that encompass a frame. Frames serve as the product of selected aspects of perceived reality, with the purpose of increasing their saliency in a communication text. Entman clarifies that saliency means that "a piece of information must be noticeable, meaningful and

memorable to audiences receiving them in order to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation” (1993:52). Once frames are constructed, they can become extremely salient and contentious, resulting in increased polarization among individuals and groups (Campbell & Docherty, 2003). Moeran states that the practice of frame analysis depends on one’s observational skills. The author interprets Goffman’s definition of frame to refer to “basic elements of organization that govern social events, but also to the organization of involvement as well as of meaning” (2005: 44-45). During fieldwork, researchers need to take note of the interactions that take place during various events and to analyze the set of movements that are demonstrated by the parties involved. The content of people’s activities themselves become frames. A casual greeting in the street or a telephone call are frame episodes that can bring about different attributes (e.g., as lover, neighbor, friend) and different kinds of behavior (e.g., ritual, formal, informal) during our encounters with different sets of people.

Frame analysis can explore several meanings related to issues or particular situations. People will make sense of the situation and act accordingly through classification. Institutions also employ classification, because they have their own ways of categorizing events that are guided by routine. In their study on gender equality, Verloo and Lombardo (2007) found that different visions, debates, and locations are involved when people discuss the topic of gender equality.²⁰ Their in-depth analysis of the frames resulted in diverse meanings related to gender equality, such as meanings from the perspective of policymakers, researchers, and audiences worldwide.

Frame analysis has been described as heuristic (Rein, 1983; Pick, 2006). Certain researchers depend on situational and social world maps to assist them in classifying the codes and categories that are established during data collection and analysis. Frame analysis may ask questions such as “why, how and when individual and collective actors apparent on the maps articulate about the central phenomena of the research study, possibly affiliate their ideas and finally, negotiate and organize their actions“(Mills, Chapman, Bonner, & Francis, 2007: 77). Hajer and Laws (2006) explain that frames represent ordering devices in policymaking. Frames can be tied to action, cognitive commitment or other approaches

²⁰ From the study of Verloo and Lombardo, countries present their frames on gender equality through family-related policies and sometimes it is visible on the dominance of men or women in politics. The visions of sameness, neutrality and feminism were often associated. Typical debates on gender equality are mostly connected to policies (e.g., anti-discrimination and domestic violence) and theories (e.g., gender theory, social movement theory and public policy).

depending on how scholars describe policy practice. Studies on frame analysis have mostly dealt with policy controversies (Rein & Schön, 1996; Fletcher, 2009), and predominantly how people negotiate and contest frames to emphasize the saliency of issues. Various authors have presented their own understandings of how frame analysis can determine the content and other elements that are promoted in a frame.

Gamson (1975) states that frames offer “packages” for every situation. A package is usually composed of a core frame that determines the issue at hand, as well as reasoning devices that explain what needs to be done. Metaphors, exemplars, catchphrases, descriptions, and visual images are generally accepted framing devices. Reasoning devices may include “roots” or causal analysis; “consequences” or a “particular type of effect”; and “appeals to principle” or moral claims (Gamson & Mondigliani, 1989 in Wagenaar, 2011: 86). Each package may present how individuals view themselves on the issue (e.g., as victims, champions, protectors, mediators, or observers) (Gray, 2004: 167). For Waller and Conaway, frame analysis aims to connect “carefully selected ideas, information, judgments, arguments, claims and value statements into [a] tightly compressed noetic narrative that guides the frameholder’s interpretation of events, including discourse related to them” (2011: 87). Hertog and McLeod (2001) note that one should be aware of the critical concepts, relations, and metaphors that various institutional actors present as frame sponsors for a given issue (e.g., as businesspersons, social activists, or government officials), because these factors form the cornerstone of frame analysis.

Research on meaning-making processes has employed various methods for analysis, especially in the study of institutions. Hardy and Maguire (2010) write that institutions manifest distinct discursive spaces in which different types of text are produced, distributed, and consumed. This involves the analysis of narratives in which textual activity is based on stories. These stories may span visions of the future, experiences that correspond to chronological events, and other meanings that are derived from various physical and social phenomena. As a method, meaning-making places the researcher at the boundary between persons, stories, and even organizations (Sauer, 2005: 62) through participant observation and ethnography (Hardy & Maguire, 2010). Sensemaking research focuses on detailed, situated, and actual practices and interactions in organizations. Researchers usually adopt micro-interpretivist data-gathering techniques to understand the meanings that people associate to themselves, to others, to the situations they encounter, and to other personal accounts (Allard-Poesi, 2005: 177). Sensemaking is also a

diagnostic tool for exploring the behavior of individuals or groups in complex organizational situations (Paull, Boudville, & Sitlington, 2013). The interpretation of data can concentrate on the clustering of themes and patterns. Both narratives and sensemaking have similarities with frame analysis in terms of the desire to make sense of events, the aim to create legitimacy (Hardy & Maguire, 2010), and the emphasis on uncertainty (Mills, 2003) and issue interpretation (Gioia & Thomas, 1996). The issue of language, talk, and communication—including how situations, organizations, and environments are “spoken” into existence (Weick, Sutcliffe, & Obstfeld, 2005: 409)—are not restricted to sensemaking or even to narratives. These issues can also be found in frame analysis. While all of these methods hope to establish shared meanings and collective understandings of events, frame analysis is more applicable than the other two in analyzing situations in which conflicting interpretations are present (Coburn, 2006).

The method of frame analysis that was used in the present study considered a tool to eliminate intractability (Shmueli, Elliot, & Kaufman, 2006: 210). From my understanding, the institutionalization process posts several challenges related to meanings, the motivation for actions, and the implementation (Coburn, 2006) of several reforms in the structure and practices of the university. Ambiguous issues and situations may be uncovered through a frame of reference that is common to all institutional members. Flichy and Libbrecht’s study, as an example, considers that “all technological activity is situated in a frame of reference where actors within technological operation are subject to activating particular frames that make them perceive and understand the phenomena they witness and sort out their own action” (1995: 16). As such, the frame of reference becomes a baseline (Cornelissen & Werner, 2014) for individuals when they make certain decisions to pursue practices that are destined to become permanently activated (Colvas & Jonsson, 2011).

Respondents in this study described how they evaluated their actions in pursuing entrepreneurial activities based on the information that they had processed (Cornelissen & Werner, 2014; George, Chattopadhyay, Sitkin, & Barden, 2006) through their frames of reference (e.g., grounded in the nature of academic work). While we can build a common ground on this, group differences or the differences in respondents’ academic profiles can constrain the effective deployment (Davidson, 2006: 24) of entrepreneurially related initiatives and activities. Frames that are constructed by institutional members on the institutionalization of the entrepreneurial university model typify the question of “Who are they and what do they want?” Because actors are expected to respond to

massive changes that affect their environment, their frames will be based “according to what they believe events and changes mean, and what they believe matters” (Desrosiers, 2012: 6) to their own situations.

5.2 Research Approach to Frame Analysis

This study highlights the choice of using a multidisciplinary approach to analyzing various issues and situations in higher education: namely, the framework of institutionalization from the healthcare sector and the categories of frames from environmental conflict research. Not all problems related to interactions, practices, behaviors, and transformations that universities experience are confined to the theories or frameworks that are used in the field of higher education. As a researcher, it is important to offer a broad understanding of the situation by the use of boundary-crossing approach. This skill-set refers to the ability to change perspectives, to accommodate new modes of thinking, and to cope with complexity (Spelt et al., 2009: 366). Strong empirical studies are also necessary to understand how institutionalization occurs in higher education by considering elements that have been used and have proven to be effective in other fields. At the same time, both the institutionalization and entrepreneurial university concepts need to accommodate new methods that can offer a set of categories for interpreting universities’ conditions in various contexts. For instance, one relevant feature of this study is the classification of the nature of challenges that could possibly affect future trends (Haila & Henle, 2014) in the conduct of entrepreneurial activities.

Frame analysis draws on a variety of methodological techniques, including discourse analysis, socio-linguistics, and other forms of quantitative content analyses (Koenig, 2006: 62). According to Fletcher (2009: 800), frame analysis is based on social constructivist epistemology, which discards the idea of universal truths and is contemptuous of the use of certain concepts, such as objectivity, proof, and the accumulation of knowledge. Wagenaar (2011: 88) states that the epistemic status of frames is not lucid; by referring to Fay’s study (1996; cited in Wagenaar, 2011: 88), he writes that it remains questionable whether frames are to be discovered and constructed by analysts through the use of proper methods (meaning realism), or if they are a conceptual tool for interpreting social reality (meaning constructivism). Creed, Langstraat, and Scully agree, arguing that “the notion that texts contain related idea elements and that these elements connect to

each other through some unifying concept is an ontological claim regarding the nature of text and frames” (2002: 37). They also argue that their ontological claims can be explained better through Snow and Benford’s functional definition of frame analysis, in which “frames are collections of idea elements tied together by a unifying concept that serve to punctuate, elaborate and motivate action on a given topic”; they add that the ontological status is not something immutable, but should be taken into account as an “underlying assumption when employing the concept and analytical framework” (1988; cited in Creed et al., 2002: 37).

In Singapore’s context, the word “entrepreneurship” has appeared many times in the government’s policy goals and plans. Having an entrepreneurial society would mean that all important institutions (e.g., government, university, and industry) would play a role in achieving this purpose. The university is an important institution that may offer flexible interpretations about ways to develop entrepreneurship in Singapore. From an ontological perspective, the reality of entrepreneurship may mean two things related to the response of the university: (1) those aspects that are essential for their own survival (Bisaso, 2011: 63), and (2) those that are related to achieving national goals. The term “entrepreneurial university,” as used in higher education research, explicitly elaborates on these responses. Mautner (2005) described the “entrepreneurial university” as a higher education buzzword that could demonstrate processes of appropriation to fit particular agendas. Actors from various backgrounds, positions, and interests (Kohtamäki, 2009: 101) operationalize the term differently. Institutional work, or those practices (Suddaby, 2010: 17) that define the entrepreneurial university and the processes in which they become acceptable, also differ from one context to another.

Tackling the institutionalization of the entrepreneurial university model is vital at the epistemological level, because the model connotes a boundary of processes that pertain to the language, dilemmas, and events that the case study experiences. These process views affect the construction of reality and the way in which individuals organize actions to address complexities, events, and interactions in the “stream of reality” (Steyaert, 1997: 18).²¹ In applying frame analysis, the researcher must be keen in examining these process views because they are essential in the identification of frame categories. The outcome of frame analysis is thus to link the categories of experience to the factors that contribute to the institutionalization of

²¹ For instance, Steyaert (1997) explained that process view on language may look at verbs such as “entrepreneurizing” or the word “entrepreneurship” which may suggest descriptions of the entrepreneurial phenomenon. He also highlighted that “words are deeds,” which means that through the ways we discuss entrepreneurship we contribute to shaping it.

the entrepreneurial university model. The construction of social reality has implications for frame analysis and the understanding of institutionalization because of the researcher's quests for a specific meaning and interest in observing how human beings structure their daily lives. How people live, act, and think (Bourdieu, 1989: 15), including the patterns and maintenance of behavior involved in this structure, are all essential during investigations.

The strategy adopted in this study is similar to how frame analysis is utilized as a method for exploring public policies (Schön & Rein 1994; Pick, 2006). Examining policy controversies is Schön and Rein's (1994) forte; they point out that some "wicked problems" (in Fletcher's words [2009: 801]) can be too complicated to address, due to people's different worldviews and assumptions. I am more interested in the qualitative approach to frame analysis, with an overall emphasis on the *whole-story frame* (Campbell & Docherty, 2003; Campbell & Docherty, 2006; Gray, 2003). The primary objective is to treat frames as categories of experience. Whole-story frames are derived from the phrases or statements that individuals utter when they define issues. Applying frame analysis in this study assumes that readers want to know what the institutionalization of the entrepreneurial university model is in this context. Likewise, some of the framing perspectives used for this study are present in the management and organizational literature (e.g., Cornelissen & Werner, 2014; van Burg, Berends, & van Raaij, 2014; Davidson, 2006; Hodgkinson et al., 1999), in which various authors have discussed how frames explore issues related to organizational pressure, change, strategic management, and decision making. In the broad area of management and organizational theory, scholars have utilized the framing concept for examining cognitive, linguistic, and cultural processes within a variety of institutional and organizational contexts. Cornelissen and Werner (2014: 182) observe that the framing construct has also been modified to fit with the research questions, theoretical traditions, and methods that are typically found in management and organizational literature. For example, the term "framing effects" (micro-level constructs) are utilized for analyzing scenarios of decision making and social judgments. Another example is the term "institutional frame" (macro-level constructs), in which the context of application is intended for cultural-cognitive analyses of institutional fields, and social and economic change.

In every chapter of this paper, I will use the words "issues" and "situations" to highlight the concerns, problems, and differences in interpretations vis-à-vis the state or condition (Reyes, 2016) of institutionalization of the entrepreneurial university model at the case study institution. When the entrepreneurial university

model is recognized as a crucial move for confronting various issues that affect university operations and contributions to economic development, the manner in which information (other than the content itself) is presented has resulted in very different responses (Nisbet, 2009: 16). The frames that institutional members in this study depict are important because they “assign responsibility and create rationales” (Coburn, 2006: 343) for prioritizing certain activities or actions over others. In addition to issue definition, frame analysis can also assist in identifying appropriate solutions for an issue. Alternative measures for speeding up any decisions that need to be made about incentives, tasks, programs, and policies related to entrepreneurial activities may be raised within a frame to inform the university management about the need to act promptly. By paying attention to the frames that are presented, this study can examine the potential roles of people (or groups of people) who are supposed to be involved in the process of developing entrepreneurial activities. The situation of the university in this study is assumed to bring uncertainty to institutional members.

Earlier studies on framing have dealt with a qualitative, text-analysis approach, in which the researcher works alone as an expert in identifying frames (Tankard, 2001: 98). Koenig (2006) observes that the methodological literature on frame analysis is limited, citing the effect of methodological obscurity presented in Goffman’s 1974 book *Frame Analysis: An Essay on the Organization of Experience*. Goffman first claims that framing studies lack specific measurement models (Gamson, 1975, cited in Koenig, 2006: 64), but later employs keywords to identify several frames and item solutions for coding that have given researchers flexibility (Entman, 1993: 53; Koenig, 2006: 64). Even if previous studies do present various approaches in relation to using and understanding frames, Scheufele (1999) claims that research on framing is marked by theoretical and empirical vagueness. In another study, Borah (2011: 257) suggests that the development of frame analysis should include allowing more room for new definitions as they are applied in various fields, instead of restricting the focus to framing issues and outcomes. In addition to exploring issues from different angles, the results of frame analysis should aim to target individuals; in this way, solutions can be addressed together with all of the parties involved.

The issue of institutionalizing the entrepreneurial university model is an example where the issues that are attached to the subject cannot be discussed in a short period of time. According to Benford (1997), it is necessary for the researcher to monitor continuities and changes in order to see how other issues have progressed. Interestingly, Benford raises the importance of emotions in frame

analysis, because actors produce, orchestrate, and strategically deploy emotions in pursuit of their goals. For example, those feelings of happiness, hate, neglect, disappointment, and concern that individuals have can relate with how they tend to delay or move issues to the next level and manage conflicting situations (Scheff, 2006). Van Gorp (2007) adds more insight to the methodological implications of frame analysis, arguing that the purpose of frame analysis is to provide an assessment of both the impacts related to the loose elements in a communication text and to the cultural phenomena demonstrated as a whole.

I have kept in mind the relevance of detecting the salience of frames in uncovering the issues and situations connected to the entrepreneurial university model as adopted by the chosen case study. Entman (1989; also in Entman, 1993) discusses the necessary interaction between the communicated texts and receivers to realize the degree of salience, warning that just because researchers detect frames does not guarantee that these frames will influence the way others think. Identifying and analyzing frames was a challenge while planning this study; I had to be careful to identify the sources of these frames and to be particular about how the frames would affect the theoretical and data analyses. Rather than demonstrating a framing process, which refers to the procedure of selecting words (Entman, 1993) or a “chunking” process (Gumperz, 1992 in Hale, 2011: 2) that will lead to the creation of frames, I opted to consider using “frame” as a noun, which connotes the boundaries and tools that individuals use while interpreting situations (Shmueli et al., 2006). The applicable definition of “frames” for this study is based on meanings presented by Lewicki, Saunders, and Minton (2001) as cited in Campbell and Docherty (2003: 769): “Frames are perceptions that individuals hold about what defines the issue or event, who is involved in it, how [the] issue or event is presented, what the expected outcomes might be, and how it will be evaluated.”

The types of frames adopted for this study come from various studies in the environmental policy field (e.g., Shmueli et al., 2006; Raitio, 2008; Campbell & Docherty, 2003). Environmental issues commonly exhibit a lack of unified agreements and resolutions; environmental awareness, human activities (Harashina, 1995), technology and environment mismatches, and policy interpretations are among these pressing issues. Burgess and Burgess (2003) observe (within the conflict research field) that some environmental issues are intractable, because such issues can be destructive, malignant, and stubborn at being moved forward. Intractability is also understood to exist in the university environment, since various issues and situations can be difficult to resolve (Reyes, 2016). HEIs can

manifest unclear goals, technologies, along with conflicting and unpredictable participation of actors (Cai & Mehari, 2015). Institutional members of universities may tend to resist actions because of differences in values, worldviews, or principles (Campbell, 2003). Some may attempt to appeal changes in policies, encourage cooperation to decide what should be done or prefer to do nothing in the situation (Gray & Putnam, 2003: 240). These differences bracket the members' experiences and provide meaning in a particular fashion (Brummans et al., 2008: 26), which contributes to the level of complexity (Dietz, 2001) over time.

In this study, the journey to institutionalization of the entrepreneurial university model is viewed to be difficult and challenging not only because it needs to typically surpass stages or phases. Categories that will elucidate the entrepreneurial university's ambiguous setup and university actors' struggle to understand the issues and situations affecting their environment still warrant further exploration. During transformation, people mostly challenge the relevance of university practices when initiatives fail and activities become unmanageable. It is important to take note of situations in which only minor improvements are made, despite the measures to encourage people's involvement in sustaining activities. At the organizational field level, it is also difficult to decide on certain actions when actors are constrained in their possible range of actions (Lounsbury & Pollack, 2001). Working together by finding suitable alternatives to discussing issues in order to change the situation is thus a tremendously long process. In the next sections, the four frame categories: Identity; Characterization; Power; and Risk and Information frames are described. Employing these specific frame categories will help in analyzing various intractable issues and situations that are related to the institutionalization of the entrepreneurial model in the context of a Singaporean university. Overall, the following categories can offer new modes of thinking to understand the experiences of the university during entrepreneurial transformation.

5.2.1 Identity Frames

Individuals often view themselves as belonging to certain groups, locations, and institutions. Some may describe themselves as being unique, and that they play significant roles in society. Campbell and Docherty (2003: 774) describe identity frames as being least malleable, and that they are major contributors to intractability. People present such frames in a positive tone: one that is grounded in the individuals' demographic characteristics, roles, influences, and affiliations to

institutions. Identity frames signify boundaries in which individuals inform who they are, what they do, what they do not do, what they believe, and what they reject. Individuals will always attempt to protect their key interests, and they will fully express that they have a sense of responsibility over any issues that affect their identity (Lewicki, Gray, & Elliot, 2003).

Other observations relating to identity frames found that emotions can be a strategy to pursue collective actions on certain issues as most of the statements communicated by individual actors depict the nature of their consciousness on matters that affect their identities (Paltemaa & Vuori, 2006). Comparable to the case with environmental conflict issues, identity is a relevant aspect of the institutionalization process at universities, because, as Raitio notes, people “become tremendously defensive once fundamental beliefs and values that define them are questioned or threatened” (2008: 49). When individuals’ (or group) identity is challenged, their usual response is to disregard any information and perspectives that will threaten their identity (Shmueli et al., 2006). Wondolleck, Gray and Bryan (2003) explain that identity serves many purposes for an individual or group because it provides a sense of self, clarity of intention and role, and/or affiliation with others. Several tensions have identity-based components but these are not commonly recognized. Thus, the authors mention the relevance of identity frames in addressing the differences in perception of the situation and in examining the causes/degree of tensions. This category is relevant in investigating institutionalization scenarios where people are compelled to adopt models that will lead to unclear outcomes in university operations and performance.

5.2.2 Characterization Frames

Characterization frames are any positive or negative attributes that can describe individuals or groups (Campbell & Docherty, 2003: 775). The most frequently presented characterization frames are characterizations of institutions, and the interests, roles, and places of individuals or groups (Lewicki, Gray, & Elliot, 2003). Characterization may also pertain to individuals/groups responsible or in control of the situation, and those problems linked to individuals/groups that require corrective actions (Ward & Ostrom, 2006). Such frames can be used to gauge individuals’ or groups’ actions, attitudes, motives, or trustworthiness in a stereotypical way. It is possible to reflect the relationship that exists between the

frame sponsor²² and the individual/group in such a characterization (Shmueli & Ben-Gal, 2003: 214). People share these frames by conveying information to others who share the same circumstances, since they will understand them. Discussing the boundaries, dimensions, and intensity of issues are common to both identity and characterization frames.

However, there is a line that draws between “us” (identity frames) and “them” (characterization frames) (Wondolleck et al., 2003: 207). Characterization may perhaps weaken the legitimacy of the subjects who are involved, although in time, such characterization can be reframed when the situation has improved (Shmueli et al., 2006). Raitio (2008) stresses people’s proclivity to blame others for the current state of affairs: why things are not organized and running smoothly, or why no progress is made over the years.

5.2.3 Power Frames

Individuals have their own interpretations about the notion of power in terms of how things are decided and controlled, how decisions should be made, and which decisions are legitimate (Shmueli et al., 2006). As an example, citizens can interpret the government’s ability to exert economic power by introducing policies to develop domestic trade or change regulations in different ways (Coleman, Hartley, & Kennamer, 2006: 555) to fit the national agenda. An individual’s grasp of an issue is influenced by power, especially in conflict and media research. With this, the inscription of power is reflected in the identity of the actors or interests who dominate the text (Entman, 1993: 53). The authority of the person who sponsors the frame may be visible in that individual’s strategy for structuring conflict and news interpretations. Likewise, the different mixtures of actors such as the epistemic communities (e.g., biomedical communities, mechanical and civil engineers, natural scientists) are recognized for advancing particular frames within institutional settings because they exhibit “soft power” that can persuade, argue for, and justify particular policy approaches and solutions affecting their respective domains (Rushton & Williams, 2012: 160).

Dewulf et al., (2009) describe power frames as a type of relational frame that define meanings of interactions and convey structures of expectations about status

²² Frame sponsor as referring to the perspective of the speaker interpreting the situation (Creed et al., 2002).

(i.e., superiority or inferiority over others). Likewise, Campbell and Docherty (2003: 777) suggest nine categories of power frames from studies on intractable issues in environmental policy:²³

- Authority/positional (based on traditional sources such as role, job title, or institutional status)
- Access to resources (money, staff, and time)
- Expertise
- Interpersonal style
- Coalitional/relational (group affiliation)
- Sympathy/vulnerability (role as a victim; an underdog)
- Force/threat (coercion)
- Moral/righteous
- Voice (participation in debates and discussions)

Power, as Campbell and Docherty describe it, is the degree of influence an individual or institution might have over others. The ability to exercise power based on the categories above may hamper decision-making processes, and may mean that some issues fail to move forward. Frame analysis can be a tool to empirically explore the meaning of power by means of determining an actor's influence, purpose, and practices in the reality of implementation processes (Azad & Faraj, 2008).

5.2.4 Risk and Information Frames

According to Shmueli et al. (2006), certain events may pose risks or uncertain results and thus lead to intractability. Frames in this category are influenced both by the consistency of information and the information sources. Individuals provide assessments of issues and situations not only based on their interests, but on their level of expertise and experience, and their familiarity with (and the extent of) the risks that are involved. This means that the information conveyed to individuals provides initial signals leading to decision making. With years of work experience and level of expertise of each individual, successive learning processes and sufficient experience (Cai, 2012: 45) can assist in assessing risk and organizational

²³ In Lewicki et al. (2003), they suggest that these categories pertain to the varying source of status differences in the analysis of power frames.

decisions. The value differences among individuals are pertinent to examine in this frame category because the uncertainty conveyed by particular issues could amplify value conflicts (Dietz, Stern & Rycroft, 1989: 51). In another study, Elliot (2003) defines risk in environmental conflict research as judgment, in which the response of individuals to pressing and acute situations is almost instinctual. He notes that the evaluation of risk sometimes indicates selective attention to problems in institutions, especially in situations where problems are just recurring. As a result, people may exhibit attitudes of frustration, selective listening, distrust, and mutual reproach.

Muter, Gore, and Riley (2009) write that risk frames are not only cognitive in nature (based on individual assessment); people may rely to a great degree on the “affective” characteristics of the risk, or on their intuitive feelings (e.g., their feelings of goodness or badness). Consequently, the assessment of risk can also reveal the extent of damage caused by previous actions. In other disciplines, risk frames are termed “valence” frames, in which consumer choices (marketing), health preventive behavior, and medical practices (medical and health) are assessed by not only using “loss and gain” factors, but also “benefits and costs” and “threats and opportunities” (Schuck & de Vreese, 2006: 8).

For instance, academics who have more exposure to teaching activities may find it risky to consider engaging in start-up companies; they may have observed colleagues who are engaged in start-up companies finding difficulties persuading venture capitalists or angel investors to finance their endeavors. Thus, based on their assessment of risk and information, some academics are satisfied with accepting teaching loads that are performed on a regular basis and without the requirement of any extra commitments. Schuck and de Vreese’s study defining the concept of risk is relevant for examining issues and situations related to institutionalization. My research covers individuals’ motivations to pursue decisions that necessitate the acceptance of academic practices that are proposed by the entrepreneurial university model. We assume that individuals’ decisions to pursue the entrepreneurial path involve foreseeing *future disadvantageous situations*, and that they may consider certain actions from the side of the university administration, the government, or fellow academics as bearing *unpleasant future outcomes* (Schuck & de Vreese, 2006: 11). Colyvas and Jonsson (2011) suggest that institutionalization encompasses analytic decision making; institutional members have to assess and decide in every situation (particularly in the situation of the current case study) the challenges of weighing the good and the bad sides of the entrepreneurial university model that confronts them. In this context, frames that underscore risk are also

essential, because entrepreneurial activities at universities differ across countries and over time. The causes and consequences of entrepreneurship per se are topical, and they trigger extensive debate among scientists, policymakers, and governments (Raposo & do Paço, 2011: 453). There is a need to uncover risk perceptions because it will help in understanding issues within institutionalization not only on how decisions are done, but also on the differences in people's way of recognizing their identities and how they characterize others in a particular setting (Elliot, 2003: 218).

5.3 Applying Frame Analysis in Higher Education and Other Fields

Applying frame analysis in higher education studies is still in the exploratory stages. During the initial research conducted for the present study, framing or frame analysis appeared not to have been applied before in studying the university's entrepreneurial environment. Although there are differences in terms of universities' objectives, structures, and governance (Todorovic, McNaughton & Guild, 2011), certain meanings and interpretations need to be investigated in relation to the university's entrepreneurial orientation and behavior. In this field, Pick (2006: 230-232) utilized frame analysis through a qualitative approach to examining shifts in higher education policy in Australia. The overall setting of Pick's study was influenced by Schön and Rein's work (1994), and demonstrates the significance of frame analysis in conveying issues and the systemic effects of higher education policy decisions. Prior to investigating policy shifts in Australian higher education, Pick had already conducted a qualitative study that used frame analysis to examine higher education mergers (Pick, 2003: 299). He adopted a frame analytical approach to scrutinize the differing and competing interpretations and commitments that affected the ways in which mergers were carried out. Pick considered frame analysis to be appropriate for his study because of "its potential for linking small-scale organizational events to large-scale social, cultural and economic phenomena" (Pick, 2003: 300).

Within the organizational research field, Creed et al. (2002: 52) proposed frame analysis as a method for guiding macro theories so that they will pay more attention to the ways in which environmental factors present organizations' discursive building blocks, and how organizations can change these building blocks and bring these innovations back into the environment. Creed and colleagues add

that frame analysis can contribute to the theoretical understanding of institutional theory or stakeholder theory by connecting the linkages between social environments and organizations. In their study of organizations, Besio and Pronzini (2011) suggest that frame analysis can be used as a suitable technique for analyzing the observation of observers, i.e., second-order observation. Frames can clarify the causal and implicit distinctions that constitute self-descriptions, as well as the description of others. For example, first-order observers ask “what” questions, while second-order observers ask “how” questions related to specific decisions that have been made and existing organizational structures, routines, and practices.

Frame analysis has also been effectively used in media and social movement studies; it essentially offers more interpretive aspects of certain questions that had not yet been raised (Reese, 2007: 149). The selection of words, and their organization into news stories, has great power in setting the situation for debate, defining issues that are under consideration, assembling a variety of mental representations, and providing the key tools for discussing the issues at hand (Pan & Kosicki, 1993: 70). One example is Miljan’s (2011: 559 and 573) research on the national television coverage of Canada’s proposed coalition government during the first week of December 2008, in which Miljan applied frame analysis to examine news discourse. Miljan’s study used the term “primary definers” instead of “frame sponsors” to describe individuals or groups who are capable of providing initial definitions of the topic in question. The use of frames in media studies depicts how news stories are negotiated, accepted, and interpreted in different angles. Within healthcare research, frame analysis has been applied for scrutinizing the frames that the media presents that affect public health, such as smoking and breast cancer (Mills et al., 2007). For studies that involve social movements, frame analysis can be a suitable method for presenting the views of the marginalized and for defining their issues through engagement in “framing contests” (Ryan, Carragee & Meinhofer, 2001). Gitlin provides a definition of frames as “principles of selection, emphasis and presentation composed of little tacit theories about what exists, what happens and what matters” (1980: 6). This definition characterizes both media and social movement accounts, as they frame pressing issues and situations during news coverage.

Several public debates have been analyzed using frame analysis, including gender equality (Verloo, 2007; Lombardo & Meier, 2008), climate change (Dirikx & Gelders, 2010; Nisbet, 2009), and migration (Horsti, 2008; Roggeband & Verloo, 2007). Nisbet points out that “there is no such thing as unframed information”

(2009: 15 and 17) in any issues that relate to public affairs and policy. Expert communicators usually present their frames either intentionally or intuitively, while audiences may view the frames by integrating them with pre-existing interpretations that have been shaped by personal experience, partisanship, ideology, social identity, or simply through conversations with other people. It is common in public policy debates to see the stability of frames over time; Shmueli and her colleagues, for example, write that “even when people move in and out of the situation, some frames are shared through community storytelling and [are] socially reinforced through community interaction” (Shmueli et al., 2006: 216). Such frames are utilized as a communicative strategy.

At the same time, frames also encounter modifications whereby new perspectives or solutions are realized through intervention. In studies on conflict resolution, frame analysts exemplify the role of mediators by helping the parties who are involved in the conflict to produce a single frame that will enable them to resolve the issue together (Campbell & Docherty, 2003). For the current study, it is likely that the present interpretations about the entrepreneurial university, and their ambiguity in terms of setup, may change in the future. These shifts in framing (Vliegenthart & Roggeband, 2007) may arise due to policy reforms that the government introduces or other internal developments at the university. In this regard, people accommodate new meanings and categories in order to understand the transformation of the university as an entrepreneurial institution. The process of modifying frames is called “reframing”; among its goals is to clarify, refresh, and evaluate how issues have been perceived over time (Shmueli et al, 2006: 215).

Studies on the institutionalization process have also recognized the value of frames. For example, Rhinard (2000) acknowledges that the complex nature of policymaking involves framed issues that have a strong impact on policy and process, while Nylander (2001: 293) notes in his study that an established frame contributes to the institutionalization process, and has the propensity to sway actors’ preferences and beliefs.

5.4 Limitations of Frame Analysis in this Study

Fisher (1997, cited in Pick, 2003: 300) has identified two major limitations in using frame analysis. First, there is no clear agreement in the literature about how a frame should be identified, recognized, or used, or even what a frame is. Because most studies are rooted in Goffman’s original idea, Malin (2012) similarly comments that

Goffman did not offer an explicit procedure for analyzing frames. The second limitation of frame analysis is its propensity to overemphasize the importance of “master frames”²⁴ as being exceptionally influential in shaping people’s framing and actions about issues (Fisher, 1997, cited in Pick, 2003: 300). In another view, Tankard (2001)²⁵ predicts the likelihood of people defining frames in a stereotypical way. Researchers also tend to identify those frames that they are consciously or unconsciously looking for, because a systematic approach in identifying possible frames is lacking.

While I am following studies on how frame analysis is utilized in public policy (namely, how frames are presented in environmental conflicts and disputes), I do not intend to negotiate with the respondents or to encourage them to propose a single frame that would lead to better solutions in addressing various issues. It is not the purpose of this study to seek consensus among institutional actors. Rather, I am in search of clarity over issues and situations that Wong et al. (2011)²⁶ did not present in their study. Participants may present frames that indicate opposition, however; my approach here is not to distinguish those people who say that they are for or against the implementation of the entrepreneurial university model.

5.5 The Researcher’s Role in Frame Analysis

There are advantages when the context is familiar to the researcher; for example, I am knowledgeable about how universities operate in Asia, especially in my home country, the Philippines. My interest in entrepreneurial universities adds to this factor. The more I encounter studies about the setting of entrepreneurial universities in various contexts, the more I have the chance to depict the realities that HEIs in my home country experience. My experience as an insider (as a student and employee) at private HEIs in the Philippines is beneficial in terms of having access to documents and professional contacts. The disadvantage is that the information that I obtain from them might contradict my own views, because I was part of the institution and I am familiar with the system. My own frames about certain issues and situations may appear to be more prominent than others. As Unluer (2012) points out, familiarity can defeat a researcher’s objectivity. While

²⁴ Master frames can be considered as more of contingent phenomena that both affect and are affected by other levels of frames (Welsh & Chesters, 2001 in Pick, 2006: 231).

²⁵ Tankard’s given example was on the issue of abortion wherein the debate concentrates on just two standpoints: pro-choice and pro-life.

²⁶ See Chapter 3.

there may be more credibility in an insider's published results, someone who exhibits role duality (as a researcher and a member/ex-member of the institution) may overlook proper research conduct, such as the protection of the anonymity of respondents, the recognition of the researcher's power and authority over the staff, and the possibility of having unlimited access to sensitive information. Participants in the study may assume that the insider-researcher's familiarity with the situation means that they will require no further elaboration on certain issues, because of the notion that the researcher already knows what the participants know.

For this reason, I decided to choose a case study that was not located in my home country and that could thus offer unbiased interpretations about entrepreneurial universities in the Asian context. The results of this study, particularly the content of frames, came from the analysis of an outsider who is not an employee or former student of a Singaporean HEI, and has no prior experience with Singapore's education system.

I have direct influence in structuring this study: specifically, the aspect of narrowing the scope of the topic. This occasionally affected the way in which I was categorizing most interpretations, until I finally decided to focus only on the most important aspects of the entrepreneurial university and institutionalization literature. According to Raitio (2008: 97), someone must construct frames. The sources of frames were described earlier in order to stress that the findings of the current study will rely on conceptual tools that were chosen by the researcher in examining the ambiguity (Hajer & Laws, 2006: 252) of issues and situations that institutional members experience at the case study university. The analysis of the interviewees' interpretations was thus performed against the sources of frames that were most suitable for this study: identity frames, characterization frames, power frames, and risk and information frames.

5.6 Case Selection—NUS as a Case Study

One method of conducting qualitative research is the case study, which offers researchers tools to examine complex phenomena within the case study's context by using several data sources. In this manner, the issue at hand is not investigated via one angle, but rather via a variety of angles, which enables multiple features of the phenomenon to be disclosed and understood (Baxter & Jack, 2008: 544). Yin considers choosing a case study to be a research strategy, because it is employed in several situations "to contribute to our knowledge of individual group,

organizational, social, political and related phenomena” (2013: 4). In a previous study, Yin defined the case study “as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (2009: 18). The use of the case study method is also related to process evaluations, which can present how the researcher hopes to document and analyze the results of program implementations, projects, or initiatives (Yin, 2011).

The primary concerns during the initial stage of the present study were in determining how the requirements or elements described in the entrepreneurial university literature could be fulfilled by my chosen case study, and in selecting the research purpose. The topic of the institutionalization of the entrepreneurial university model also creates questions about process and practices. Lucas and Moreira (2009) argue that case studies can acquire more extensive information about processes and practices by focusing on a single case. My task as a researcher is to focus on the phenomenon in context, especially in the gathered evidence that is actually happening at the university (Farquhar, 2012). I decided on the number of cases during the earlier stages of my research. Time, funding, and document accessibility are crucial in conducting such studies. While comparative studies might contribute to understanding the complexity of this topic, it would be more expensive to study multiple cases, as this would require long stays at single or multiple sites (Mills, Durepos, & Wiebe, 2009). Thus, NUS was chosen as the case for this study. Although three other universities in Singapore are considered to be active as entrepreneurial organizations, the relevant documents (including published journal studies about entrepreneurial activities) are more evident at NUS and can be conveniently accessed. Having continuous access to data (Munro, 2008) is significant for every study; as a researcher, given the time and budgetary constraints that I face, I need to have access to well-established and openly available information.

Using a single case institution may provide a good platform for exploring frame analysis, since previous authors have written that NUS has the features of an entrepreneurial university (e.g., Mok, 2013; Wong et al., 2011; Wong, Ho & Singh, 2007). As such, themes of globalization, governance, higher education reforms, and national innovation systems (Mok, 2013; Fetters, Green, & Rice, 2010; Wong et al., 2011; Wong et al., 2007) offer grounds for broad discussions that are relevant to NUS’s entrepreneurial university model.

As a flagship university, previous studies have highlighted NUS’s anticipated response to the Singaporean government’s initiatives of promoting quality

education, improving the working lives of its citizens, and creating policies that target economic development goals. My interest in the trajectory of Southeast Asian countries and their HEIs has influenced the planning of this thesis. NUS's chosen path will have a significant impact on pressing issues that affect the daily lives, health, and welfare of Singaporean citizens. From what I understand of the entrepreneurial university model at NUS, the university's response goes beyond simply producing novel ideas that will further advance technologies or create more jobs in Singapore. Though I do not intend to generalize the situation of universities in Singapore through the case of NUS, focusing on a single case study has the advantage of filling one of the research gaps that previous studies have raised about NUS: that the views of institutional members have not been covered well. The nature of frames has implications in pursuing a single case study; the frames that were identified in the current study may be modified as institutional practices change (Raitio, 2008, cited in Miller, 2000) because of possible shifts in the government's or the university's priorities toward various issues related to higher education. Because of my lack of extensive experience in utilizing frame analysis, I found it to be more appropriate to focus on NUS institutional members' interpretations of the current arrangement that they experience within the entrepreneurial university model.

The National University of Singapore was founded in 1905, and it is the largest HEI in the country. From 1905 to 1962, the university was renamed many times, and has merged with other HEIs. It was originally a tertiary education provider in the fields of medicine, arts, and the sciences. In 1980, the merging of the University of Singapore and Nanyang University (a privately funded Chinese university in Singapore) took place; the new university was named the National University of Singapore.

As of the 2014–2015 school year, the student population was close to 38,000, and comprised both undergraduate and graduate students. There are twelve undergraduate schools, four graduate schools, and twenty-six university-level research institutions and centers. In terms of the faculty and staff profile,²⁷ the university has:

Faculty members	2,400
Research staff	3,200
Executive and professional staff	2,700
General staff	2,400

²⁷ Information found at <http://www.nus.edu.sg/about> as of May 2015 .

NUS has campuses in three locations—Kent Ridge, Bukit Timah, and Outram. The main campus is at Kent Ridge, which houses several faculties, schools, and teaching units (e.g., engineering, science, social science, dentistry, and business schools). This campus is close to the National University Hospital, Biopolis, as well as several government agencies. The Bukit Timah campus is the home of the Faculty of Law and the Lee Kuan Yew School of Public Policy, while the Outram campus is the base of Duke–NUS Graduate Medical School. The University Town (“Utown”) is a recently opened education hub within the Kent Ridge campus; it has residential spaces and teaching facilities to provide a more interactive learning experience for students. UTown’s construction highlights NUS’s stance in promoting environmental sustainability. Table 3 provides details on the activities that NUS performed as an entrepreneurial university for the school year 2014–2015.

Table 3 Activities performed by NUS as an entrepreneurial university

Performance in entrepreneurial activities (as of school year 2014–2015)	Total
Papers published by three research centers of excellence (Scopus)	7,301
Invention disclosures	2,900
Patents filed	4,000
Technology licenses achieved	330
NUS enterprise portfolio companies	360

Source: <http://www.nus.edu.sg/images/resources/content/about/glance-en.pdf>

In order to achieve entrepreneurial goals, the university established the NUS Enterprise to be the main arm for entrepreneurially related activities. Its task is to provide support by nurturing business ideas and incubating promising enterprises. Details on the tasks and coordination of activities within NUS Enterprise form part of the current study’s empirical findings (Chapter 6). Several teaching and research programs have partnered with leading international universities including Duke and Yale universities (United States), Keio University (Japan), Peking University (China), University of Oxford (United Kingdom), and many others. The university highly encourages student and faculty mobility. According to the 2014–2015 Quacquarelli Symonds (QS) World University Rankings, NUS is ranked twenty-second in the world, and is ranked first in Asia. In the Times Higher World

University Rankings 2014–2015, NUS is ranked twenty-fifth in the world. The benchmarks that are used include teaching, research, and knowledge transfer activities and international outlook.

Certain duties and responsibilities in NUS’s corporate governance structure have been delegated in order to support the university’s goals and day-to-day operations. The board of trustees has twenty-four members who are appointed by the minister for education; the board is comprised of entrepreneurs, academics, business executives, and professionals from both the private and public sectors. NUS Annual Reports from 2006–2014 explicitly describe that these members are tasked with working closely with the management and stakeholders “to shape the vision, chart the major directions, and develop programs and initiatives to produce a strong and enduring impact for the university, and for Singapore and beyond.” The senior management is composed of sixteen members—deputy presidents (academic affairs, research and technology, and administration); provost and vice provosts (undergraduate education, graduate education, special duties, academic personnel); chief executive officer of NUS Enterprise; senior vice president (health affairs); and vice presidents (human resources; endowment and institutional development; university and global relations; campus infrastructure). These members, along with the NUS president (as the head) oversee the management functions and daily operations of the university. The president has the status of chief executive officer of NUS (NUS Annual Report, 2011). The offices that are handled by members of the senior management are often referred to on the NUS website as being part of the university administration. Below are some of the important offices categorized under the university administration:

- Office of Admissions
- Office of Alumni Relations
- NUS Enterprise
- NUS Libraries
- NUS Museum
- Office of Financial Services
- Office of Corporate Relations
- Office of Student Affairs
- Office of Internal Audit
- Registrar’s Office

Each faculty is headed by a dean, and the academic and research affairs of the faculty are handled by the vice dean (or deans). In other faculties, the assistant deans oversee internal and external relations, human resources and finance, and matters related to student life; directors lead discipline groups or divisions. For larger faculties (such as the Faculty of Arts and Social Sciences), departments and programs are handled by department/program heads. The MOE has set a total expenditure (consisting of operating and development expenditures) for NUS amounting to SGD 1.06 billion during the 2014 fiscal year. The Singapore

government's budget for universities addresses the expenses related to their daily operations and development projects.²⁸ In addition to this, NUS's yearly operating income comes from tuition, other related fees, and all other income (which includes rental income and student hostel residential fees, course and conference fees, and clinical and consultancy fees). All donations and government matching grants that are received each year are placed directly into the endowment funds. NUS also receives grants from the aforementioned Agency for Science, Technology and Research (A*STAR), and other organizations. These grants are marked as operating grants in the university's financial statements (NUS Financial Report, 2014).

Previously, NUS, like other state-owned institutions were mostly dependent on government's decisions regarding their daily operations. For instance, cabinet members used to appoint the Vice Chancellors while members of the University Councils were selected from the public and private sectors by the government to set and implement policies for the university. The clearance of course contents, implementation of new programs, hiring, firing, and salary decisions were usually endorsed to the government. By and large, it was not easy for universities like NUS to execute decisions to dismiss incompetent staff and reward the exemplary ones (Sam, 2016: 59). After corporatization, universities had stepped out of their comfort zones by officially adopting market-oriented values such as stronger emphasis on institutional branding. Through the actions of corporatized universities, the public can gain insights on Singapore's developmental strategies—mainly in setting direction for the city-state's important sectors as they respond to global economic changes (Ng, 2014). Likewise, being a flagship university, the actions of NUS should always serve the national interest. The benefits of flexibility in internal governance and financial matters should not be overemphasized as moving away from the Ministry of Education's guidance (Mok, 2010).

5.7 Data Collection

The empirical work for this study has relied on two main sources: interviews and documents. The following details describe the conducting of interviews and the documents that were collected for this study.

²⁸ For example, the development expenditure covers the upgrading of the NUS campuses or addressing the present condition of some buildings in each campus. Project costs and other expenses allocated for NUS in 2014 can be found at Singapore Budget website :

http://www.singaporebudget.gov.sg/data/budget_2014/download/27%20MOE%202014.pdf

5.7.1 Interviews

Two pilot interviews were conducted in 2012 and 2013. One interviewee represented the faculty (medicine), while the other was an alumnus of NUS and the owner of a start-up company that is linked to the university. Their responses to my email inquiries signalled that they were willing to be interviewed. The first pilot interview was held in Tampere, Finland, while the other was conducted over the phone. During the pilot interviews, I raised a few questions that were not part of the original items I had listed for our interview agenda. This is among the key features of semi-structured interviews: interviewers have the opportunity to form questions based on the flow of conversation (DiCicco-Bloom & Crabtree, 2006). The pilot interviews do not form part of the main results, because my purpose at that time was only to test the questions related to the mission of NUS, and to explore various topics on the role of the entrepreneurial university in Singapore's national innovation system (since this was the original focus of the study). As such, the responses centered on entrepreneurial activities, but not on the aspect of institutionalization per se. In addition to the changes to the scope of the study, I was also unable to tap enough stakeholders to be interviewed during my planned trip to Singapore.

I conducted fieldwork in Singapore in November 2014; thirty-five institutional NUS members were invited for interviews. The selection was purposive, because I had considered the target interviewees' positions, years of experience at NUS, disciplines, and the nature of their academic work. The topic of the institutionalization of the entrepreneurial university model might involve timelines that cover the transitions of NUS. Other aspects (such as the interviewees' positions and the nature of their academic work) were considered relevant when selecting interviewees because of the need to determine their level of awareness and engagement in entrepreneurial activities. Choosing participants across disciplines can capture the variations (Mugabi, 2014: 69) in meanings of an entrepreneurial university. Wong et al.'s study (2011) did not reveal academics' entrepreneurial activities, nor did the authors provide information on social sciences students' interests in forming start-ups.

Following Rose's proposed checklist (1994), my duty as an interviewer included:

- informing the participants of the purpose of the interview
- clarifying the topic, and defining the concepts that would be covered in the study

- notifying the participants about the interview format
- assuring the participants' confidentiality by informing them that their personal information would not be divulged publicly, and that a code would be assigned to each participant
- seeking the participants' permission to use a digital recorder during the interview

While twenty-three participants originally agreed to participate in the study, in the end only eighteen participants confirmed their interview schedules. The participants included three institutional members from the university administration and fifteen teaching and professional staff. Three participants had served at NUS since it was still the University of Singapore, while nine were hired between the years 1981 and 2000; six were hired between the years 2001 and 2013. They represented various disciplines, including science, engineering, business, social science, and the humanities (see Appendix 4 for the profile of interviewees). The interviews were mostly held at NUS's Kent Ridge and Bukit Timah campuses, although one interview was conducted in the Biopolis area, where the participant demonstrated NUS's proximity to industry and other governmental agencies there. That participant gave a short presentation on his start-up company, which is located in that area. I also tried to target interviewees who came from the strategic research growth areas of Singapore,²⁹ such as the biomedical sciences, interactive and digital media, and environmental and water technologies, since entrepreneurial activities are known to be strong in these areas and they are crucial to the country's national innovation system.

The interviews were recorded, with the exception of three respondents who requested not to be digitally voice-recorded during our conversations. The interview duration ranged from twenty minutes to one hour and fourteen minutes. All interviews were conducted in English; the responses were transcribed verbatim, and amounted to seventy-seven pages. (The quotes have been edited slightly for this dissertation for maximum clarity, although the editing does not affect the speakers' meaning in any way.) The questions that were asked during the interviews were based on the preliminary analysis of NUS documents, specifically the annual reports issued from the years 2006–2012. The preliminary analysis of the annual reports produced 107 pages of coded texts, mostly covering the most important events and activities for NUS each academic year. At the same time, the literature

²⁹ Singapore's priority growth areas were presented in the introductory chapter.

on institutionalization, the entrepreneurial university, and the frame analysis method provided additional insights for structuring the interview questions. The semi-structured interviews focused on the following topics (see the complete interview guideline in Appendix 2 and 3):

1. NUS's vision, mission, and strategy statement
2. Any transitions observed at NUS since the interviewee's time of employment
3. Any support from internal and/or external groups in conducting entrepreneurial activities
4. Activities of the department/office/institute (e.g., collaboration, project funding, teaching and research, commercialization)
5. The interviewee's position and the nature of his or her tasks

5.7.2 Documents

Similarly to interviews, documents offer ideas, thoughts, and meanings that individuals or groups express in written texts (Polkinghorne, 2005: 138). I retrieved NUS's annual reports from the years 2006–2014, as well as newsletters, press releases, project descriptions, policy documents from government agencies, and empirical findings about NUS-related entrepreneurial activities. These documents were mostly accessible online, and were written in English. The documents provided background for the study, particularly relevant information on past and current NUS activities. The annual reports, for instance, include detailed information about NUS's accomplishments in teaching and research; financial reports during the fiscal year; and updates on university governance and any activities with stakeholders. Access to these rich sources of data (Sixsmith & Murray, 2001) allowed me to structure the interviews according to specific issues and situations that are relevant to NUS as an entrepreneurial university.

Whether data sources take the form of internal documents or public records, all of these forms are important in conducting research because they can trace, confirm, and maintain proofs of experiences or situations (Lincoln & Guba, 1985). My encounter with these documents served as homework that had to be done before conducting the fieldwork. Taking on the objective of frame analysis, I first needed to find out “what was going on” with the documents, as this would tell me a great deal about the case study.

5.8 Ethical Considerations

Each participant received an invitation for an interview via email, in which I described the purpose of my study, method, and fieldwork details. The anonymity of the participants was guaranteed in the invitation letter. While empirical work at NUS does not require a bureaucratic process of securing a series of permits to conduct interviews, in some cases, target interviewees had mentioned that they were assigned a staff member that handles external affairs and could answer my inquiries in their stead. Before arriving in Singapore, I was constantly reminded about the types of questions that I should ask, and about the fact that criticisms of the strategies of the university or of the Singapore government are usually discouraged. This situation affected one of the scheduled interviews: as I reviewed the recordings, some respondents repeatedly mentioned that they only wanted to express their views about the “real situation” at the university. The shortest interview that I conducted may have been affected by my choice of using a voice recorder, as the responses were short and depict uneasiness.

Another ethical obligation on my part was the need to protect the recorded data (Sixsmith & Murray, 2001) that identifies the voice of each respondent. I am the only person who has direct access to these voice recordings. In this study, codes were assigned to each participant. University administrators are coded as *UA*, while teaching and other professional staff are coded as *TPS*.

5.9 Data Analysis

The interview data and documents were explored via content analysis. Content analysis pays attention to the text as abstracted from its contexts. Unlike in discourse analysis, researchers have to study how meanings are historically and socially located, and how they change over time. Analyzing frames by way of content analysis is more suitable than discourse analysis, because coding and counting (Hardy, Harley, & Philips, 2004: 20) can assist in determining “how much attention is given in the text to a certain topic in comparison to other topics” (Apostol, 2011: 84). In relation to this study, content analysis can reveal issues and situations by condensing related texts into explanatory categories (Marvasti, 2003: 92). Conducting this research involved the use of NVivo 10 for coding. Although this dissertation mentioned earlier that a quantitative approach to frame analysis would not be used, the word frequency query in NVivo 10 does make it easy to

evaluate the relevance of some of the documents and to propose possible categories.

While I considered the idea of pursuing a purely deductive approach to employing frames during the early stages, I became cautious about how the present and future data would be compatible to the definition of “rhetorical frames” or “policy frames,”³⁰ as these are two familiar frames that are commonly used in examining public policy. With this initial challenge, I was prompted to explore other frames inductively using NVivo 10 software before conducting fieldwork, with the intention of allowing the data sources I had on hand to speak for themselves (Porter & Hulme, 2013: 344). This process continued even while transcribing interview data, at which point I decided to follow Hertog and McLeod’s advice that it is essential to look for guides that will keep the frame analyst from straying off track (2001: 152), and to avoid having multiple frames or twisted frame boundaries. Hertog and McLeod warned that some scholars will occasionally attempt to establish unique set of frames in probing social phenomena; researchers might conduct their studies via a trial-and-error approach (Raitio, 2008: 94). This situation is a feature of the “abductive” approach, in which there is “continuous interplay between theory and empirical observation” in order to “discover other variables and relationships” (Dubois & Gadde, 2002: 559). An abductive approach is carried out in this study in order to advance the understanding of the institutionalization of the entrepreneurial university model through the frame analysis method. Accordingly, the process of content analysis should be approached both systematically and objectively (Vuori, 2011: 108).

The following steps were taken into account in the research process, based on the suggestions of Silverman (2006: 159) and Marvasti (2003: 73):

1. Selection of texts that were relevant to the research problem.
2. Going through the sample texts if there were too many of them to analyze completely.
3. Building a coding frame (i.e., a categorization scheme) to identify the categories or features that will become the focus of the research.
4. Initiating a pilot, and modifying the coding frame and clearly defining the coding rules.
5. Assessing the occurrence of the pre-established categories.

³⁰ Schön and Rein (1994) refer to rhetorical frames as “general story” underlying the policy process while policy frames are frames “informing policy practice.”

5.10 Validity and Reliability

In qualitative research, validity determines the appropriateness of the tools, processes, and data. The challenge in assessing validity can start from the ontological and epistemological underpinnings of the issue being investigated (Leung, 2015: 325). Whereas, reliability in qualitative research involves assuring the accuracy and inclusiveness of research data (Peräkylä, 2016: 414). According to Lewis et al., (2014: 356), the reliability of research findings depends on the probable recurrence of key features of the raw data and the integrity with which they have been classified. Now that frame analysis is widely used in different areas of study, researchers are increasingly concerned about various validity and reliability issues. Creed and his colleagues (2002) state that two aspects will establish the type of validity that the researcher intends to do while engaging in a frame analysis: the purpose of the analysis and its anticipated audience. The authors note that frame analysis permits checking and rechecking how assumptions are emerging in the text; even if the features of this approach are still not particularly solid, there is the opportunity to establish dialogue and the continued unpeeling of layers. One way to test the validity and reliability of quantitative frame analysis applications is to assign and train coders to determine frames by using a detailed rule book (Miljan, 2011: 566). Other proposed methods for the statistical validation of frames (Koenig, 2006) include hierarchical cluster analysis and factor analysis (Risse & van de Steeg, 2003, cited in Koenig, 2006).

Since this study proposes a qualitative approach, triangulation was applied to ensure validity. According to Lewis (2009: 11), triangulation involves gathering interview results, theories, previous works in the literature, personal observations, and other pertinent data, and comparing the findings to establish the validity of a specific theme or category. The sources of frames used in this study can be verified by previous studies in the literature. “Member checking” is another possible way to validate gathered information; Lewis states that this method offers the respondent “both an immediate and continuous opportunity to correct the errors and misinterpretations of what was stated or observed.” Doyle (2007) discusses member checking as a method for active participation in the research process because it encourages negotiation of meaning between the participant and researcher.

Researchers can achieve reliability in case studies by following a protocol (Tellis, 1997). Yin (1994: 64, cited in Tellis, 1997: 5) prescribes that the following elements be included in the case study protocol:

- Overview of the project (project objectives and case study issues)
- Field procedures (credentials and access to sites)
- Questions (detailed questions that the investigator should prepare for data collection)
- Guide for the report (outline, format)

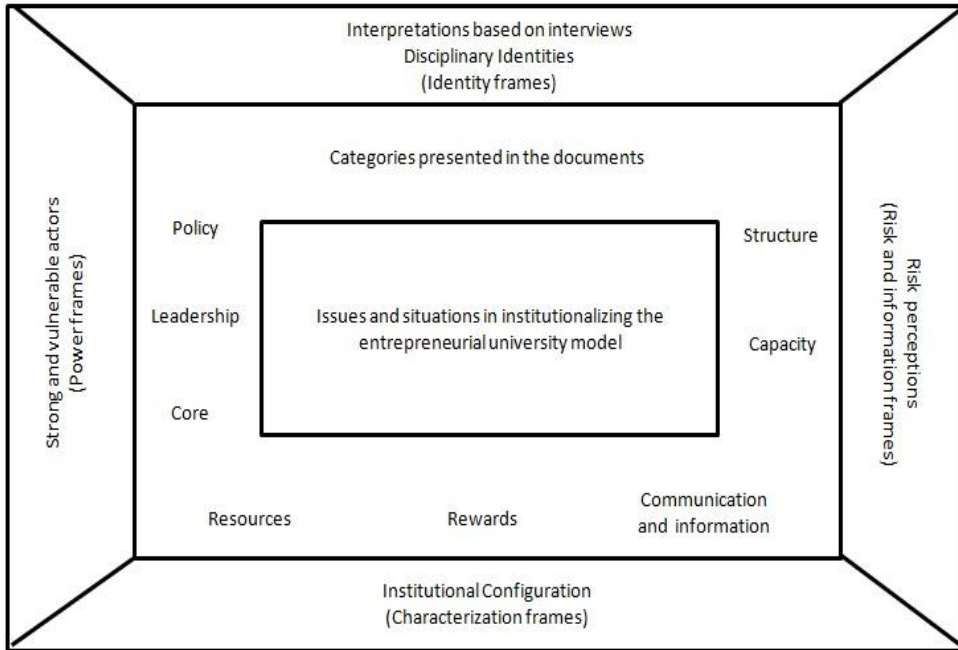
As the case study investigator, I have fulfilled the elements above by following a field agenda (Yin, 2011: 53). In the field agenda, I have documented inquiries concerning the scope of the topic, design of the study, case selection and procedure, data collection, and analysis. In addition, a timetable indicating the targets and measures for carrying out the case study was prepared. During fieldwork, a daily schedule was arranged in order to ensure an organized visit to the interview sites. Separate files were created for the lists of interviewees, interview questions, contact information, and other field documents. There was careful consideration on how the information gathered during the interview will be stored. Thus, it was highly important to have sufficient resources in the field (Yin, 2009) such as voice recorder, notebook, personal computer, and flash drives. The planning, structuring, and writing continued until the completion of this study.

After the interviews were conducted, data were transcribed and validated from the available documents that I had, or I referred the information to another participant in the study in order to check the consistency of the statements that were given. Reliability involves the awareness that every researcher must be keen about maintaining the consistency of the empirical data, as others may well be interested in revisiting researcher's studies in the future. Attempts to improve reliability may require the use of qualitative data analysis software (Cai, 2012: 82), such as (in this study) the use of NVivo 10.

5.11 Conceptual Operationalization

With the concepts of the entrepreneurial university and institutionalization discussed in the previous section together with detailed information about the methodological choices that were made for this study, the research approach is illustrated in Figure 1.

Figure 1 Research approach: Institutionalization of the entrepreneurial university model



The approach of this study include the categories of Silimperi et al. (2002) on the institutionalization of quality assurance in the healthcare sector, together with Shmueli et al. (2006) and Campbell and Docherty (2003) on the frame categories utilized in environmental conflict research. Instead of exploring the stages or phases of institutionalization, this study is more concerned on understanding the various issues and situations that enables the acceptance and sustainability of the entrepreneurial university model at NUS. Framing the institutionalization of the entrepreneurial university model at NUS starts with the issues and situations presented in the documents, specifically in the annual reports. It is then analyzed through the categories presented by Silimperi et al. (2002) that explain the condition of institutionalizing the entrepreneurial university model as manifested in policies, leadership approaches, core values, resources, and the university structure at NUS. In addition, capacity building efforts, communication and information on entrepreneurial activities, and rewards to successfully promote and implement entrepreneurial-related initiatives are examined.

Analysis of the interview data is done by applying frame categories to understand the nature of interactions behind the implementation of the entrepreneurial university model at NUS. Identity frames, characterization frames,

power frames, and risk and information frames (Shmueli et al. 2006 Campbell and Docherty, 2003) are established from different perspectives such as the varying definitions of the university, activities, processes, and outcomes involved. In other words, this study will not endeavor to stabilize the depiction (Leydesdorff, 2005) of the entrepreneurial university as an ideal framework for most universities to implement, because the purpose is to analyze the possible gap between institutionalized practices and activities presented in the documents and institutional members' experiences in the implementation of the entrepreneurial university model. By investigating responses from institutional members representing various offices, departments and faculties at NUS, the study will be able to shed light on the extent of institutional acceptance and commitment to entrepreneurial ideals, along with the factors that hamper or contribute to entrepreneurial university transformation. With Singapore's response in the overall drive to develop entrepreneurial activities in the country, universities like NUS are expected to provide the foundation of structural changes in economic and social activities other than increasing the output for the economy (Amiri et al., 2009: 497). However, taking this route is fraught with several challenges such as attempts to delay, avoid or reject certain initiatives to push through (Reyes, 2016: 135), and the participation of some relevant actors in the process is taken for granted - which affects the ability to increase the potential to accelerate entrepreneurial activities at the university. As presented in Figure 1, it would be pertinent to situate the case study in the institutionalization continuum by analyzing each essential element (Franco et al., 2002) and applying the frame categories.

6 EMPIRICAL FINDINGS

This chapter focuses on the findings from the documents and interview data. The annual reports and other internal documents that were consulted offered valuable information on the NUS's responsiveness to the government's initiatives in developing entrepreneurship in Singapore. The documents depict NUS's entrepreneurial university model, as well in the documentation on the university's transitions, achievements, plans, activities, and strategies, starting from the year of corporatization in 2006 through 2014. More importantly, the data collection results depicted in this chapter feature the perceptions of institutional members on the institutionalization of the entrepreneurial university model at NUS. Frame analysis was used to analyze the institutionalization situation, guided by four categories of frames derived from environmental conflict research: identity frames, characterization frames, power frames, and risk and information frames.

6.1 Document-based Interpretations: Institutionalizing the Entrepreneurial University Model

Guided by Silimperi et al.'s study (2002) on the institutionalization of quality assurance (QA) in the healthcare sector, the official NUS documents were primarily analyzed in order to investigate the university's efforts in institutionalizing the entrepreneurial university model. The focus of analysis is on the annual reports published by NUS from 2006–2014. In addition, newsletters, press releases, project descriptions, policy documents from government agencies, and empirical findings about NUS's entrepreneurial activities were retrieved to verify information and claims. The chapter on the study's data sources (section 5.7) explained that official documents—specifically the annual reports—are published for the purpose of informing stakeholders and other interested parties about the university's accomplishments over the course of the previous academic year. These documents may be presented for transparency and reporting purposes, but the content of the university's official documents may be viewed as a strategy for branding the institution.

According to Wæraas and Solbakk (2009: 449), “branding” defines the essence of what a university *is*, what it *stands for*, and what it is *going to be known for*. Universities may regard branding as a mechanism for enhancing their competitiveness and reputations. The target audience of the documents can grasp how the university and its members exercise their values, norms, interests, and expectations (Melin & Nordqvist, 2007: 325) related to certain activities. In relation to the current study, because these documents may exhibit a commitment to the university’s entrepreneurial mission, they are pivotal for examining the institutionalization of the entrepreneurial university model at NUS.

6.1.1 Policies Related to Entrepreneurial Activities

NUS complies with the accountability framework set forth by the government in relation to how funding is utilized and directed toward attaining national objectives. This policy appeared in the 2006 Annual Report, which is the report that was published during the year of NUS’s corporatization. The autonomy granted to NUS requires the observance of a *policy agreement* and a *performance agreement*. These agreements were signed between the university and the Singapore Ministry of Education. They do not form the internal policies set forth by the university, though the accountability framework does serve as a strategic direction and guide for defining the boundaries of autonomy, as set out in the policy agreement. The performance agreement is in accordance with the expected performance of NUS within five years, and it encompasses teaching, research, service, and organizational development. In the year of NUS’s corporatization, the title that was chosen for the 2006 Annual Report was “New Horizon.” The title corresponded to the new chapter of NUS as an autonomous university in which changes in the governance, administrative, and financial processes were implemented. The chairman of the NUS board of trustees specifically discussed fundraising in this document:

With financial autonomy comes ownership and the need for the University to play a more active role in fundraising as well as to seek alternative funding options to support its mission. The Singapore Government remains the principal source of funding for the University. Empowered by financial autonomy to decide on its tuition fee structure, the University, nevertheless, will have to comply with caps on undergraduate tuition fee

increases which are prescribed by the Ministry of Education, to ensure continued affordability. (NUS Annual Report, 2006)

The transition of NUS in reflecting the adoption of the entrepreneurial university model was among the broad policies that Franco et al. (2002: 14) described. For years, the NUS website and the university’s official documents have emphasized the *Vision*, *Mission*, and *Strategy* statements indicated in Table 4.

Table 4 Vision, mission, and strategy of NUS (2006–2014)

VISION
<ul style="list-style-type: none"> • NUS will be a globally oriented university, in the distinguished league of the world’s leading universities. A key node in global knowledge networks, NUS will have distinctive expertise and insights relating to Asia. • NUS aspires to be a bold and dynamic community, with a “no walls” culture and a spirit of enterprise which strives for positive influence and impact through our education, research and service. • Every member of our university enjoys diverse opportunities for intellectual, personal and professional growth. Learning and working at NUS will foster quick, well-rounded minds, well-equipped to succeed in our fast-changing world.
MISSION
<p>The NUS mission comprises three mutually reinforcing thrusts:</p> <ul style="list-style-type: none"> • Transformative education that nurtures thinking individuals who are alive to opportunities to make a difference, are valued members and leaders of society, and global citizens effective in diverse settings. • High-impact research that advances the boundaries of knowledge and contributes to the betterment of society. • Dedicated service, as a national university, that adds to social, economic and national development.
STRATEGY
<p>The eight key components of NUS's strategy are:</p> <ul style="list-style-type: none"> • Nurture, recruit and retain best quality people, the single most important determinant of the quality of education and research. • Attract the best students, who are academically strong, and who have passion, commitment, leadership potential and come from diverse

backgrounds.

- Provide a high quality educational experience that stretches students, is globally oriented, and develops skills and values to enable them to reach their full potential.
- Focus on high impact research that advances knowledge and its application, and which is of high international quality and impact.
- Inject a spirit of enterprise into education and research, and develop impactful synergies in education, in research, and between education and research, within a dynamic “no-walls” environment.
- Nurture committed alumni to be key members of the NUS community, who will actively support NUS toward its Vision and Mission.
- Develop global profile and reach as a leader among universities.
- Adopt and adapt best practice governance and management, for optimal administration, management of resources, and faculty, staff and student services.

Source: www.nus.edu.sg/aboutus/vision.php. Accessed on 10 July 2012.

The “spirit of enterprise” is the statement that is most relevant to the institutionalization of the entrepreneurial university model. In the documents, the “spirit of enterprise” gives the impression of a behavior that is essential for developing entrepreneurship. The entrepreneurial university is expected to sustain this behavior for the success of various efforts.

In the statement below, the “spirit of enterprise” is aimed at maintaining a dynamic approach in carrying out institutional initiatives:

Building on the core strengths of scholarship and research, the university kept the spirit of enterprise alive by generating new initiatives in education and development, enhancing the framework to advance the university’s R&D and to bring to fruition results from the lab.

—Review of Entrepreneurship (NUS Annual Report 2008)

The statement also applies to students, through their exposure to entrepreneurial activities at the university:

NUS’s efforts to encourage and nurture a spirit of enterprise in our students are bearing fruit. We take pride that our NUS Overseas College [NOC] alumni have so far founded 33 start-up companies, even as the NUS Enterprise incubator ecosystem is being strengthened to facilitate the translation of intellectual property into innovations.

—President’s message (NUS Annual Report, 2009)

The “spirit of enterprise” as a self-reproducing attitude and atmosphere is implied in the statement below.

These efforts are spreading the spirit of enterprise among the NUS student body and beyond. I am delighted to see more NUS students getting involved in activities planned for the Week. For example, NOC graduates are mentoring younger teams participating in the Global Innovation Tournament. The StartUp@Singapore team is organizing the Entrepreneurs Unplugged Forum, and the NUS Entrepreneurs’ Association is coordinating a live-video conferencing discussion on “How to go Global from Day One” with eminent entrepreneurs and thought leaders from Silicon Valley.

—NUS president’s speech during Global Entrepreneurship Week, 2009

We promote the spirit of enterprise through experiential education and industry engagement. With an NUS education, our students can write a new chapter in the success story of our nation and thrive in a globally competitive economy.

—Review of Entrepreneurship (NUS Annual Report, 2013)

Aside from its well-established roles in research and education, NUS also actively nurtures a spirit of enterprise in our students, faculty, alumni and the rest of the NUS community.

—NUS Freshman Guide 2015/2016.

The focus on entrepreneurial undertakings coincided with the university’s globalization drive. Prior to corporatization, NUS was already working on modifying its faculty compensation policy. In this move, the university aimed to make the policy more flexible in order to attract foreign talent. The tenure and promotion policy became more rigorous and performance-based, reflecting the policies of top universities in the United States (Wong, Ho, & Singh, 2014: 290).

Research-related policies guide institutional members in carrying out research activities in terms of costs, data management, ownership issues, agreements with external parties, and the acquisition of goods and services. In entrepreneurial activities, intellectual property and research collaboration pose several concerns for academics. NUS’s IP policy addresses basic inquiries about the definition of IP, as well as patentable ideas, patent-related decisions, patent applications, filing

durations, and public disclosures. More importantly, the *University Intellectual Property Policy* was established for the promotion of financial rewards that benefit both the university and its members. In research collaboration, this policy clarifies the boundaries of agreements that are initiated by institutional members with external parties. The university is mindful of the preparation of agreements, as well as the importance of constant communication between contact points and institutional members for facilitating collaboration with external parties. For instance, the Industry Liaison Office will take charge of processing research collaboration agreements, and will interact regularly with researchers about administrative procedures.

The university has also established policies on consultancy activities, covered by the Consultation Work Scheme. Full-time faculty members who hold the rank of assistant professor or above are allowed to accept consultation work and to utilize NUS facilities and materials, subject to the prior approval of the university (this is usually approved by the department head). Consultation work is considered to be a private agreement between the staff and the external party. According to the policy the university should not be involved or obligated to do anything in any consultation contract, and the scope cannot be similar to the research projects engaged in by NUS or any future undertakings with the external party. NUS ensures that the latest versions of the policies indicated in Table 5 are updated on the university website.³¹

Table 5 NUS research-related policies

Policy	Content	Version
University intellectual property (IP)	<ul style="list-style-type: none"> —Protection, management and commercialization of University IP; —Rights and obligations of the University and the University members with respect to the IP created or developed in the course of university research; —Ways to stimulate the creation, development and dissemination of IP by providing appropriate financial rewards to the creators and the University. 	110309 (no date indicated)

³¹ Policy on University IP is available for public viewing. The rest of the policies can be accessed internally by NUS employees.

Establishing new agreements with external agencies	Policy and procedure for new collaboration or partnership agreements with external parties.	1 September 2008
External grants distribution of indirect research cost recovery	Policy related to indirect research cost which is to be levied on the total research project direct costs provided by external parties.	19 June 2013
Data management	Guidelines for the management of University data as an asset of the University.	February 2013 (version 2.2)
University procurement manual	Policies concerning the acquisition of NUS goods, services (including research or consultancy services), and construction services.	April 2013

Source: <http://ilo.nus.edu.sg/for-researchers/policies-for-pi/>

No *conflict of interest policies* were evident in NUS's annual reports until 2009. The content of this policy covers the terms of business and staff code of conduct. Concerns related to entrepreneurial activities are not specifically stated, but the Conflict of Interest Policy aims to ensure that institutional members (i.e., those employed by the university) separate their private activities and interests from their professional obligations to the university. In case of violation, institutional members must give full disclosure and may appeal for an exemption. Institutional members need to file annual declarations of compliance with NUS's current policy on conflict of interest and related policies.

Receiving gifts forms part of NUS policies, as presented in Statute 7 and Regulation 12. Solicitation, acceptance, and the "stewardship" of gifts are geared toward securing resources that will develop NUS teaching, learning, and research activities. The types of gifts that may be accepted by the university, gifts raised during events, and gift conditions to qualify for government matching grants are explained in Regulation 12. The definition of "gift" is presented as:

... a contribution, grant, testamentary disposition or otherwise, property and moneys from a Donor that the University receives without making any commitment of resources or services with a commercial value in return, other than naming opportunities and using the Gift as the Donor may designate.

6.1.2 The Role of Leadership

In this study, it is important to recognize actors and other aspects involved in the internal transformation of traditional universities (Guerrero & Urbano, 2012: 47) like NUS toward the entrepreneurial path. Leadership styles vary during entrepreneurial transformation and it is challenging for leaders as change agents to move the university in achieving related goals. Leaders are expected to provide expert attention (Koryakina et al., 2015), have strong problem-solving focus, and ability to run the institution with trust and openness (Davies, 2001: 41). During the corporatization of NUS in 2006, the annual report for that year highlighted the chairman’s statement on the importance of leadership during the university’s transition. The chairman anticipated that the new board would have to embark on building legacy. These board members represent the public service sector, the private sector, and academia, with different experiences and expertise for contributing to NUS activities. The board’s appointment corresponded with the creation of several sub-committees, including an entrepreneurship committee. The university would like to be certain that in times of renewal, it can bring people on board who can support it in achieving institutional goals.

The leadership of Professor Shih Choon Fong has also been recognized in the NUS documents. Professor Shih served as the university president from 2000–2008. Wong et al.’s study describes him as a visionary leader who worked on changing several initiatives that were already taking place at NUS, particularly the “strategic shift toward embracing an entrepreneurial university model” (2011: 173). The 2008 Annual Report stated that Professor Shih’s “philosophy of imagination, openness and courage, coupled with visionary foresight and resoluteness have steered the university toward transformation.” His education and work background at Harvard University, General Electric, and Brown University are added factors. Professor Shih was dedicated to NUS’s vision statement, in which he focused on two strategic dimensions for transformation: first, the university needs to compete globally, instead of within the national economy; second, the university should concentrate on injecting an entrepreneurial dimension into its research and educational activities by driving commercialization and producing more entrepreneurially minded graduates.

The role of leadership may pertain to NUS and its contribution to Singapore. An example may be seen in the annual report published in 2014 under the president’s message:

Next year, Singapore will celebrate its 50th anniversary. NUS will also mark the 110th year of our founding. Since its inception, our University has had a distinguished history of leadership and contribution in service of country and society. We are proud to continue our rich tradition of nurturing leaders in government, the professions, the arts, as well as business and industry. On the ground, our students have very substantially expanded the scope and impact of their engagement with our community, giving back through fundraising for the needy, most notably through Rag & Flag [referring to an annual charity project that takes place on Rag Day and Flag Day], and through community volunteerism locally as well as overseas service learning projects.

—President’s message (NUS Annual Report, 2014)

Likewise, President Tan Chorh Chuan, who has been the president of NUS since 2008, has shown commitment to the university’s entrepreneurial undertakings. During his state of the university address in October 2014,³² titled “Influencing the Future,” he highlighted the necessity of further enhancing the entrepreneurial culture at NUS. His own Chinese-style paintings were used during his state of the university address to deliver the message about the three key areas that NUS needed to prioritize. He specifically noted that the university should help “paint the future” by redoubling its commitment and efforts in the following areas:

- Emphasizing the preparation of future-ready graduates;
- Striving to make NUS the most vibrant university enterprise ecosystem in Asia, and a key contributor to Singapore’s global aspirations in this area;
- Translating and applying research in transformative ways, particularly in strategic areas for Singapore.

The current NUS president implies the role of entrepreneurship in addressing these three areas. The current administration expresses its awareness that the university has concentrated on innovation and enterprise at both the university and

³² Full information available at: http://president.nus.edu.sg/pdf/soua_2014.pdf

regional levels in recent years. Training students to be future-ready is an advantage for NUS students, since they will study in an academic environment that embraces change and encourages enterprising and imaginative skills, which are commonly known to be essential for seizing new opportunities.

The commitment to the second area, making NUS an entrepreneurial ecosystem, has been continuously solid, particularly in the growth of start-ups that have been developed within the university. Professor Tan noted the role of NUS Enterprise in developing an entrepreneurial ecosystem during his state of the university address in 2014. Under NUS Enterprise, the NUS Overseas College (NOC) makes it possible for promising entrepreneurial students to gain exposure to start-ups at known entrepreneurial hubs outside Singapore. The NUS president has announced plans for expanding NOC locations, and raising the number of participating students each year. As of 2015, NOCs are found in six locations, and the plan is to add two additional locations. The number of students to be deployed each year in this program will be raised to three hundred. For this endeavor, the president stated that the university will provide an additional investment of SGD 10 million for NUS Enterprise. Under Professor Tan's leadership, NUS aims to go beyond the ICT sector and to tap other types of technology-driven start-ups and spin-offs. He believes that NUS faculty actively participate in commercialization (mostly from their increasing interests in IP and spin-offs). Collaboration between faculty members and graduate students, however, was reported to be a work in progress.

The state of the university address in 2014 expressed optimism that NUS would become a leading university hub for entrepreneurship and start-ups in Asia in the upcoming years:

[Becoming an entrepreneurship hub] will position NUS as a magnet for promising entrepreneurial students and faculty. It will help draw investors, venture capitalists and business partners, as well as large high-tech corporations for potential acquisitions. In turn, this would facilitate the commercialisation of NUS IP and promote the culture of academic entrepreneurship on campus.

—State of the university address, 2014.

The third area, the translational impact of research, is also important for NUS. Professor Tan stated that the research expertise and discoveries that NUS contributes can enhance Singapore's growth areas. He underscored the additional

value that research brings to wealth (economic development), health (improving health and the diagnosis/treatment of disease), and social good and policy. The university is proactive in developing translational research with local and industry partners. In his state of the university address, the NUS president specifically pointed out various actors from government and industry who have supported NUS in this drive. Among others, he recognized the aforementioned National Research Foundation (NRF) and A*STAR as being active partners.

Leadership perception of issues is important in institutionalization. The content of speeches and statements from the university's internal documents can validate a researcher's identification of issues, because it might be that entrepreneurial undertakings are not particularly salient when making institutional decisions (Diehl, 1992: 340). During his 2014 state of the university address, the NUS president tackled the changes, strengths, challenges, and the future of NUS. He used several metaphors in his speech, and provided his own framing of the situation on the status of NUS, particularly on how he depicted and understood the idea of an entrepreneurial university. Metaphors have relevance in the manifestation of leadership. The metaphors that the NUS president utilized, as Parry writes (referring to metaphors in general), "display the characteristics of leadership[,] and that metaphors are what followers might follow" (2008: 6). In addition to using his own Chinese-style paintings, Professor Tan has used the Delphic Oracle to explain how he foresees the future of NUS, and how things can be achieved through the continuous support of the university community and its stakeholders. Even in his other speeches, Professor Tan often asks thought-provoking questions, such as the following:

What is the NUS Spirit? What would you say defines it? How does it manifest itself?

—NUS commencement dinner, 2010

... we had defined together the goals, strategies and major thrusts for NUS, encapsulated in our vision: to be a leading global university, centred in Asia, influencing the future. How much have we achieved in moving towards this vision? How has NUS performed as a Singaporean university which is also global and Asian?

—State of the university address, 2013

... how do we read the water in relation to the future trends for research?
Do we need strategies which would allow us to do even better and create
even greater value?

—State of the university address, 2010

From the statements above, Professor Tan demonstrates leadership by heightening the morale and self-esteem of institutional members. The state of the university address is a way for the president to express that leadership becomes effective when there is a steady flow of information, because it increases the ability of institutional members to contribute (Kerr, 1984; Bland & Ruffin, 1992). Thus, the use of “we” instead of “I” in these statements appears to emphasize that the setup of the university has to be profoundly collegial or cooperative in nature (Clark, 2000).

In the documents, donors to the university are recognized as visionaries.³³ Individuals or groups who extend gifts “play a leadership role in shaping NUS’ future success through sustaining contributions” (NUS President’s Speech at the Launch of Giving Circle, 2013). The university’s website states that “leadership through giving allows NUS to confidently plan for the future and inspires others to show their support.” Documents have revealed the influence of the late Prime Minister of Singapore, Lee Kuan Yew. His leadership is greatly admired because of “his vision, commitment and countless contributions to the economic and societal advancement of the nation; as well as his strong affiliation and contributions to the University” (NUS Annual Report, 2013). His pragmatic ideals as the founding leader of the long-serving and successful People’s Action Party have guided the ways in which individuals and institutions in Singapore function and confront a variety of situations. Lee was instrumental in shaping and developing Singapore’s university sector. The NUS president said in his eulogy for the former prime minister that the responsibility for talent development (particularly the training of graduates and professionals) was entrusted to NUS due to Lee’s foresight in viewing Singapore’s situation as a newly industrialized economy (NUS President Speech during Eulogy for Prime Minister Lee Kuan Yew, March 2015).

Leadership for this case study does not only mean identifying relevant people behind the institutionalization of the entrepreneurial university model. In addition

³³ One example is the press release in November 2012, describing Dr. Stephen Riad as a visionary donor. He donated a large amount of money for the development of the University Town and Yale-NUS College. Link: <http://news.nus.edu.sg/press-releases/812-stephen-riady-group-of-foundations-donates-sgd-25-million-to-national-university-of-singapore>

to the various qualities that relate to leadership, the case study showed the importance of having an environment that is conducive to developing future leaders. For instance, the educational experience at NUS is also an opportunity to prepare future leaders in the changing operational environment. This environment is enhanced through infrastructures such as the “N-House” (short for “eNterprise House”) and the aforementioned University Town (UTown), where students can interact and exchange entrepreneurial ideas. In addition, the Annual Report in 2009 used the term “intellectual leadership,” which characterizes the contribution of recruited talent to enhance the university pool of academics and researchers. Mukherjee and Wong’s study (2011:142) found that the corporatization of NUS has given the university the opportunity to exercise leadership and management flexibility in institutional practices. For instance, NUS was able to heighten its “market adjustment allowance” for faculty in fields that have considerable market demand (such as medicine and finance), including the recruitment of deans and departments through international search committees. As a consequence of corporatization, leadership roles emphasize stewardship (see NUS Annual Reports 2006, 2008 and 2012) as a principle of commitment for the continuous renewal of NUS. During leadership turnover in 2006, newly-appointed leaders were entrusted to continue developing NUS goals through the solid foundation (referring to the autonomous status of the university) convened by previous leaders. In 2008, during the appointment of Professor Tan Chorh Chuan as NUS President, the word “stewardship” was again used to describe that new leader’s role to carry on other plans for the university after successful corporatization (NUS Annual Report, 2008). From an institutionalization perspective, stewardship is an important aspect of the 2006 reform. It reminds leaders to serve the university community, to be held accountable to some crucial tasks, and to seek for continuity after implementing policies that will greatly benefit NUS in the years to come.

6.1.3 NUS’s Core Values

It may be observed that the faculty and NUS offices websites each have their own sets of core values as a constant guide to practice. These core values were likely created so that academics and the rest of the university staff can be prepared to face trends and issues that affect their offices over time (Helfgot, 2005: 11). Core values are not necessarily exclusive to the idea of being an entrepreneurial university. Table 6 provides information about the core values observed by

selected fields within NUS. From the manner in which they are presented in the documents and on the university website, some of these values are connected to Singapore’s national identity, which applies to all undertakings that are performed by NUS. The government also observes core values for achieving national economic goals, as specified below (Haley & Low, 1998; Bhasin, 2007):

1. Community over self
2. Upholding the family as the basic building block of society
3. Resolving major issues through consensus instead of contention
4. Stressing racial and religious tolerance and harmony
5. The importance of honest government
6. Compassion for the less fortunate

Table 6 Core values observed by selected organizational fields at NUS

Field	Core Values
INTERNATIONAL RELATIONS OFFICE <i>Source:</i> http://www.nus.edu.sg/iro/home/mission.html	<ul style="list-style-type: none"> • Service to students, stakeholders and partners • Passion and integrity in all that we undertake • Advancement of our university vision—A leading global university • Relationships of value • Keys to the world
INDUSTRY LIAISON OFFICE <i>Source:</i> http://nus.edu/ilo/aboutus/corevalues.html	<ul style="list-style-type: none"> • Integrity: commitment to highest standards of integrity and ethics • Standards apply to all dealings, both internal and external • Knowledge: utilization of professional knowledge and expertise in NUS technologies and industry to honor ILO’s [the Industry Liaison Office’s] commitment to internal and external customers • Teamwork: fostering a work environment of teambuilding, shared skills, openness and honest communication • Respect: treating each other with uncompromising truth and respect with regard to each other’s contributions • Drive to maintain public trust and respect to customers • Opportunity-seizing opportunities to form win–win partnerships, to respond quickly and provide service excellence
NUS BUSINESS	<ul style="list-style-type: none"> • Excellence: deliver the best in teaching, research and

<p>SCHOOL</p> <p><i>Source:</i> NUS Business School Annual Report, 2013</p>	<p>service</p> <ul style="list-style-type: none"> ● Integrity: uphold the highest moral and ethical principles ● Innovation: embody curiosity, ingenuity and enterprise ● Teamwork: respect and inspire one another in our collective endeavours ● Care: serve our community and safeguard the environment
<p>DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING</p> <p><i>Source:</i> https://www.ece.nus.edu.sg/corevalues/</p>	<ul style="list-style-type: none"> ● Excellence: strive to perform to the best of one’s ability, be it in learning, teaching, research or service ● Commitment: take ownership of ECE and contribute towards a stimulating, nurturing and collaborative environment ● Integrity: act with utmost honesty and professionalism
<p>DUKE–NUS GRADUATE SCHOOL</p> <p><i>Source:</i> https://www.duke-nus.edu.sg/about/mission-vision-values</p>	<ul style="list-style-type: none"> ● Passion for a cause: we want to make an impact on the understanding and practice of medicine ● Collaboration and teamwork: we trust each other, share goals and work as one in the interest of our organization, partners and community ● Innovation and creativity: we foster the exploration and testing of new ideas, to find improvements that [make] an impact ● Diversity and respect: we treasure the unique contributions that diverse individuals bring ● Professional conduct: we promote an ethos of professional values and lifelong learning

This study analyzed the relevance of core values and their similarities across fields in order to support other evidence that the entrepreneurial university model is institutionalized at NUS. Documents revealed an awareness of its service mission to Singapore and various stakeholders. In addition to supplying global talents, NUS contributes various innovations and technological breakthroughs. The university’s efforts in integrating education, research, and enterprise aim for core values that benefit students, stakeholders, and partners. NUS’s service mission to students is specifically manifested in this statement:

As Singapore’s national university, we enrol a broad spectrum of students. We must not lose sight of this public mission. To bring out the best in each student, we need to offer each student an educational experience that

fosters a spirit of inquiry and enterprise, as well as nurtures life skills and global perspectives.

—President’s message in NUS Annual Report, 2006

NUS is committed to offer opportunities and facilities for other partners and stakeholders. Initiatives linked to this core value include new programs, new “centers of excellence,” increasing research resources, and other avenues to discuss pressing issues that affect Singapore. The “G-10-10” initiative can serve as a specific example. After the year of its corporatization, the university announced its plan to have ten “great” programs (the G in G-10-10) or departments over the next ten years (NUS Annual Report, 2007). NUS strives to be different, and more than just a good university.

The university’s vision to become a global university entails a commitment to advancing research and providing value by bringing scientific breakthroughs “from the laboratory to the workbench” (NUS Annual Report, 2007: 24). As most research activities expect to have some kind of societal impact, the university calls on its members with shared interests and shared passion to complement one another and to work harmoniously (President’s Speech during University Awards, 2007). The president defined “passion” as something that would enable NUS “overcome challenges, see possibilities and seize opportunities,” which is among the guiding principles that determine how Singapore benefits from meritocracy for strength (NUS Annual Report, 2007). The 2009 Annual Report mentions that having a shared passion for work “can build up expertise and take advantage of opportunities for substantial external funding.” These statements denote that institutional members’ participation in university activities should be accompanied by utmost enthusiasm in order to succeed. Furthermore, integrity is a core value that institutional members should observe in times of conflict-of-interest situations. NUS wants to guarantee that institutional members are concerned about promoting ethical business conduct in all of their activities at all times.

Developing NUS to be a leading global university is more than just a vision. This focus involves a great deal of investment in terms of time, infrastructures, marketing, additional funding, and people to carry out a variety of initiatives. The core value stated in the phrase *the advancement of our university vision—a leading global university* (from the NUS International Relations Office website) specifically concerns NUS’s quest to become a global university, which most likely substantiates all dimensions of the structure and purpose of NUS as an

entrepreneurial university (Myers, 1997). In one of the NUS president's lectures from 2009, he emphasized the strong appreciation of issues of global importance that can be learned alongside the Asian perspective. Nurturing talents—most especially those from the science and engineering fields—is highly important. Professor Tan highlighted that the creation of new knowledge and its application in the global arena is necessary for developing societies and individuals (Tsinghua Global Vision Lecture, 2009).

In another interpretation, the NUS board of trustees chairman stated that creating and imparting knowledge covers both global and entrepreneurial dimensions (Chairman's Message in NUS Annual Report, 2006). The output that NUS continuously delivers via its research, teaching, and graduates has a significant impact on the demands of globalization, and this is a justifiable reason why NUS extends its initiatives beyond Singapore. Other core values emphasize that internal and external relationships are of great importance to the university. *Relationships of value*, as interpreted by NUS members, refers to teamwork and one's contribution toward building valuable relationships for the university (International Relations Office Yearbook, 2009/2010). Good networking skills and the ability to bring in valuable relationships for the strategic growth of NUS is part of the criteria for certain appointments (e.g., appointment to the board of trustees). This core value corresponds to the success of all university undertakings, including entrepreneurial ones.

Collaborative work is impossible to achieve without solidarity, whether at the faculty level or across disciplines. For example, annual reports stress the joint efforts that departments have made to facilitate entrepreneurial programs and other activities. Individuals and groups within the university who value meaningful interactions with stakeholders and other partners regularly organize events. The university is improving various infrastructures and programs to encourage social awareness, and to realize “how connectedness to the wider society can test and shape individual ideas, understanding and interest in engaging the community” (NUS President's Speech during Official Opening of UTown, 2013). Valuing the diversity of students and staff is crucial to NUS, because cross-cultural perspectives can complement university activities and practices. Infrastructures built at the campus are for the purpose of embracing diversity: to uphold continuous interaction with different cultures beyond the classroom. In this analysis of NUS, *keys to the world* and *relationships of value* are considered to be mutually dependent core values, because enhancing the university's networks requires harmonious and sustainable relationships with existing partners and stakeholders. In terms of

excellence, competing closely with other HEIs for the best faculty and students is considered a collective endeavor, and a shared aspiration at NUS (President's Message in NUS Annual Report, 2008).

Core values present intrinsic meaning and importance to members of an organization. These values particularly infuse an individual's day-to-day actions (van Rekom, van Riel, & Wierenga, 2006: 176). In analyzing the extent of institutionalization of the entrepreneurial university model, core values could signify reasonable motivations for NUS institutional members to promote power-sharing, open information-sharing, social responsibility, and ethics (Jin & Drozdenko, 2010: 356). In addition to being considered important guiding principles in the organization, core values also cultivate stability; they remain fixed, while most strategies and practices continually adapt to changes (Collins & Porras, 1996). According to Bhasin, Prime Minister Lee's leadership adopted Confucian values as a "guiding light in structuring society to ensure survival and success in the changing global environment" (2007: 42). Singapore's core values of the need to show concern for the community, the relevance of making consensus decisions, and the importance of diversity and honesty appear to be present in the core values observed by the organizational fields within NUS. Entrepreneurship, as promoted by the government and the entrepreneurial university model adopted by NUS, both present ideas and actions related to survival, and both require unified efforts to achieve goals.

The documents could not specify important events in the establishment of core values at the field level (e.g., core values of departments or offices at NUS). Some aspects of the interviews may have shown indications of strains between the old and the new, in which institutional members can describe how they relate to the changes in core values—whether or not they find the fit to be tolerable (Ylijoki, 2005: 571).

6.1.4 Resources for Conducting Entrepreneurial Activities

Universities' capacity to innovate and strengthen organizational strategies within the scope of national frameworks appears to be highly reliant on the availability of funds and other resources that are derived from numerous agencies (Whitley, 2008: 35). Internal documents of NUS mostly claimed that the university is equipped with the necessary financial, infrastructural, and other material resources to facilitate institutional activities. These resources cover staff members' and students'

interests in entrepreneurial undertakings. From the university's perspective, resources have a significant impact on nurturing incubation, developing teaching and research, and forming start-ups at NUS (NUS Annual Report, 2007). The allocation of resources has been modified since the university's corporatization, driven by efforts to move away from an egalitarian model. At that time, the NUS president suggested that a performance-driven framework for research funding would be more appropriate, in order "to ensure value-for-money in research activities, as well as focus resources in niche areas for NUS to achieve peaks of research excellence" (NUS Annual Report, 2006).

NUS has pledged a commitment for substantial resources to differentiate itself and to cope with the intense competition with other universities (e.g., the G-10-10 master plan mentioned in Chapter 6.1.3). The university has also announced that the university's teaching, research, and collaborative resources are concentrated in areas that are aligned to the research foci that the government has targeted for medium- and long-term growth. These areas include environment and water technology, interactive and digital media, translational medicine, quantum information, nano science and nanotechnology, Asian studies, and biomedical sciences; in other words, the priority growth areas of Singapore that were specified in the introductory chapter. With such investment, NUS believes that it will become Singapore's prime research resource by offering expertise through its newly established centers and providing training for promising post-graduate students. In 2013, 589 projects were conducted thanks to the financial resources that were provided by external partners. The NRF has funded a total of 149 projects, including the funding of "Research Centres of Excellence" at NUS in the amount of SGD 51 million (NUS Annual Report, 2014). Resources for other university activities are supplemented by income from NUS subsidiary companies, both in Singapore and abroad.³⁴ Endowment serves as a permanent source of support; NUS received SGD 3.22 billion of such funding in 2013. Financial aid is allocated for promising students as part of NUS's quest to broaden access to learning facilities and opportunities for developing entrepreneurial ideas (NUS Annual Report, 2013). Faculty and staff members are given time to be involved in various activities, such as conducting research, going on field trips, and attending conferences, and the university approves sabbatical leaves for tenured faculty members. If students participate in events representing the university, they are

³⁴ NUS Press Pte Ltd, NUS Ventures Pte Ltd, (Singapore) and Star Incubator Sdn Bhd (Brunei Darussalam) are among the subsidiaries where the university's proportion of ownership interest and voting power is 100% (NUS Financial Report, 2014).

entitled to short-term leave of absence, depending on the prevailing rules of the faculty or school. Leave applications are not required for graduate research students who want to attend conferences and/or attend to research when faculty members have given their approval.

Various faculty-level initiatives to seek additional resources for their activities were notable in the NUS documents. In the case of the Faculty of Engineering, an agreement with the government and industry to enhance collaboration and to nurture future engineering graduates has resulted in the establishment of a SGD 75 million laboratory based within the faculty's premises (NUS Annual Report, 2014). Securing funding for facilitating joint teaching and research initiatives for NUS and other higher educational institutions (HEIs) abroad was also evident in the activities of the School of Medicine's faculties of science and social science. Some facilities connected to the faculty and school-level activities were highlighted as "first in Asia" or "first in Singapore" (e.g., the Micro and Nano-Fabrication facility that is part of the Graphene Research Centre at the NUS Faculty of Science).

Other projects that involve faculty and students have proven that both parties can work together under limited budgets, and that teamwork is important when dealing with external parties. This aspect becomes an advantage when one focuses on fields beyond information technology. The NUS president stressed that the university's goal of becoming an entrepreneurship hub would be achieved through the support of entrepreneurial students and faculty, who can provide additional resources for the university in terms of their ability to assist in drawing investors, venture capitalists, and business partners (State of the University Address, 2014). Combining resources with other HEIs in Singapore can be seen in NUS's past activities. The Singapore Centre on Environmental Life Sciences Engineering (SCELSE) is an example of a joint collaboration with Nanyang Technological University (NTU); its research activities focus on environmental engineering applications that can address problems from toxic pollutants and infectious diseases (NUS Annual Report, 2010). This Research Centre of Excellence believes that combining NUS's and NTU's resources enables both universities to share access in facilities and staff while organizing numerous projects. Following a framework of team collaboration can help expand research interactions. At the same time, the resources (i.e., skills and technologies) that both universities have contributed had an impact on achieving effective research outcomes (Singapore Centre on Environmental Life Sciences Engineering, 2015). Creating new multidisciplinary themes in research is a competitive edge for the university to attract grants from different funding sources (NUS Annual Report, 2011). The

promotion of various activities, whether local or overseas, is also described in the annual reports. These include road shows, kick-off events, and gatherings for those who are interested in entrepreneurship; faculty, staff, and even students seek sponsorships for such endeavors due to the significant resources that are required for many of them. The hiring of additional personnel to conduct research and teaching activities was also manifested in the documents, which stated that people's employment depended on performance and the availability of funds. Certain positions (for example, the positions of scientific manager or museum officer at Lee Kong Chian Natural History Museum) require fundraising skills and experience in sourcing/securing sponsorships. In this situation, the resources that the university provides assist institutional members and external partners in identifying the contact points or experts for developing entrepreneurial activities and initiatives. The flow of resources and the capacity to manage other tasks properly also have implications for future plans and decisions at the institutional level.

In recent years, NUS has built educational facilities that aim to support learning and interaction among students. The aforementioned UTown was opened to offer IT and multi-media facilities, discussion spaces, recreational facilities, and residential accommodation. Roughly four thousand students and professors reside in this facility. The seminar rooms at UTown have been designed to support academics in introducing new teaching methods and to engage students in collaborative learning. The establishment of UTown was geared toward “combining the vibrancy of campus living with an exciting learning experience in a global setting—one that fosters a spirit of adventure, inquiry and enterprise” (NUS Annual Report, 2011). A total of SGD 184.6 million in philanthropic support was received in 2012, in which 6 percent of the donors were reported to have assigned their gifts for the construction of UTown (NUS Annual Report, 2013). UTown currently accepts donations for improving educational programs, for supporting students with financial needs, and for sustaining teaching excellence (i.e., recruiting and retaining academics, residential fellows, and visiting professors).

The NUS Enterprise Incubator offers hard and soft infrastructure for fostering start-ups into sustainable companies; it has office spaces, mentors, and networks to facilitate start-up incubation (NUS Annual Report, 2009). Another recent achievement is the partnership to form a liberal arts college between NUS and Yale University in the United States. The Yale–NUS College, formed in 2011, is located close to the main campus in Kent Ridge. The college's brochure guarantees that In addition to intellectual, artistic, and professional opportunities, a Yale–NUS

student will also be surrounded by entrepreneurial opportunities. By adopting Yale's residential college system, the college's home base offers state-of-the-art facilities for developing students' chosen fields of study, research, and possible collaboration in promising projects across disciplines.

6.1.5 Structure for Organizing Entrepreneurial Activities

The chapter that introduced NUS as a case study (Chapter 5) included a description of NUS's corporate governance structure. In this section, the focus is on the structure for organizing entrepreneurial activities at NUS in order to examine the extent of institutionalization. During the corporatization of NUS, the annual reports made clear that the university's structure promotes "clear internal control systems, reporting and responsibility lines and procedures" (NUS Annual Report, 2006). Through the years, organizing for entrepreneurial undertakings at NUS has involved various modifications of programs, the establishment of offices, and the emergence of key positions that will sustain and maintain entrepreneurial activities (Silimperi et al., 2002).

Clarity in the role of certain offices within the university was intensified during NUS's transition in 2006. The 2007 version of the annual report cites two important sub-committees during this transition, which were led by members of the board of trustees. The Investment Committee's (IV's) task is to help the university in managing its funds, and particularly in generating "a consistent stream of income to support the activities of NUS as a public institution of higher learning." Other responsibilities include:

- Setting out the long-term investment objectives for the investment of the NUS funds
- Ensuring that the overall level of risk taken corresponds with the returns from the funds
- Developing an asset allocation mix and investment strategy that is designed to achieve NUS's investment goals and objectives, including the policies and procedures for safeguarding the funds
- Reviewing and monitoring NUS's investment policies, controls, and processes, including violations related to investment policies
- Supervising the selection, appointment, and termination of investment consultants, fund managers, and advisors, including the conducting of regular reviews of the funds' progress

An Entrepreneurship Committee (EC) has been organized to approve strategies, monitor strategic directions, and endorse policies in developing entrepreneurship and industry involvement at NUS. More importantly, the broad strategic directions for promoting entrepreneurial activities and university/industry interactions fall within the scope of the EC's task. Additional responsibilities include approving strategies, policies, work plans, and key performance indicators of the NUS enterprise cluster, as well as providing industry perspective on its activities.

As mentioned previously, the NUS Enterprise is the main office that supports the university in its entrepreneurial mission. It was instituted in 2001, when a professor chosen from the Faculty of Engineering was appointed as the first CEO. The main activities of the university—particularly those that are associated with technology commercialization and the internal promotion of entrepreneurship—are coordinated and managed by the NUS Enterprise. An annual operating budget equal to 1 percent of NUS's overall budget was assigned for this new division. Yearly budget increases for NUS Enterprise's operations were not planned, due to the expectation that it needed to be entrepreneurial in nature by generating revenue and securing more funding from outside sources in order to support the development of its activities.

The structure of NUS Enterprise is more lucid in describing the line of reporting and the delineation of specific duties (Franco et al., 2002). According to Wong et al. (2007: 942), Singapore's situation in adopting the aforementioned "triple helix" framework (industry, government, and universities) is weak because of the bureaucratic control by the state; a lower base of research and inventive outputs delivered by the university; and lower demand and ability of private enterprises to commercialize university knowledge. For this reason, the urgency to become entrepreneurial is more viable in order to address these challenges. The radical reform of organizational structure is necessary to influence the culture and mindset of staff in terms of knowledge commercialization. Wong et al.'s study mentions that early experimentations were conducted by the university administration before the NUS Enterprise dynamically introduced numerous initiatives to reform the university's policies in commercialization and to add an entrepreneurial dimension to its educational programs. These events took place in the late 1990s, when former NUS president Shih Choon Fong was appointed vice-chancellor and selected Professor Jacob Phang from the School of Engineering to

lead the NUS Enterprise as CEO. Academic and corporate clusters comprised the structure in NUS's original setup. With the creation of the NUS Enterprise, an enterprise cluster was added to take over some of the tasks that were previously handled by the two clusters. The corporate cluster originally handled any tasks related to consulting, publishing, knowledge commercialization, continuing education, technology licensing, and industry-sponsored research. A unit that reported to the academic cluster was taken over by the NUS Enterprise to become a university-wide entrepreneurship center for education, research and promoting entrepreneurship. The CEO of the NUS Enterprise directly reports to the university president. NUS has employed people with backgrounds in entrepreneurial activities to lead the NUS Enterprise and the offices that are under it. For instance, the current CEO has biomedical industry experience, knowledge in start-ups, and is also a patent holder. Others have been involved in consultancies, conducted extensive research on entrepreneurship in Singapore, and have had practical experience within the country's research priority growth areas. Affiliation with professional and academic associations is also noticeable in their profiles.

Under the NUS Enterprise, the Industry Liaison Office is in charge of connecting the university to industry for potential collaboration and cooperation in research, and the funding of entrepreneurial activities led by NUS faculty members and students. The NUS Entrepreneurship Centre handles conducting studies on the latest entrepreneurship trends. The former NUS Venture Support (which assisted the university in business incubation, venture support services, and seed funding related to start-ups) was transferred to become a part of the NUS Entrepreneurship Centre's (NEC's) tasks in 2006. The NEC was then expanded and renamed the NUS Venture Support to "NUS Enterprise Incubator" (Wong et al., 2014). NUS Enterprise also monitors the NUS Overseas Colleges (NOCs) in training students in entrepreneurship and providing hands-on experience at entrepreneurial hubs located in Beijing, Shanghai, Stockholm, Silicon Valley, and New York. In addition, the CEO created the NOC and NUS Venture Support, with the purpose of embarking on new activities that were not undertaken by NUS in previous years. Table 7 illustrates the changes in organizational structure of NUS Enterprise until it was revised in the year 2006.

Table 7 Evolution of NUS enterprise organizational structure 2003–2006

Units of NUS enterprise year 2003	Core functions	Revised structure since 2006
NUS ENTREPRENEURSHIP CENTRE (NEC)	—Entrepreneurship education —Outreach —Entrepreneurship and innovation —Applied research and thought leadership	The expansion includes the NUS Enterprise Incubator
INDUSTRY AND TECHNOLOGY RELATIONS OFFICE (INTRO)	—Technology licensing and IP management —Industry liaison	Renamed Industry Liaison Office (ILO)
NUS CONSULTING (NCO)	Consulting service	Discontinued
NUS EXTENSION (NEX)	Continuing education	
NUS PUBLISHING (NPU)	University press	
NUS VENTURE SUPPORT (NVS)	—Business incubation —Venture support services —Seed funding of NUS-related start-ups	Became part of NEC and renamed NUS Enterprise Incubator
NUS OVERSEAS COLLEGE (NOC)	An education program with internship in high-tech start-ups overseas	

Source: Wong et al., 2014

Promoting students’ and faculty members’ interest in entrepreneurial undertakings has affected the faculty and school structure at NUS. For example, the Institute of Engineering Leadership at the Faculty of Engineering was established to stimulate and support innovative enterprise development. The institute collaborates with the NUS Enterprise in guiding student and faculty start-ups. Programs in technology commercialization, “technopreneurship,” and incubation are also offered. The School of Computing has its own incubation center called “The Furnace,” which supports students and alumni who are interested in entrepreneurial ventures and commercialization and the development of ideas with social impact. The NUS Business School has two departments that prioritize entrepreneurship: the Department of Management and Organization covers innovation processes, entrepreneurial capabilities, and entrepreneurship

education, while at the Department of Strategy and Policy, the research cluster on Technology and Innovation covers entrepreneurship, particularly in the Asian context.

In the case of NUS, it is not easy to get rid of the physical attributes of structures. The manner in which departments or centers were established defines their purposes and tasks in promoting entrepreneurship and entrepreneurial activities.

6.1.6 Capacity Building in an Entrepreneurial University

Similar to the health sector's research, capacity building in the context of an entrepreneurial university can be understood as strengthened community action that forms a series of relationships between actors involving those who design programs or offer funding for entrepreneurial activities; those who implement programs; and individuals and groups who are targeted or encouraged to become participants in supporting the entrepreneurial mission. All of these actors are instrumental for promoting resource opportunities and sustaining entrepreneurial activities (Labonte & Laverack 2001: 112). For Singapore, restructuring a small country into an innovation and knowledge-intensive hub is a risky move. The government's view of domestic capacity building involves strategies for education, training, and retraining to prepare its citizens for changing job market demands (Sidhu et al., 2011).

Singapore's biomedical drive has been influential for NUS's entrepreneurial activities, most especially to the Yong Loo Lin School of Medicine and the Duke–NUS Medical School. Starting in the year 2000, the university conducted workshops and lectures for policymakers and government personnel in order to educate them about the country's new direction, as well as recent developments in the life sciences. Phon (2003) noted that educating the public and the government so that they would embrace this area was a challenge for NUS. The resources invested in the biomedical drive were able to provide a training center for postgraduate students in developing new ideas and collaborative work in the field of biomedicine. NUS established research platforms, methodological techniques, and support for conducting research work for assisting biomedical research practitioners at the university; this means that entrepreneurial initiatives and activities had already started prior to NUS's corporatization.

The NUS Enterprise claims to be active in reinforcing students in their entrepreneurial pursuits via the enterprise cluster; it organizes annual business plan competitions for jump-starting aspiring entrepreneurs' ideas and technologies. Business plan competitions have been staged since 1999, and were originally started by the NUS Entrepreneurship Centre (NUS Annual Report, 2009). Student groups, particularly the NUS Entrepreneurship Society, are visible in promoting entrepreneurship endeavors, particularly in promoting the portal and business plan competition called "Start-up@Singapore." This event gives student entrepreneurs the opportunity to pitch their ideas. Start-up@Singapore has attracted 3,600 teams and 11,000 individual participants over the past decade, and around a hundred start-up companies have been formed through the initiative. Today, this successful business plan competition is known as "Global Start-up@Singapore," which is a networking platform for Singapore-based start-ups. The initiative improved its activities, and began a seminar series in June 2014 in which globally renowned entrepreneurial leaders were invited to speak. The university claims that Global Start-up@Singapore offers "a vibrant community for entrepreneurs to meet, interact with and learn from each other through various activities and collaborations" (NUS Annual Report, 2014).

The Centre for Family and Population Research was established in early 2015 under the Faculty of Arts and Social Sciences; it focuses on the key mission of research, training, and mentorship. There is no direct claim in the documentation that activities are considered to be entrepreneurially related, although NUS does stress the importance of present-day issues in Singapore, especially when multi-disciplinary approaches for addressing key policy questions are applied. The university has granted the center funding of SGD 1.5 million. The center concentrates on building a critical mass of expertise at NUS by recruiting top scholars; seed grants, scholarships, and training programs for faculty and students on family and population studies are planned (NUS Press Release, April 2015).

In addition to the activities mentioned related to the Institute for Engineering Leadership (IEL) under the Faculty of Engineering, capacity building was described in the documentation through the hands-on and interactive programs available for students. This is the Institute's way of extending help to students in developing a comprehensive understanding of entrepreneurship. Setting up businesses, and financing and fundraising, are among the topics covered by the program, which runs from 2.5–5 days. Students who attend this program are assigned to project groups, and are required to make presentations. The program offers grant-writing workshops so that students and academics can familiarize

themselves with application and evaluation processes for obtaining grants from various funding bodies to support technology ventures. The program also offers projects that use “action learning” processes for developing cross-disciplinary collaboration.

NUS deems capacity building with industry and other HEIs to be important. The agreement with Singapore’s five polytechnic institutes in 2009 was described in the documentation as forming a symbiotic partnership that brings technology commercialization to another level. Agreements with industry partners should enhance research and training, and would bring scientific breakthroughs to market (NUS Annual Report, 2009). Without these partnerships, institutional members would not be fully equipped to know the latest trends in research, collaboration, and other promising ideas that would make entrepreneurial activities more productive at NUS. Capacity-building initiatives could assist in increasing the number of experts who are not only knowledgeable in various research areas, but also in processes related to entrepreneurial undertakings. Building partnerships with other HEIs manifests that amid the existing competition (i.e., for the best students, faculty, and research partnerships), devising joint initiatives can benefit both institutions in knowledge and information exchanges toward achieving their respective goals (Knight, 2011: 227).

6.1.7 Disseminating Information about Entrepreneurial Activities

NUS communicates information about its activities and achievements for the whole academic year by publishing annual reports. A calendar of events is featured to provide summaries of happenings and experiences that have taken place in a given month; the reports convey reviews of research, education, and entrepreneurship activities. In these annual institutional reports, the board of trustees and members of the university administration broadcast their views about how strategies and actions should be addressed to achieve NUS’s mission. Their respective messages are relevant for informing institutional members and other stakeholders that certain activities are taking place within and outside NUS to support entrepreneurial endeavors. Financial statements form part of the NUS annual reports, in which income received from tuition, grants, and other activities are reported; reclassifications and related amendments that are done to income statements and balance sheets are also informed for the purpose of transparency. The state of the university address is significant for analyzing the

institutionalization of the entrepreneurial university model, because it provides an opportunity for institutional members to hear the plans, strategies, challenges, and progress of NUS in undertaking various entrepreneurial activities. In his state of the university address in 2014, the NUS president stated that the university's role was to be a vibrant university enterprise ecosystem in Asia, and reported the initiatives and achievements of the past year. The university community was present for that event, including Singapore's former president, alumni, and other stakeholders. The president's speeches in these annual affairs include issues related to entrepreneurial activities.

Similarly, the NUS Enterprise posts information about events on the university's website.³⁵ The web page appears to be well maintained and updated regularly; it includes the necessary forms for collaboration agreements, and the latest versions of entrepreneurially related policies have been taken into account. The website includes links to access research projects, media coverage, media releases, and newsletters, where certain information is categorized as being "NUS Enterprise"-related and "incubatee"-related. Potential industry partners can access the NUS Enterprise Technology Database to search for university technologies that are available for commercialization. Funding opportunities for researchers, aspiring student entrepreneurs, industry (non-start-ups), social enterprises, and expanding start-ups overseas are announced on the webpage. Interested parties can seek funding opportunities from less than SGD 50,000 to up to SGD 500,000.

More importantly, the NUS Enterprise webpage showcases successful stories of start-ups. Student groups who are involved in entrepreneurship endeavors use social media to inform the public about their activities. For example, N-House student residents use their website and Facebook page to notify the public about their weekly activities, which involve workshops and pitching and information sessions with entrepreneurs and student start-ups.

Faculties and departments publish monthly, bi-annual, or yearly newsletters that target a broad audience to communicate the latest research in their respective fields. The newsletters report on conferences; staff, student, and alumni activities; and gifts (e.g., scholarships, financial aid, and research funds) that the faculties have received from donors. Brochures and other marketing paraphernalia that contain entrepreneurially related activities and information are available online and on the NUS premises. Studies about NUS's entrepreneurial undertakings offer a platform for information sharing, and new ways to investigate the university's commitment toward the government's goals in developing entrepreneurship in Singapore. Some

³⁵ NUS Enterprise web page can be accessed at <http://enterprise.nus.edu.sg/>

of these studies (e.g., Wong et al. [2011], as considered in this dissertation) were initiated by NUS employees who were experienced in entrepreneurial undertakings and who aimed to advocate their results (Silimperi et al., 2002) to improve such activities, not only in Singapore, but also for other countries to consider.

The Faculty of Arts and Social Sciences launched an online portal for researchers to retrieve previous studies that are considered to be important to Singapore. The Singapore Research Nexus is a repository of seven thousand publications that covers fifteen departments of the Faculty of Arts and Social Sciences (NUS Annual Report, 2011). The initiative aims to improve research by conducting further studies to encourage new ideas, thus bringing about access and opportunities for faculty members to collaborate.

6.1.8 Rewarding Entrepreneurial Efforts

According to the NUS website, university employees receive “remuneration packages that are driven by market competitiveness as well as organization and individual performance” (National University of Singapore, 2015). Academic staff can participate in activities such as conferences, field trips, and data collection for research by filing a leave for academic purposes. Staff members can enroll part-time in graduate programs at heavily subsidized fees. Health and well-being are taken care of, as staff members perform different tasks within and outside the university’s premises.

NUS recognizes the efforts of its institutional members in their commitment to education, research, and service through the annual University Awards. In this event, recipients of the Outstanding Educator Award, Outstanding Researcher Award, Young Researcher Award, and Outstanding Service Award are presented with their awards. Other faculty members’ achievements are also acknowledged in the university’s annual reports. Yearly conferences organized by NUS recognize people who contribute “the best and brightest ideas to the entrepreneurial community” (NUS Annual Report, 2013). The “InnovFest” conference gathers entrepreneurs and collaborators to share insights on innovation- and entrepreneurship-related activities. Participants hear feedback about their latest ideas, including information about licensing and collaboration agreements. Promising NUS start-ups and NUS Innovator Awards are also conferred during this event. NUS Enterprise provides awards for student teams by funding up to SGD 10,000 per project, recognizing the innovativeness in their ideas and for pilot-

testing their technologies (NUS Annual Report, 2011). Faculties extend their appreciation to members who raise the faculty's profile because of their contributions' impact on Singapore. As an example, the Faculty of Science presents the Outstanding Science Entrepreneur Award to researchers who have made a valuable contribution to society, technology, and/or industry based on their projects in the last five years.

The NUS documents described that the university is committed to providing substantial resources to reinforce its members' efforts, most especially for the establishment of excellent programs and departments that complement the university's corporatization (NUS Annual Report, 2007). NUS has consistently secured grants from the government and other agencies to foster its activities. While this should fall under the category of "resources," the ability to ensure that funds are received appropriately in various fields of study is an overall strategic incentive. This aims to motivate researchers and to advance research activities in the country. Interestingly, research funds at NUS increased from 28 percent in 2008 to 33 percent in 2013 (NUS Annual Report, 2008 and 2013). It is generally assumed that increases in fund allocations generate positive responses from academics to contribute to various projects, not only to lift the profile of their faculties and the reputation of NUS, but for their personal career development.

6.2 Interpretations Based on Interviews: A Frame Analysis

The categories of frames that were discussed in the Methodology chapter (Chapter 5) are applied in this section.

6.2.1 Disciplinary Identities: Interpretations of the "Spirit of Enterprise"

In Davies' (2001:26) observation of European universities, he saw the need to understand the culture at universities prior to their transformation as entrepreneurial institutions. Davies describes that more often, the culture is highly individualistic, protective, and there is a denial of the need for overarching approaches to take place at faculty or university levels. The same issue was pointed out by Clark (2001: 22), in which he highlights that the university's disciplinary base molds institutional functioning. Research and teaching activities are linked to disciplines that vary extensively in terms of training, orientation, skills, practices, and loyalties. Entrepreneurial behavior at NUS was explored in the study by

collecting interview data on the meaning of the “spirit of enterprise.” In NUS’s vision, mission, and strategy statements, the approach is to foster and inject the “spirit of enterprise” into its education and research. During the interviews, institutional members were asked how the statement applied to their respective office’s or department’s activities. The idea was to examine the various interpretations of this statement, particularly the awareness of the institutional members about which direction the university wanted to pursue. The results also exemplified the attributes that define disciplines and boundaries in terms of the tasks and priorities of its members.

In this study, the interviewees’ experiences in entrepreneurial undertakings are related to filing patents, supervising students’ technology inventions, running spin-off companies, and actively participating in project proposals that are relevant to Singapore’s national innovation system in terms of contribution to clinical practice, engineering technologies, and the growth of local enterprises. Raising funds, organizing events, engaging in consultancy work for industry, and promoting teaching and research programs (both within and outside Singapore) are considered to be entrepreneurial activities. The majority of the interviewees were department heads and institute directors. They stated that the task of *promoting the “spirit of enterprise”* was not part of their key performance indicators (KPIs), and they emphasized that they were not expected to generate income or lead income-generating activities. As noted earlier, the following quotes have been edited very slightly; as a reminder, *university administrators* are coded as *UA*, and *teaching and other professional staff* are coded as *TPS*.

Our KPIs are different. We usually look at the number of students, employability, and the contribution of students, such as awards and publications. We finish the money, but not really to come up with income-generating activities.

—TPS5

Nobody really restricts me. I mean, I have to support another person’s grant applications and so on. Grant getting, let’s say ... it’s not part of what I’m expected to do. It’s not the core mission. I do an international summer school, which generates a small amount of income, and you could say that in some way, that’s an entrepreneurial thing. At the department, we fairly accumulate a little outside help and support in partnership with an association outside NUS. The primary aim is not to generate revenue. So

much is to build this faculty in the region and knowledge of the social sciences, so we're not primarily focused on profits.... If we integrate an entrepreneurial framework, it devalues the material.... Many [people are] sensitive to the fact that there are more and more self-goals on what you turn in to students in giving them an education.

—TPS10

Income generation is always secondary. Income generation is maybe compelled, especially if you're facing challenges. For us, we went on income generation or fundraising because we want to do something, not for trade but for the country. Is it in my KPI? No. Do I want to include it in my KPI? No. Do I really care? No. I've been taking care of an institute in the past where I have to persuade stakeholders to put money into research projects to keep the staff alive. So I'm used to living on soft money; looking for money to pay for project staff facilities. My mentality, I suppose, everything I had, I have to fight for it...

—TPS6

One response from a TPS member explained that it was common to observe that academics at NUS are more concerned about their KPIs, because they are often judged by their research publications. Innovation- or enterprise-related tasks are not part of their KPIs. Unless the university takes action to modify its reward system, many faculty members will not likely be convinced to participate in entrepreneurial activities or to encourage their PhD students to work with them. In line with this, another respondent did not directly answer the question of whether income generation was part of his tasks, but the need to interact closely with industry was highlighted. It was noted that the basis of promotion and tenure at NUS was research quality and research with a societal impact.

The idea of enterprise being linked to generating knowledge that will have an economic impact was consistently observed from the respondents who had a background in engineering. They stressed their responsibility for creating jobs for other people, and said that their focus was to meet the needs of future engineers at the university. In particular, they are expected to propose many transferable ideas. Also depending on the involvement of faculty members in other disciplines vis-à-vis entrepreneurial activities, entrepreneurship may compliment rather than oppose some of the norms and values of higher education. For instance, the case of those from the Department of Social Work can treat the relevance of entrepreneurial

activities as being beneficial because of their need to procure resources that will support community projects (Mars, 2007: 45). Similarly, some institutional members believed that multinational companies in Singapore typically show preference for training people who have an entrepreneurial mindset.

From the insights of the respondents below, the “spirit of enterprise” statement is *meant for departments that are involved in practical, real-world applications*.³⁶ This is another indication that scientific disciplines are different from non-scientific disciplines in terms of their culture and practices (Becher & Trowler, 2001). The spread of entrepreneurial ideals and practices across disciplines overlap the boundaries of universities because of growing opportunities to conduct activities outside the classroom (Kretz & Sá, 2015: 83). As such, disciplines that use different fields of inquiry and methods (Lewis, Ross & Holden, 2012) add to the complexity. Baschung (2014) notes that fragmentation is an unavoidable fact in the setup of universities, thus making it difficult to execute actions that are used in business, such as the entrepreneurial university model.

I think it’s more difficult for departments like English literature, philosophy, or history, because there are fewer opportunities to seek outside funding that is granted, on the basis that people can see (in a way) that there are direct, real-world applications. If, for example, the nature of a bank, which better understands the operations of foreign currency markets, [the bank] may go to our economics department and ask if there’s anyone doing sophisticated new research that might shed some light on this. That makes it more difficult for disciplines like ours to attract truly outside funding. This discipline is seen widely in the general community as having direct relevance to the life of the country, society, or a community. But it is indirect, it is never going to provide direct financial stimulus to economic growth and development. So it is always a matter of making the case that funding projects in this discipline ... by academics or others is necessary because communities, societies, and countries have a soul that needs to be nurtured, not just the “balance sheet that needs to be in the black” fad.

—TPS14

This drive to entrepreneurship [means] to take academic knowledge and convert it into applied knowledge. So when you talk about us in the basic

³⁶ In the case study, respondents mentioned Social Work, Applied Economics, Engineering and Medicine as examples of departments with practical real world applications.

sciences, [it's] much harder to convert them into applied things. Because the problem with entrepreneurship and so on is that entrepreneurship is more [about] making money. If you're looking at converting scientific knowledge into applied sciences in [an] entrepreneurial sense or basic sciences, I'll say good luck! This is where state or university investment would have to come in.

—TPS6

With institutional members who have been employed at NUS for more than a decade, they felt that the “spirit of enterprise” was different during those times when they struggled to fund their projects and to introduce innovative ideas to the university. Teaching activities were manageable for them, but they perceived engagement in entrepreneurial activities without the guarantee that their business plans would be accepted to be stressful. This changed completely when NUS started prioritizing entrepreneurial activities, and stakeholders expressed interest in the knowledge and technology produced by academics and students.

A clarification of the idea of “enterprise” was considered for this study. The statement below highlights an interviewee who worked in the university administration, and who claimed that *it was not compulsory and not for everyone*. The question focused on the ways in which the university makes the “spirit of enterprise” more comprehensible and acceptable to other institutional members, particularly to those who are not engaged in commercialization and other types of income-generating activities. Academics are supposed to be working in harmony for the development of the university. However, the statement below suggests a dimension of identity that could exclude others purposely or unintentionally (Wondolleck et al., 2003: 209).

At the level of educating and creating awareness, our vision here is broad. You know, this idea of enterprise, it's not compulsory. I mean it's offered for those who are interested. We're realistic that entrepreneurship, this idea of enterprise is not for everyone. The anthropologists, the sociologists, the historians ... if they're not interested in entrepreneurship and they're not even aware of this office, or they're not aware of the entrepreneurial university model, I think that's understandable, because they don't need to. They don't have to.

—UA3

Nonetheless, it was not always the case that institutional members were aware of the “spirit of enterprise” nor the “entrepreneurial university model.” In addition, the findings prior to the data collection in Singapore show how some TPS institutional members exhibited reluctance and a lack of enthusiasm to discuss NUS as an entrepreneurial university. Although these institutional members were invited to participate in the study, unfortunately neither granted my request, for the following reasons:

I am afraid I have no idea in what ways [NUS is a] “model” as an “entrepreneurial university.” Indeed, I would be most disappointed if it is.

[and]

I have looked through the questions below; none of them applies to the sociologist and anthropologists, as none of us are involved in any entrepreneurial initiatives. So, there is no need for you to interview me.

—Email correspondence with a faculty member from the School of Social Sciences and Humanities, 30 September and 1 October 2014

I am quite hopeless when it comes to such topics. Honestly, it is not a lame excuse, I am. If you wanted to discuss physics I would be your man but for the entrepreneurial university model you will be better off talking to our Admin Director___ or Deputy Director ____.

—Email correspondence with a faculty member from the Physics Department, 24 September 2014

TPS15 was assigned to another campus as director of an institute, which made me wonder if the main campus at Kent Ridge had a different approach to promoting the “spirit of enterprise.” Compared to TPS3, who was also based at the same campus, the interviewee’s responses below (and in most parts of this study) evidently presented awareness about NUS being an entrepreneurial university. It may have been easy for TPS3 to share perceptions about this study because of the work background associated with entrepreneurial undertakings (namely, marketing and program management), which entailed more involvement and interaction. TPS15’s exposure only concerned developing policy-oriented research, even though the scope was within the priority growth areas of Singapore. There was no pressure on TPS15 to be involved in income generation, because the school is financially in good shape in terms of operational and expansionary needs. TPS15 referred to TPS3’s department as being more profit-oriented, because they sell programs.

“Spirit of enterprise.” Yeah, actually it is quite interesting because it is maybe ... the first time I [have come] across this term. Maybe different parts of the university emphasize different things; I think in my recollection this has not made a big wave in the schools here, at least to my knowledge. And I think this would probably be more I guess in other schools, other departments. But here, quite honestly, I don’t necessarily know that there is such an emphasis on this; like I said, this is the first time I have heard about this.

—TPS15

... we are self-funded, we raise funds ourselves, we provide scholarships under our own funding. For example in 2007, a businessman from Hong Kong, he gave us a hundred thousand million ... a hundred million US dollars. So we raise funding that way ... from donors, from individuals. Basically, the school is independent. Our department is like a self-sustained department under the school. What we do is we have about sixteen people who work here. The school uses its money to hire people. So what we do is we give our short-term programs and we sell these programs to governments, to corporations, to international organizations. So that’s how we generate income.

—TPS3

In conflict research, the escalation of issues is more visible because of the ongoing public debates and the role of the media in structuring interpretations that can influence public perceptions. Compared to this study, the intensity of issues in entrepreneurial activities becomes apparent when individually exploring the views of institutional members at the university. Statements about exploring the “spirit of enterprise” at NUS have exposed the nature of identities, including participants’ grievances and goals, in which it is quite difficult to expect possible mutual accommodation (Kriesberg, 2003).

Both conflict research and issues in higher education appear to be facing the challenge of how to deal with these differences in identities that will allow for a way forward (Raitio, 2008: 220). In general, institutional members feel that the university’s focus on entrepreneurship, and functioning in an enterprise environment, are two different things. The focus on entrepreneurship is significantly related to spotting entrepreneurial students who are interested in forming companies and developing inventions with the potential for

commercialization. Taking risks and bringing value to work that is conducted (e.g., research with societal impact) makes for an enterprise environment, but the results that their respective disciplines pursue are sometimes not money-making endeavors. Departments may be under tremendous pressure to bring students into their programs. With that in mind, the abilities to attract more students and to create funding opportunities are other ways to show that the university can deliver effective education services.

6.2.2 Institutional Configuration

Institutional members characterized NUS's setup as an entrepreneurial university; they provided insights on policies, mechanisms, support, and incentives to conduct entrepreneurial activities. More importantly, this frame raised issues about the coordination of activities at the university. Both the TPS and UA institutional members were aware that the *policy environment at both national and institutional levels have clear intentions*. Singapore mainly strives to become a global enterprise hub. The vision of becoming a "global knowledge enterprise" expects that the institutional configuration will provide a foundation and will have a favorable effect (Tohyama & Harada, 2013) on NUS. The same goes for Singapore being a small country; it needs to be dynamic and should always strive for the best results in order to survive.

One way to develop an entrepreneurial society is to support, guide, and reinforce the university to make this happen (Silimperi et al., 2002). The interviewees in this study could not provide an accurate response to the question of why the term "entrepreneurial" was accentuated in the NUS documents. Those who had been employed for years believed that the university wanted to use it as a catchy term associated with globalization. In terms of traits, being an entrepreneurial institution connotes flexibility and taking initiatives, and there is the willingness to seek opportunities. NUS hoped to become robust, and not just a university that treated itself as an ivory tower. From the university administration's point of view, another motivation for NUS to concentrate on the entrepreneurial dimension is to address Singapore's need for increasing graduates' employability. Similarly to the perception of UA3, TPS12 explained that being entrepreneurial is not something that is imposed at NUS. The idea is to provide opportunities and support for those institutional members (including students) who are interested in

doing so. There is the aspiration that everyone at the university will be innovative in their way of doing things.

The issue of funding in particular garnered positive views; interviewees pointed out that *opportunities to jump-start entrepreneurial initiatives are well-supported by the university administration*. A TPS interviewee clarified that as an entrepreneurial university, the generous funding they got was not only to encourage self-sufficiency in the long run, but to nurture the students' entrepreneurial mindsets. Some TPS interviewees who were institute directors acknowledged the importance of certain positions that require fundraising skills; they explained that the current situation of universities no longer allows scientists to sit in the corner and focus only on research. In essence, institutes' long-term goal is to be financially autonomous. Opportunities for institutional members to seek funding from outside sources are communicated centrally, and are accessible to everyone. The university administration demonstrates a top-down approach in encouraging institutional members to be active in submitting grant applications. They take note of deadlines to ensure that departments, faculties, and institutes will not miss the opportunity to apply. Likewise, information is disseminated to social media accounts. The university is up to date with the funding applications of government agencies such as National Medical Research, the NRF, and the MOE. Some departments have formed research recruitment committees who are responsible for encouraging members to be active in seeking grants.

There was consensus that *leadership played an important role during the transition of NUS toward becoming an entrepreneurial university*. The interviewees recognized the influence of some university administrators and faculty members. In addition to giving proper support to institutional members, good leadership ensures that bureaucracy is kept to a minimum and that there are few barriers, especially in conducting research.

In another example (below), an institutional member from TPS characterized their head, who took the initiative of founding an institute to develop entrepreneurial activities at the Faculty of Engineering.

It's all because of Professor____. He would say he's a troublemaker, but [for me] he's a visionary. He set the beginnings of many things. If the effort is not embedded in this institute or faculty, it won't happen. Somebody needs to be that ... with good background.

—TPS11

TPS11 added that as faculty members, they also made students realize the importance of leadership. Even with the university's strict policies for PhD studies, one student took the initiative to change his dissertation topic in order to develop his ideas that were done at the lab. He made efforts to raise money to support his new research topic, and sought the support of the faculty to commercialize his project (which was related to vaccines). According to TPS11:

We can see more and more of this coming in different ways. Our students are getting the routines to help lead this stuff. It's not the only example; we have more. That's what I mean by leadership. That would not only have to [mean] I'm a manager of a big team, describing the initiative to step over ... creativity altogether makes a difference.

Funding in connection to *rewarding individuals for their contribution to successful entrepreneurial outcomes is still underdeveloped*. For instance, academics do not gain incentives from converting IP to an enterprise. Instead of being rewarded, the university gets a share of the income (10–20 percent) from academics who use campus facilities during pure consultation work with industry. The publication of papers has corresponding incentives for most departments. The interview data showed indications that institutional members would like to have had access to the rewards that were commensurate with the changes in their academic needs (Bland & Ruffin, 1992). Respondents in the engineering field thought that students deserved to receive incentives (e.g., dividends) for their enterprise contributions. For some institutional members, the endowment they received may have been a form of incentive, but it was not acceptable to them to treat the endowments that way in the long term. As TPS6 stated, “incentives must be real.”

Unfortunately, few institutional members were aware of any incentives that were given by the university, despite their contributions to entrepreneurial undertakings. Based on observation over the past two decades of employment at NUS, an institutional member from TPS “framed” that *rewarding efforts is a game system*. This problem caused the respondent to be reluctant to talk about the current state of group projects, including personal achievements:

It is a game system here. In a very small place, we compete against each other, which is really unhealthy. We only have a small number of universities, with few professors. In order for me to get a good score so I can be rewarded, then somebody has to move. The more I publish, then I

will be up. I'm not concerned about me and the world. It's me and my friend. So we are competing, which is pretty stupid. So that is the system here, it is a game system. I'm very open to you. If you want to be successful in an ecosystem, you have to bear these things. They do not generally celebrate your success, because it's a game.

—TPS1

In the case of US higher education institutions, the interviewees stated that commercial output and institutional achievements are connected to technology transfer offices (TTO) at universities. TTOs contribute to providing essential and adequate conditions for university members to participate in entrepreneurial activities. When there is a failure to provide the necessary support for commercialization, however, it is most likely that institutional members will directly commercialize their research through the help of their own formal and informal networks (Göktepe-Hultén, 2008: 662). The majority of the respondents pointed to the NUS Industry Liaison Office's (ILO's) task of supporting students and staff in transforming inventions and in strengthening partnerships with industry. They believed that an entrepreneurial university should have a strong internal support system. The findings of the case study stressed how respondents often initiated communications but *were not getting enough from the ILO*.

For me, an entrepreneurship organization is to get a bunch of people who really think out of the box: the type of people who are willing to make calls to anybody, contact anyone, and they help someone. That's it! At the end of the day, how many people did you really help? How many people were you able to help start their own company? How did you do it? How did they keep them sustained? ILO is a large organization. Everybody is in the office working in their computers. I don't know what they're doing. Most entrepreneurs who really want to do something ... need help. They would go to them, talk to them, and try to get help, but they do not get instant help. Sort of like difficult for them. I've met people who are really enthusiastic in order to do something, but the problem right now is hiding in the system. All the energy is going through that, rather than focusing on trying to develop technology. Also, the interface between them and the ILO office is not so good, not so efficient. It needs to be streamlined.

—TPS4

Though the department is somehow successful in spinning off companies, ILO's job is quite far from MIT's operations. They only match up potential industry partners, but they are not that active.

—TPS8

If you are from Harvard or MIT, you no longer need to be noticed by the tech office [ILO]. They come to you. They come to look at your technology. I have a more symbiotic relationship with the government agency called A*STAR. There is synergy when we work. We shape all of the practices that we know. This side of the university, they have never asked for my opinion.

—TPS1

Some of the respondents mentioned that their upcoming events were already running out of topics to discuss. The ILO could not give good referrals for their forums, particularly the right entrepreneurs from various industrial sectors (not only those that are IT-related) for people to get in touch with. Submitting “proof of concept” to the ILO has been difficult because of the questionable evaluation process. Feedback is given, but no fixed criteria are utilized to understand the basis of rejection. Interviewees also noticed the quick turnover of employees at the ILO. Some were more satisfied in dealing with the A*STAR Foundation because, in addition to funding, the group tracks potential partners well, and the matching is often successful. While it is important to consider the business perspective of acquiring help in finding venture capitalists, more and more start-ups rely on experiences. Based on the interviewees' experiences with venture capitalists found through outside help (e.g., A*STAR), the packages that they are offered include funding and guidance from high-caliber people.

An important characterization of ILO's task is to focus on setting up avenues that will encourage participation of more institutional members in supporting the university's entrepreneurial mission. One respondent suggested that the university needed to think of another paradigm in order to resolve this issue about the ILO because its current arrangement (i.e., policies and practices) is only hampering other institutional member's participation and contribution in developing NUS as an entrepreneurial university. Another observation raised by one of the respondents is the condition of NUS researchers who work on projects at

Singapore's Biopolis. Researchers who were assigned there often do not seek help from the university, since they have everything they need compared to those who are located at the three NUS campuses. The researchers at the university campuses will often go somewhere else if the ILO cannot provide them with the resources and help they need.

During my fieldwork in Singapore, I had the opportunity to inquire about other offices at NUS about the coordination of entrepreneurial activities. When I sent the invitations to participate in the study, some of the respondents' initial reactions were that income generation (including the scope of interaction with stakeholders) should be inquired from another office, because income generation was not part of their main activities. For instance, I learned that the Alumni Relations Office usually makes the first contact with NUS alumni, and the Development Office³⁷ is in charge of fundraising aspects. The Office of the Vice President for University and Global Relations deals with internal and external stakeholders, covering those people and groups who have academic, research, enterprise and education, and overseas components. An interviewee from UA admitted that there was some overlap in these offices' activities, and that in some situations they either divided up the task or did things together.

Meyers and Pruthi (2011: 350) suggest the relevance of having robust internal and external networks in the definition of an entrepreneurial university. NUS dynamically collaborates with international universities; these collaborations cover student mobility programs, internships, and other activities that are closely related to research. NUS's interactions with local HEIs is not very strong, because institutional members recognize the competition between them. Internal collaboration across disciplines, however, appears to be improving. Kretz and Sá (2015) see entrepreneurship in higher education as a broad phenomenon; the authors explain that in addition to governments and entrepreneurs from the local community, philanthropists and non-profit organizations join universities in developing courses and programs that focus on entrepreneurship. NUS is experiencing the same phenomenon. Aside from offering courses dedicated to creating ventures and advancing innovative ideas, the university has a center that concentrates on social entrepreneurship and philanthropy under the NUS School of Business.

³⁷ As described in an email correspondent with a representative from Alumni Relations Office, anything entrepreneurial is handled by the Development Office. The acceptance of donations from alumni is the responsibility of the latter.

Students are exposed to entrepreneurship education via experiential learning through courses organized by the NUS Enterprise and by joining the NOCs for internship programs. Other faculty members have tried to develop courses in order to enhance the scope and range of entrepreneurial education. Interviewees perceived rankings and accreditation as factors for continuously improving entrepreneurship programs and courses. Students are free to take entrepreneurship courses if they are interested.

Within the social sciences, institutional members recounted that some of their graduates were successful entrepreneurs because of the exposure provided by the university. Interestingly, those who were in the social sciences believed that imagination and creativity were two of their main advantages. They felt that they were able to adapt to certain tasks in their departments, despite not having management or entrepreneurial training. Likewise, interviewees (e.g., those in the basic sciences such as biology) said that entrepreneurship courses should be placed elsewhere or should be the task of the NUS Business School. The basis for evaluating education programs is determined by how they can add value, but is not specifically related to looking at their compatibility with the entrepreneurial mission. In general, most of the interviewees described the education curriculum at NUS as being liberal and multidisciplinary.

The school and faculty levels have encouraged collaboration across disciplines and with other HEIs. In the fields of medicine and engineering, students and faculty members were encouraged to intensify collaboration to explore different areas, particularly in the School of Medicine, where clinically based activities are constantly developing. Another interviewee (from TPS) never experienced collaboration between the engineering and social science departments, but that they were nonetheless trying. The reasons identified were similar to those found in Hagoel and Kalikin-Fishman's study (2002: 298), that having to make justifications for such collaborations and interdisciplinary outcomes affects the plans. Some respondents currently find that individual faculty initiatives do take place, where people help their colleagues to seek collaborators; they believe that this is a minor contribution for developing an entrepreneurial ecosystem.

Shmueli et al. (2006) found that characterization and identity frames are sometimes connected when analyzing environmental conflicts, because these situations illustrate how people attempt to strengthen their own identities while justifying their actions toward other parties (e.g., the way we frame opponents as our opposite). In the current study, one of the interviewees brought up the topic of the "spirit of enterprise" statement to justify NUS's overall actions. Instead of

categorizing the response under the “identity” frame, the statement below falls into the “characterization” frame, in which the *attitude of Singapore toward entrepreneurship* is depicted in relation to the university’s transformation and setup as an entrepreneurial university:

I think going back to the Singaporean mentality, [to the] the mindset in Singapore ... because it’s a resource-constrained country, right? They have to generate income from anything and everything. So what they have now is the knowledge and enterprise. So they are selling their knowledge, they are selling their expertise, and that’s how they make money. Singapore strives to be number one in everything; that’s why I think everyone has the entrepreneurial spirit in themselves.

—TPS3

Other responses during the interviews also demonstrated the characterization of Singapore, by raising the inquiry about attracting foreign talent as a recommended task of an entrepreneurial university in newly industrialized countries like Singapore (Wong et al., 2011). Research institutes wish to retain their own PhD students and foreign talent because these people provide a vibrant environment for research. Having the opportunity to choose good international candidates is particularly relevant in the field of sciences. Some departments have experienced a decrease in the number of international students who are coming to the country (both graduate and undergraduate level). Nevertheless, retaining talent is not always possible because institutes operate under soft money. Singapore always wants faster ways for coping with the changing environment, and this affects the institutional arrangement of NUS.

The interviewees “characterized” that foreign talent that comes to Singapore (and even local talent) must know how to deal with an “impatient country” (as emphasized by TPS6). Engineering-related projects, and those within the scope of Singapore’s priority growth areas, are in demand. The institutional members who were interviewed recognized the contribution of this talent to the university’s targets of developing research and promising local enterprises. While NUS has money allocated for attracting foreign talent and for sending local talent for training abroad, it is also challenging to retain both types because career development in academia is quite slow, and one should think of the opportunity cost, especially for engineering graduates. Another interviewee noted that aside

from the slow progress in academia, attracting and retaining talent (both local and foreign) needs to address Singapore’s pragmatic nature:

If they continue working here, they won’t get that break. If you come back, then come back. By that time, you’re a very different person, you know, with a modified perspective on what can be done. Some sciences pose difficulty because Singapore’s pragmatism is like what I’ve said emerges on how can I do ... what can I change during PhD training ... why are these things not working in Singapore? When we subsidize and train them here it can be a problem. We try to look for knowledge goals and compute the deliverables within a matter of a year or two years after graduation, then compute them over five or ten years—that sort of impact.

—UA2

6.2.3 Strong and Vulnerable Actors

This section depicts the notion of “strong” and “vulnerable” actors in the entrepreneurial university setup. The interviewees focused on NUS’s major transitions through the years, and consistently highlighted the corporatization of NUS in 2006 as a major transition. They frequently mentioned the government being a dominant institution that set the rules, sanctions, and pressures in developing higher education activities. It was evident that the government trusts NUS’s capacity to extend the output and benefits of university activities to society at large. Similarly to countries that experience massive changes in their higher education systems, the results of the current study provided proof that the government expects to go beyond the traditional methods of university operations (Coaldrake, 2000: 8).

Some institutional members said that even with the flexibility and autonomy that was granted to NUS, *corporatization does not mean total independence from the government*. For instance, financial matters are still subject to civil service guidelines, despite having flexibility to make certain decisions. Respondents also frequently mentioned that the government’s pragmatism is evident in its investment in higher education, because of its belief that such investment will have beneficial and achievable results. As the main provider of higher education resources, the government has high expectations and closely monitors the university’s output. The government’s influence is visible in the heavy investment that is allotted for Singapore’s priority growth areas of research, covering the biomedical sciences,

environmental and water technologies, and interactive and digital media. The high-tech facilities, projects, and programs—and the best students and researchers in those areas—are found at NUS.

While the success of the US model is often attributed to the fact that the United States has many successful entrepreneurial universities, an institutional member from TPS clarified that it is wrong to believe that Silicon Valley, for example, was developed by the private sector alone. The US government was also heavily involved, and there was nothing wrong with Singapore's top-down approach.

The degree to which resources are assigned for specific projects and activities can increase fragmentation (Whitley, 2008: 36), especially in the case of disciplines that cannot associate commercialization as part of their activities. The respondents also emphasized power as an element that determines the behaviors and outcome (Diehl, 1992: 334) of issues related to entrepreneurial activities at the university. While they consistently mentioned that funding had never been an issue at Singaporean universities, the institutional members' statements below denote their views about *who gets the most attention from the university*.

We are usually less funded [than other programs]. In terms of commitment to liberal arts, this new Liberal Arts College that was built ... you know, I don't have a lot to say, but it was a very good thing. That goes for an extra faculty: many of [these new faculties] are very good, and it [new Liberal Arts College] got some international attention. They have been well funded. There have been unmistakable economic realities that make funding differ.
—TPS10

People in disciplines such as ours, which tend to be more about training people to think and not about training people to be directly ready for a job ... we're not a law school, we're not a med[ical] school, we're not an architecture program ... we don't have direct connection to a field of employment. Such disciplines ... ourselves, [the] philosophy [department] ... we really have to make more an indirect case for the relevance of our work to those who might choose whether or not to support us financially.
—TPS14

The results presented the difficulty of some disciplines to prove their appeal and relevance. Because the government has set its focus on entrepreneurship and allocates vast amounts of funding, it targets specific areas for this purpose. The

depiction of vulnerability in the case study can be connected to the views of Kogan and Henkel (1983), who write that the government's knowledge frames may not point to academic disciplines, but rather on policy areas that are targeted for long-term growth. In this study, however, the government's knowledge frames may have produced considerable effects on academics and the university's efforts to intensify its entrepreneurial activities, most especially on the institutionalization of the entrepreneurial university model. Despite some disciplines' contributions to policymaking and collaboration, the university might pay more attention to other disciplines, especially if their output is readily usable (e.g., applied research by the field of engineering) and compatible to sponsors' agenda, since the sponsors are also the prospective users/benefactors of that output (Kogan, 2005; Buxton, Gonzalez-Block & Kogan, 2002).

Though industry has strong linkages with the university, its influence on faculty or department activities varies. Based on the interviews, most of these industry partners are multinational companies. In certain projects with the government and universities, there is the expectation from industry that it will be a co-investor. A respondent from TPS said that industry does not provide direct funding in their discipline, and that this is actually a cheaper way for industry to fund research through government calls. A respondent from the engineering department mentioned that industry input is crucial in improving the department's curriculum.

Interestingly, the notion of power was reflected in the faculty members' expertise in performing entrepreneurial activities. While familiarity with the process of entrepreneurial activities makes some institutional members feel that they are justified in expressing opinions about how things should work, it was evident in the results that individual efforts in promoting an entrepreneurial culture were not only for the pursuit of resources that will help sustain their own projects or taking action due to institutional pressure (Mars, 2007: 44).

It is relevant to point out here that the role of individuals in pioneering certain activities can encourage the development of new sets of behaviors that may be accepted by others. According to Göktepe-Hultén (2008), the course of interaction between individuals can be seen as the institutionalization of the acceptance of new behaviors. The power of expertise demonstrates the relevance of entrepreneurial role models who exemplify behaviors for others to follow. In this frame, interviewees are *accentuating their individual efforts*:

All the collaboration that we had with companies, they all happened when I came. I think the previous director was not into commercialization. I took

the opportunity, and it's hard to push everybody. People don't want to go up [referring to institutional members' effort of initiating change through entrepreneurial activities].

—TPS13

... all entrepreneurship programs in the country are managed by bureaucrats, not by entrepreneurs. What I can do is to set my own model, create some entrepreneurship activities, be sure that it will become successful, and then I've got credibility. Then people can emulate the model and I can work with them. That's my future direction. For me, if you want to criticize somebody, be ready to say how to fix it. If you give a comment, give ways to fix it.

—TPS4

In other interviews, power was illustrated by individuals giving voice in the process (Schmueli et al., 2006) of conducting entrepreneurial activities. Most interviewees were fully aware of NUS's policies in conducting entrepreneurial activities. They did not express sentiments about how certain policies limit their teaching, research, and activities pertaining to spin-offs/start-ups, including the acceptance of consultancy work. They did raise the topic of awareness of codes of practice, because of the assumption that this is a complicated topic that sets the financial aspects and time that faculty members are allowed to spend for activities other than teaching or research (Martinelli et al., 2008). Nevertheless, they brought up other issues related to improving the process of entrepreneurial undertakings within NUS. An institutional member from TPS *attempted to suggest* a systematized way of logging submissions of proposals to the ILO for easy tracking. Unfortunately, it was not implemented, but the interviewee thought that approaching and personally talking to them would help in improving the coordination of entrepreneurial activities. Especially considering the numerous agreements that the ILO brings to the university, it is its responsibility to handle these agreements properly. Other institutional members from TPS also stated that they *tried to approach the university administration* about restrictions on PhD students in performing entrepreneurial activities. One person claimed success in taking action, while another said that it was difficult to settle issues with an established organization like NUS. The results of the study show that institutional members' voice and expertise are interrelated in terms of the power frame's characteristics. In analyzing the institutionalization of the entrepreneurial university model, the

institutional members tried to address issues that hampered entrepreneurial activities by demonstrating flexibility in action and proffering their evaluation as experts (Owen-Smith, 2011: 64). The interviewees included in this study are representing groups of professionals from basic units where actual work is accomplished. Their voice in the process of developing entrepreneurial activities at NUS is significant because they possess the knowledge and proficiency for constructing (and potentially maintain) an entrepreneurial university. This apparent situation is congruent to the statement emphasized by Clark (2001: 22) that the “unique core of the university requires substantial collegial participation.” Thus, in larger faculties that cluster departments, Clark believes that to have a significant voice in decision making is expected because different groups of faculty hold the expertise required for knowledge creation and output.

6.2.4 Risk Perceptions

When considering the institutionalization of the entrepreneurial university model, it is important to address institutional members’ risk perceptions. The acceptance of (and commitment to engage in) entrepreneurial undertakings is generally assumed to be influenced by university actors’ risk assessments. Risk frames are determined from the standpoints of individuals, and will likely vary greatly. In this case, for instance, different kinds of disciplinary backgrounds, work experiences, interdisciplinary interactions, information exposures, and practices were manifested (Powell, 2007: 175). Risk in the issue of institutionalizing the entrepreneurial university model “can act as a mirror, reflecting the preoccupations, strengths and weaknesses of each discipline as [each discipline grapples] with uncertainty” (Althaus, 2005: 567). The NUS documents interpret the successful implementation of the entrepreneurial university model, and also illustrate a situation related to the unclear outcomes of the practices that the university has adopted. These issues were addressed by asking institutional members about certain risks that were related to the concept of an entrepreneurial university. This study was able to clarify Leong et al.’s (2008) claim that there was no debate when the entrepreneurial university model was introduced at NUS. Interviewees’ criticisms about NUS’s entrepreneurial university model (Wong et al., 2011) fall within the scope of this frame. The respondents were also asked about any work realities that challenged their focus (Sotirakou, 2004: 354) either on their core responsibilities or their engagement in entrepreneurial activities.

One institutional member who worked in the university administration stated that the national policy environment had influenced the urgency at the university to become entrepreneurial, and that it did not result in any debates within the university. People were aware that the university had to be aligned with the government's plan, predominantly when the latter started discussions about nurturing entrepreneurship and having a knowledge-based society. Taking risk is based on the *consensus that the national policy needs to move into a new direction, which will be an experimental move for NUS*:

We ... developed in the '80s and '90s to encourage companies to come to Singapore, but we were moving to this knowledge-based economy. It was just right at that stage when we were talking about how to become self-reliant in terms of technology. Instead of relying on importing technology and just making incremental improvements, radical innovation should be coming to Singapore. Of course, the most important engine in creating radical innovation should be the university. And I think so because what was happening in Singapore, the larger political environment was moving toward that. So when the [university] president at that time said that this is how we can transform NUS, to be in line with what the country needs.... That's why there was no debate. Anyway, some changes made it because the national policy was moving in a new direction. As the national policy moves, we as a state university, as state-funded, we know that we need to move in any way we can. We could not just continue as we were. Whether it is the entrepreneurial model or some other model, we need to implement something new. Because the direction of the country was towards a knowledge based-economy, of course, the president decided on the entrepreneurial university model to support a knowledge-based economy. In Singapore there's always a debate, in the sense that when a proposal goes out, there will be committees to discuss it. There was a kind of like ... a consensus that the national direction is moving there. The university needs to move in that direction. In a way, that was something experimental, something that we haven't tried, but if we put investment in it, let us try and have a consensus. There was a consensus created. One is the NUS Overseas Colleges Program. At the time when it was starting, I can say that nobody said that this will guarantee success. We're trying something. At least we're ... pioneering a program here in Singapore. We're trying something new, and then we'll just see if it will work or not. I would say ten

years later, we've shown that some were more successful than others; the bigger idea of the entrepreneurial model for the university has been proven to be, I think, the correct direction for NUS to take.

—UA3

Based on personal point of view, another university administrator “framed” that it was difficult to avoid people who did not agree with the university’s move to become entrepreneurial, but it was still part of the evolution process. A respondent from the university administration emphasized that most institutional members had agreed to adopt the entrepreneurial university model because of the *love they had for their respective disciplines*:

Personally, I mean, I think that for years in both sides of the world ... from the very beginning of course, that concept [i.e., the entrepreneurial university model] was rooted or becoming part of the university tradition, culture, and practice. That was not easy. You don't want to look at the university in that way in a sense. So it took a lot of effort. I'm not sure if this is going to be limited to a finite number of years, for that matter, or if it's going to be there permanently, and things like that. I think the key point to note is that people within the university signed up not because of this particular element. We signed up because of our specific love for our discipline, things that we want to do, we want to impress our students, etc., etc. This does not truly mean that we are [a shining example of a] school when it comes to either entrepreneurial abilities or incubation, etc.

—UA2

The statement below depicts that the move to become an entrepreneurial university was a similar risk that has been experienced by other countries; this person viewed it as *a worldwide movement*.

I think the reason why there was no debate is because no one saw a distinct change, you know. I think this is just a worldwide movement, not only in Singapore but in the US and other countries you see this move. So I think most academics would reluctantly understand that we have no choice, but we have to move this way. In many cases we are driven by research funding, and it is a bit hard to debate with funding agencies. If they want to give you money in certain areas, you either apply for it or you don't apply

for it. So I guess from that perspective, it is not something that the university saw as anticipating change that needed debate.

—UA1

From the side of the teaching and other professional staff, the “no debate” situation is mostly about the constant reminder of the *success of the MIT and Stanford models*. Some interviewees expressed the opinion that these institutions have been progressive in operating as entrepreneurial universities and have contributed to the growth of the US economy. Since MIT and Stanford are always considered to be success stories, TPS7 stated that “nobody had any questions about whether it [was] worth doing.” The entrepreneurial ecosystem at MIT is very impressive: so much so that Meyers and Pruthi (2011: 352) estimate that the revenues that are earned by graduates who have founded companies could form an independent nation. The authors emphasized that universities like MIT have accomplished the cultivation of start-ups that continuously effect their local economies; their students and faculty members are deeply committed to generating new and creative ideas in every project.

Some of the respondents see the “risk” of emulating US universities’ entrepreneurial university models to be an advantage; they believe that NUS could have the same trajectory because of its thriving performances in research and collaboration over the years. They consider the culture of enterprise at NUS to be very much alive, and that the policy environment essentially boosts this process. Particularly for latecomers, or for those countries that lag behind more developed countries, choosing the entrepreneurial path can be a good strategy for rebuilding their existing universities, using universities in Silicon Valley as prototypes (Etzkowitz et al., 2000). Wong et al. (2011) described Singapore as a latecomer on the higher education scene, but that NUS now has the edge as a research-intensive university with global recognition for success. Similarly, respondents from TPS felt that there was *no harm* in thinking like an entrepreneur because of the massive changes that were happening; the situation does not exempt universities like NUS. The educational experience at NUS was raised by a TPS respondent in terms of this frame:

I don’t see any harm in thinking like an entrepreneur. Everything nowadays seems quite fast. If you were left behind, then that’s it. Probably because of my education that I got here, and from working here for the [few] past years ... probably my mindset has changed.

—TPS3

TPS1 also provided reasons why there was “no harm” in showing enthusiasm about entrepreneurial activities, even with the substantial funding that his department received:

Academic grants cannot continue funding the translation forever [referring to translational research], especially when you go clinical. We need somebody who has the appetite to change the world. You will never have that if the university is not entrepreneurial. Too much money can be comfortable in so many ways. Too little, they will only look downwards; they won't do anything. They need that hunger. That's why the university must have that. How do you do it? That's a different story.

—TPS1

The majority of the interviewees discussed personal challenges about managing entrepreneurial activities; they mentioned that money was not always an issue for most departments, because *time mattered more* in their activities. Among the reasons the interviewees framed were the ways to balance activities and the implications of the quality of work. Projects in the social sciences and engineering departments, studies within the basic sciences, and even investments in medical research all face the same issue.

We need time more than we need money. We need uninterrupted time. Time that we wouldn't be in teaching, marking [grading], or committee work, to carry out the hard thinking and reading work necessary to do research in our discipline. A certain amount of money is necessary, of course. Yes, we go to archives, we must copy documents, we must stay in hotels, we must fly to places, but we need time more than we need money. And *that* the institution finds harder to arrange, even though it is trying ... [this is] a difficult task, but that would be more valuable to us. Unlike people, let's say, in computer science, economics, or psychology, they don't have to chase journal article publications and crank out five [years' worth of articles] and stay current because it happened yesterday and it's not going anywhere. Our challenge is to produce something that will last, not something that will be current. What we really need is the time to develop more substantial work, and that takes ... it's like an elephant's pregnancy.

The gestation time is longer; we need to do a lot of empirical work, we need to collate a lot of different information.

—TPS14

The problem, I think, with this message on entrepreneurship would be for scientists ... [it] is the time. The timeline issue. Not all the basic sciences, not all research can be converted into entrepreneurship. Some takes five years. Some take ten years, and some take twenty years. So when you talk about entrepreneurship, you will be talking about that.

—TPS6

Even in engineering, projects have long gestational periods. It's a challenge to divide time between academic activities and commercialization.

—TPS8

Likewise, the *mindset of the general academic environment in Singapore poses difficulties* in running an entrepreneurial university, because not everybody is doing the same thing and is willing to take risks. Because innovation and enterprise are the priority of the country's educational institutions, the willingness to try something in a different way, and accepting failure as part of the process, can be challenging in practice because teachers are expected to be role models (Ng, 2004). Some institutional members from TPS expressed similar views: that being risk-averse is a problem in Singapore, because many people are content with the country's healthy economy. They said the problem is that several pieces are missing in the ecosystem; not everybody wants to gamble on ideas because of the fear of committing mistakes or being unable to attract followers.

Another challenge in this issue is the response of the private sector to universities' activities. Respondents mentioned that wealthy individuals in the United States were more willing to invest in commercializing university knowledge than their wealthy counterparts in Singapore. TPS1 suggested that despite the profusion of ideas about boosting entrepreneurial activities in the country, three things must be studied carefully: market size, demand, and academics. One respondent argued that even for students in Singapore, not all will be willing to chase risky activities. Thus, this interview from the side of TPS claimed that the entrepreneurial university is not a reliable and accepted paradigm in the country:

Now, the entrepreneurial university and entrepreneurship are of course closely related. My experience is that people who actually go in this direction are a ... relatively small subset of the students that we have: ten percent, maybe less ... I'm not sure. Most people do not wish to engage in risky activities, and that is clearly reflected in the statistics that we keep. On the further careers of our students, where they spend their lives after [a minimum number of] years, many go into teaching. Many would like to go into some public service position. Many go into large companies. The number of people who start their own businesses is relatively small; there are many reasons for this. Maybe one is the Asian or Singaporean context. The culture of [the value of] failure that the Americans have developed to a large degree is not really something that is accepted in Singapore. People try to do this to be more accepting, and if something goes wrong ... but in general, I believe it's still very different from America ... where I lived. If something goes wrong, well, you pick up the pieces and do something else. This is not really the relied-on model or accepted paradigm in the Singaporean context.

—TPS9

Regardless of the observed difficulties in the general academic environment in Singapore, one interviewee from TPS suggested that people should be given options:

When we were told to do this, it does not mean that we neglect the other part. What we are trying to encourage is that may be this is not the only way of doing something. Since this is a research-intensive university, there are some staff who are good researchers. Let them focus on research. If there are some who are focused on innovation and enterprise, let them focus on that. The same way we train students: we cannot expect all students to do the same mode. Some students may say, "I want to be a researcher." So you will train students to do research. If a student wants to start a company, we encourage them to do that. Let them have options.

—TPS2

"Risk," as defined by the institutional members from TPS, depicts experiences of uncertainty, doubt, or worry about the outcome of entrepreneurial activities. While all interviewees agreed that finding ways to raise money is a good intention,

in which the purpose is to improve and sustain academic activities, they framed that *obsession about making money can compromise an individual's research and academic visions*. They want to avoid the deterioration of academic quality. Academics also need to focus on managing funds well and completing projects, because large grants have high expectations on their output.

Gauging risk also involves trust issues that can point out to “untrained members” (Althaus, 2005: 568) whose experiences in entrepreneurial processes are not sufficient and can impede the coordination of activities. Those academics who are interested in commercialization activities expressed risk that was in line with the improper handling of entrepreneurial activities. They stated that *entrepreneurs must be involved in programs and decisions related to entrepreneurship at NUS* to avoid this problem. For instance, the hiring of entrepreneurs with good background at the ILO would make them more confident about work with this office, because people there can understand and evaluate what they need and what they are doing. At the same time, they perceived that having a good entrepreneurial background was relevant in protecting researchers, students, and inventors during negotiations with industry. There is the risk that academics will have limited engagement with the university if they often encounter issues about the improper handling of entrepreneurial activities, and if people and offices at NUS only focus on their defined tasks and goals (i.e., those that are within their KPIs).

6.3 Conclusion

Both documents and interview data reflect the influence of the national policy covering the need to develop entrepreneurship in Singapore. The highlight of the findings was the expected response of NUS in this drive. Involvement in commercialization activities and entrepreneurship education mostly portrayed NUS as an entrepreneurial university. Since the corporatization of NUS in 2006, massive changes have occurred to address issues of operational and financial flexibility. More importantly, the essential elements that Silimperi et al. (2002) proposed have been useful in analyzing the institutionalization of the entrepreneurial university model, particularly in how the university's trajectory was communicated in the internal documents. Policies, resources, structure, and the support functions to complement entrepreneurial activities have been earnestly planned and implemented to emphasize the transformation of NUS. Compared to European universities, where decreases in funding have brought challenging times for most

institutions, the increase in resources to facilitate entrepreneurial activities was evident in this study, especially in disciplines that are aligned to Singapore's strategic growth areas. Leadership has played an important role in the entrepreneurial university model of NUS. Though it has mostly been done in a top-down manner, there is also evidence at the bottom-up level, where faculty members have taken initiatives to contribute to the development of entrepreneurial activities—even those that are not related to commercialization. The provision of additional facilities and support for other members who were interested in entrepreneurship was evident in the responses of some offices and faculties at NUS. Events, programs, and even student groups were also established to support the entrepreneurial drive.

The interview data have elaborated on and revealed additional issues related to the institutionalization of the entrepreneurial university model at NUS. Frames that depict disciplinary differences, institutional arrangements, actors within and outside NUS, and certain risks attached to the entrepreneurial university were found. Interpreting the “spirit of enterprise” statement has shown the varying notions of an entrepreneurial university. In exploring this statement, the nature of universities as having complex entities appeared to affect the institutionalization of the entrepreneurial university model in terms of moving into another phase. Bisaso (2011: 11) noted that these complex entities are structured according to disciplines, and they exemplify the distinct cultural and social dimensions of the institution. Since majority of the respondents started their employment at NUS prior to corporatization in 2006, the issue on disciplinary differences in entrepreneurial undertakings can be analyzed from the standpoint of early adopters and late movers in some parts of the university. From the profile of respondents who were hired before 1980 up to year 2013 (as indicated on Appendix 4), the interviews were able to establish how various disciplines have changed in terms of size, status, and opportunities over time. For instance, the current demand for practically-oriented disciplines has been influencing various engineering departments to continuously enhance their study programs other than concentration on patenting. While for those in the social science, a few faculty members only started becoming entrepreneurial because of the recently recognized status of collaborating with prestigious (prestigious?) universities outside Singapore (e.g., Yale-NUS collaboration). Accordingly from these findings, early adopters may be perceived as coming usually from large-sized disciplines with high operating budgets per student or large endowments, while late movers may be influenced by historical traditions

such as an institution's value commitment to liberal arts and basic sciences (Brint et al., 2011).

The interviewees elaborated on the scope and coordination of entrepreneurial activities, based on their depictions of the institutional arrangement at NUS. From the results, the institutional configuration of NUS has been linked to the mindset and pragmatism of Singapore in approaching economic development strategies. Actors in entrepreneurial undertakings manifest five categories of power frames, as mentioned by Campbell and Docherty (2003: 777). This is related to the government's authority and ability to provide access to major resources (i.e., funding) for effectively carrying out entrepreneurial activities. The results have also shown the vulnerability of some disciplines in their role within the entrepreneurial university, the expertise of institutional members through their knowledge in the conduct of entrepreneurial activities, and how they give voice in the process of improving such activities. Frames that present risk perceptions are relevant because they reflect the choices of institutional members in supporting the transformation toward the entrepreneurial path. Their involvement and contributions can be determined through different ways of foreseeing the value of entrepreneurial activities. Institutional members also viewed risk by discussing how other countries and universities have acknowledged the importance of entrepreneurial activities for higher education development and for improving economic competitiveness. The categories of frames utilized in this study, along with a summary of major findings, are presented in Table 8.

Table 8 Categories of frames, and summary of major findings

Frame Categories*	Issues and Situations Derived from the Documents	Interviewees' Interpretations	Findings
Identity Frames	<p>Vision, mission, and strategy statement of NUS</p> <p>“Spirit of enterprise”</p>	<p>—Promoting the “spirit of enterprise” is not part of the key performance indicators (KPIs) (TPS5, TPS6, TPS10)</p> <p>—Promoting the “spirit of enterprise” is not part of the KPIs (TPS5, TPS6, TPS10)</p> <p>—It is meant for departments involved in practical real-world applications (TPS14, TPS6)</p> <p>—“It is not compulsory and not for everyone” (UA3)</p> <p>—“No harm” to engage in entrepreneurial activities (TPS3, TPS1)</p>	<p>—Emphasis on disciplinary identities</p> <p>—Loyalty of academics to their discipline, rather than to NUS as their employer</p> <p>—Participation in entrepreneurial activities has no bearing on the atmosphere and location of the campus</p> <p>—University’s focus on entrepreneurship and functioning in an enterprise environment are two different things</p>

<p style="text-align: center;">Characterization Frames</p>	<p>Policies, mechanisms, support, and incentives for conducting entrepreneurial activities</p> <p>Embeddedness of entrepreneurship education</p>	<ul style="list-style-type: none"> —Policy environment at both national and institutional levels has clear intentions (Goal: “Singapore to become a global enterprise hub”) —Opportunities to stimulate entrepreneurial initiatives are well supported by the university administration —Leadership played an important role in the transition of NUS —Reward system is still underdeveloped —Rewarding efforts is a “game” system (TPS1) —An entrepreneurial university should have a strong internal support system (i.e., not getting enough support from the ILO) (TPS4, TPS8, TPS1) —Justification on the overall action of NUS based on the attitude of Singapore toward entrepreneurship (TPS3, TPS6, UA2) 	<ul style="list-style-type: none"> —Positive (e.g., funding and internal collaborations) and negative (e.g., coordination of activities and interaction with ILO) characterizations in the institutional configuration of NUS —NUS has strong policies and mechanisms to support entrepreneurial activities —Awareness that it is the natural response of the university to align its transformation with the national goals —Differences in the depiction of the entrepreneurial university model, as characterized in the documents and how institutional members framed it in practice —Entrepreneurial activities are stable in disciplines that are connected to Singapore’s priority growth areas —Entrepreneurial activities are stable in disciplines that are connected to same —Entrepreneurial activities are stable in disciplines that are connected to same —Challenging situation for the social sciences and humanities to cross boundaries
<p style="text-align: center;">Power Frames</p>	<p>Department/faculty activities and contribution to entrepreneurial activities</p> <p>Institutional priorities</p>	<ul style="list-style-type: none"> —“Corporatization does not mean total independence from the government” (TPS1,TPS2, TPS5,TPS6) —“We are less funded...” (TPS10) —“... we have to make more an indirect case for the relevance of our work” TPS14) —Accentuation of individual efforts (TPS13, TPS4) —Attempts to give voice in the process of entrepreneurial activities 	<ul style="list-style-type: none"> —The notion of strong and vulnerable actors in the entrepreneurial university setup was depicted in terms of who gives more money (e.g., government) and who receives less (e.g., social science and humanities) —Voice and expertise of institutional members are interrelated vis-à-vis power frames’ characteristics, which can lead to tensions and possible collisions (Ascui & Lovell, 2011: 992)

<p style="text-align: center;">Risk and Information Frames</p>	<p>Criticisms of the entrepreneurial university model</p> <p>“No debate” claim (Leong et al., 2008)</p>	<ul style="list-style-type: none"> —Constant reminders of the success of the MIT and Stanford models. —The entrepreneurial university as a “worldwide movement” (UA1) —“We need time more than we need money...” (TPS14) —The mindset of the general academic environment in Singapore poses difficulties in running an entrepreneurial university, because not everybody is doing the same thing and not all are willing to take risks. (TPS1, TPS4, TPS6) —Obsession in making money can compromise an individual’s research and academic vision. 	<ul style="list-style-type: none"> —The “risk” of emulating US universities’ successful entrepreneurial university models is seen as an advantage; credibility of MIT and Stanford —Becoming an entrepreneurial university is a similar risk experienced by other countries —Financial gain vs. value gain (i.e., large grants vs. more time for research) —Risk assessment based on the institutional members’ experiences, knowledge of the process, and past outcomes related to entrepreneurial activities —Government’s action is risky but beneficial for universities and Singapore’s economic development
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* Sources for frame categories: Campbell and Docherty, 2003; Shmueli et al., 2006.

7 CONCLUSION

7.1 Discussion

The entrepreneurial university concept discussed in various studies depicts the nature and culture of universities in response to government's initiatives to sustain economic growth, and the threat that operational budgets will decline because of other national priorities. This study primarily focused on the university's transformation in building up the entrepreneurial university model. The concept of institutionalization was also used as an approach for investigating how the university's responses are aligned with the government's policy framework for developing entrepreneurship. Moreover, the general inquiry of this study covered how the entrepreneurial university model is engrained in the activities of individuals and across organizational fields. The results presented consolidated interpretations by bringing together perceptions from institutional members who worked in the university administration and teaching and professional staff from various disciplines. Internal documents served as an important additional source for clarifying and validating facts in analyzing the phenomena. This single-case study on the National University of Singapore was guided by two research questions:

1. How and to what extent is the entrepreneurial university model institutionalized at the National University of Singapore?
2. What factors contribute to the institutionalization of the entrepreneurial university, based on the perceptions of NUS's institutional members?

Frame analysis contributed to examining the interpretations of university actors about entrepreneurial activities at NUS, which resulted in different views and understandings of the entrepreneurial university concept. More importantly, the internal documents mostly depicted the important elements that aim to legitimize entrepreneurial activities, and ways to offer a favorable environment for all institutional members (including students) who are interested in entrepreneurship.

Attempts to institutionalize the entrepreneurial university model were evident in the issues and situations that the internal documents presented. From 2006 (the year of corporatization) up to 2014, significant changes took place at NUS as part of its transition toward becoming an entrepreneurial university. The framework that Silimperi et al. (2002) used in describing the institutionalization of QA in the healthcare sector was found to be appropriate in investigating the basic elements that should be established in line with intensifying entrepreneurial activities, and with the entrepreneurial university model as an accepted paradigm to support the government in promoting the importance and benefits of entrepreneurship for the country's long-term growth. Aside from the fact that entrepreneurial activities can improve the university's management capacity, the NUS case study mainly emphasized the role of the university in driving the country's goals to boost these activities. By going through the internal documents, the analysis focused on the following aspects: (1) policies related to entrepreneurial activities; (2) the role of leadership; (3) the university's core values; (4) the available resources necessary for conducting entrepreneurial activities; (5) the structure for organizing entrepreneurial activities; (6) the notion of capacity-building in an entrepreneurial university setup; (7) tools for communicating entrepreneurial activities and; (8) rewards for recognizing entrepreneurial initiatives.

The broad policies representing the transition of NUS were introduced in the year of the corporatization of the university. The year 2006 marked a new beginning of the university toward self-governance, which allowed it to manage its financial resources and to decide on budget utilization, tuition fee structure, and the admission process. More importantly, the university's vision and strategy statement to promote the "spirit of enterprise" was included in its broad policies in order to emphasize the dynamic move of NUS to shape its teaching and research activities, as well as the functioning of its offices. Although corporatization clearly defines that NUS and other universities are not-for-profit institutions, they are encouraged to seek additional funding as a means for maintaining their activities and fostering research excellence.

The role of leadership has helped in driving dramatic changes at NUS. The documents consulted for this study identified the key people involved in transforming NUS into an entrepreneurial university in which qualities such as expertise, passion, commitment, mindset, and excellent leadership and educational background are vital in bringing the process to fruition. The current NUS president continues to lead institutional members in embracing an entrepreneurial culture, as

evident in the internal documents—particularly in the content of his state of the university addresses over the years.

In the empirical findings, NUS did not specify a single set of core values that apply to all institutional members. The internal documents implied that it was a purposive move for all offices at NUS to define their respective core values that complement Singaporean ideals. Those values emphasizing teamwork, integrity, and commitment may not be exclusive to the entrepreneurial university model, but they can serve as a significant guide to practice in achieving the entrepreneurial mission. For example, the 2010 Annual Report (referring to the Faculty of Engineering) said that successful collaboration would not be achieved if teamwork (through joint efforts in connecting people's expertise) was not taken into consideration during funding applications or implementing new programs for the faculty. In another example (as reported in NUS Annual Report 2014), the report mentioned that commitment to entrepreneurship serves as a driving force for implementing successful activities that involve teaching, research, and nurturing the mindset of future entrepreneurs at the School of Computing. This shows that even with a lack of clear information on the different core values at all offices at NUS, the different schools are probably inculcating similar values that are relevant for the success of entrepreneurial undertakings. In one way or another, the sample core values related to commitment, teamwork, and integrity are self-reproducing. They are associated with the institutionalized core values of the government in achieving national economic goals: core value #1 (community over self), core value #3 (resolving major issues through consensus instead of contention), and core value #5 (honest government) (Haley & Low, 1998; Bhasin, 2007).

In terms of resources, both documents and interview data confirmed that the university receives sufficient money for building facilities, funding projects, scholarships, and for promoting entrepreneurial activities. The largest portions of the financial resources are currently derived from the MOE and agencies such as the NRF and A*STAR. Perhaps more than the academic community, students are benefitting from this generous funding from outside sources. Institutional members perceived time as an important resource for them, and that the university had granted some leeway for them to participate in activities that were essential for developing their projects and focusing on research. Collaboration with other HEIs, both locally and abroad, contributes to NUS resources. For instance, the collaboration agreements include the sharing of facilities between NUS and other HEIs to foster sustainable partnerships that will have significant effects on the present and future activities, including those that are entrepreneurially related (e.g.,

collaboration with universities abroad under the NOCs). The documents that were consulted clearly pointed out that the allocation of resources aims to develop more entrepreneurial ideas and students as future entrepreneurs. Likewise, the steady flow of resources is meant to ensure that Singapore's priority growth areas will be productive and become sustainable through NUS's contribution to various research and commercialization activities.

Corporatization has significant bearing on the various changes that have occurred at the university in relation to entrepreneurial activities. The structure of NUS provides direction for achieving several initiatives; for monitoring such progress, the documents highlighted the roles of two sub-committees under the board of trustees. The clarification of their tasks in these documents was clear; they emphasized that one sub-committee must focus on supporting NUS in the management of funds, while the other has to contribute to developing policies and strategies in entrepreneurship, and in approving the KPIs of the offices that are engaged in entrepreneurial activities (i.e., Enterprise Cluster).

Another instituted structure that was present in the NUS case study was the establishment of the NUS Enterprise as the prime office for supporting the entrepreneurial mission. In addition to the university's mention of the NUS Enterprise's scope of responsibilities, the documents also reported on the budget that was allocated for its creation. From Silimperi et al.'s study (2002), the fact that sufficient resources are allocated to improving the structure is an indication of NUS's commitment to implementing activities. Comparable to the case of NUS itself, the NUS Enterprise has to be backed up by human and financial resources to function effectively as the core of all entrepreneurial activities. Interestingly, the creation of new structures at NUS was not only meant to emphasize division of labor, but was also an opportunity to cover promising areas for institutional improvement that had not been realized previously. The structural improvements undertaken by NUS through the years are likely part of its strategy to expand its entrepreneurial activities beyond Singapore.

Capacity-building at NUS has positive effects in the outcome of entrepreneurial activities over the years. Various events, programs, and trainings have been organized to orient and encourage institutional members to consider an assortment of entrepreneurship endeavors. Students have also played an important role in these activities, which strengthens the idea of capacity-building as a collective action. Most of the programs and events have served as gateways to finding potential partners and collaborators. At the faculty level, there have been initiatives to improve entrepreneurial activities by providing mentorship and encouraging

institutional members across disciplines to explore ideas and develop their own research projects. As a research-intensive institution, supporting institutional members in grant-writing applications is crucial, because this process affects the flow of funding that comes into the university, and it provides motivation for effectively carrying out entrepreneurial projects.

NUS has been systematic about communicating information about its entrepreneurial activities. Various platforms are used to disseminate information on funding, events, achievements, and challenges pertaining to present and future entrepreneurial activities. Although the documents that were consulted did not impose entrepreneurial activities as a task requirement for institutional members, not enough evidence was available that would describe other distinct incentive programs, or if certain incentive programs were feasible for intensifying these activities (Rudd & Geller, 1985).

The president's annual state of the university addresses are an institutionalized activity that communicate various people's plans, goals, and strategies related to entrepreneurship, and they serve as an invitation for institutional members to participate in the initiatives. In addition to the state of the university addresses, the University Awards is an important annual event in which members of the academic community are recognized for their contributions to teaching and research. Students receive cash awards to motivate them to develop their projects; social media is also a popular platform for informing students about updates on school events and entrepreneurially related activities.

The commitment to foster entrepreneurial activities (Silimperi et al., 2002) had different interpretations in the documents. For example, the remuneration package mentioned on the NUS website applies to all active employees who may wish to utilize their privileges to attend events or trainings that support their career development.

In connection to frame analysis, the study has offered several findings on individual attitudes and beliefs that contribute to intractability (Gray, Coleman, & Putnam, 2007: 1418), which makes it challenging for the entrepreneurial university model to be fully accepted at NUS. Frame analysis has supported the study in examining the perceptions of the university's institutional members, specifically on how they have come to understand the contexts in which they act (Raitio, 2008: 239). The results found in the study reflect the implication of loyalty as a basic value in higher education (Clark, 1986). Academics in the NUS case study fully understood the rationales and initiatives for developing an entrepreneurial university in order to address the country's policy goals. Some of the results,

however, accentuated the loyalty of academics to their disciplines, rather than to NUS as their employer. The factors that made them contribute, focus, and achieve satisfaction and recognition was greatly influenced by their respective disciplinary memberships (Coaldrake, 2000: 23). Although institutional members did not express the need to set aside the topic of national goals from their tasks, the manner in which they aimed to contribute to the transformation of NUS in becoming an entrepreneurial university was still connected to how their respective disciplines would commonly respond to the situation. Evidence related to this aspect was categorized under “identity” frames. “Characterization” frames were able to recognize positive and negative characterizations in NUS’s institutional arrangement. The more positive frames reflected on the policies and mechanisms that effectively carry out entrepreneurial activities. People generally accept that Singapore’s policy environment is changing, and they consider that a national university’s natural response is to align its moves with national goals. The institutional members had a positive view of funding for university activities. Unlike its European counterparts, the Singapore government continues to support entrepreneurial activities, but offers no guarantee of its continuity.

I have attempted to examine the many possible sources of tensions within the university environment located at multiple levels (e.g., individuals and groups) and settings (e.g., leaders, policies, attitudes and issues) (Coleman et al., 2007). Upon going through the results of the NUS case study, institutionalization was found to be difficult to achieve if there are several internal issues connected to those sources will not be addressed immediately. Given the nature of academic disciplines and the cultural differences within the university, negative responses are to be expected when change is implemented, and problematic situations often come up. This study’s findings do not intend to point out that academics’ orientations, attitudes, or behavior are directly damaging to the implementation of the entrepreneurial university model (which is typically the nature of “intractability” in frame analysis, especially within conflict research). The study results depict the reality found in the ambiguous setup of an entrepreneurial university, which may offer contrasting insights into how the entrepreneurial university model was characterized in the documents, and how institutional members framed it in practice as revealed during the interviews.

The benefits of commercialization were able to influence NUS’s strategic investment decisions (Whitley, 2008: 36). Aspects related to this idea were present in all of the frames, and were able to answer my personal inquiry into the reason that only the areas of research that are significant for Singapore’s development

were prioritized and substantially funded at NUS. The documents and interview data alike presented the situation that entrepreneurial activities are stable for disciplines that are connected to Singapore's priority growth areas. In particular, people in the applied sciences (e.g., engineering and medicine) appeared to have more interests and opportunities in entrepreneurial undertakings. Institutional members who were interviewed who belonged to such disciplines expressed awareness and familiarity with conducting entrepreneurial activities, as well as the notion of an entrepreneurial university.

Similarly to the cases of most entrepreneurial universities, the establishment of various centers at NUS are integrated with the economic activities of the country, thus promoting the growth and attractiveness of Singapore as a global enterprise hub (Häyrynen-Alestalo & Peltola, 2006). The results of the NUS case study have attempted to analyze the implications of the entrepreneurial university model on the social sciences. As interpreted by the interviewees, the purpose of entrepreneurial activities in the social sciences is to support departmental projects and colleagues in seeking outside funding. As Häyrynen-Alestalo and Peltola mentioned, it is a typical pattern for social science disciplines to have a different view about their involvement in entrepreneurial undertakings than more hard science-oriented fields. The NUS interviewees' responses were similar to the authors' findings, stressing that social sciences produce knowledge that cannot be classified in terms of pure economic concepts. Accommodating business concepts and principles (as in the case of the entrepreneurial university model) can be problematic when theoretically oriented faculty members are involved. Even if they are able to contribute in providing insights about societal development through their theory construction, "this does not mean that they can be easily placed as partners in the innovation system" or that their efforts are clearly considered in developing national agenda. People are now concerned with amplifying the "discussion of the social impact of science toward social sciences" (Häyrynen-Alestalo & Peltola, 2006: 270-271). Although attempts to shift to a scientific focus can help, the tensions that were found in the case study included the theoretical coherence of entrepreneurship-related programs, and how professors usually define their fields.

In the findings, one of the respondents (TPS14) talked about his discipline's direct relevance to real-world applications. This shows a complex reality that the necessity for social science and the humanities to cross boundaries in solving problems with other disciplines is quite difficult to enact. The institutional members implied the same observation that Hagoel and Kalikin-Fishman made

(2002) about resources, that limited funding is invested in theoretical fields compared to disciplines with practical application. Though NUS has strong policies and mechanisms to support entrepreneurial undertakings, income generation is not the main priority for most institutional members. Results that manifest both “identity” and “characterization” frames show how individuals’ grasp (and acceptance) that they function in an entrepreneurial environment might lead to several challenges in the coordination of entrepreneurial activities.

The “strong” and “vulnerable” actors in the setup of an entrepreneurial university encompass the “power” frames. As described in the literature and even depicted by the case study, the government is an important actor in influencing the intensity of entrepreneurship, not only by means of legislation but through the educational systems (Raposo & do Paço, 2011: 454). Singapore’s government has readily allocated resources to support entrepreneurial undertakings, particularly those that are not commercialization-related. Funding is utilized as a mechanism of change in the norm system to influence performance in entrepreneurial activities (Benner & Sandström, 2000: 291). Some interviewees from TPS mentioned that the generous funding from the government was more visible in the aspect of supporting teaching programs, and ongoing and future entrepreneurial activities. NUS has responded by transforming into an entrepreneurial institution to assiduously address Singapore’s economic development goals and to enhance university operations toward long-term sustainability. Even with the generous funding, the interviewees expressed anxiety that a time would come when they would encounter a change in priorities. Research funding for instance, may only cover specific disciplines, projects, and ideas that the government wishes to support in the future.

In addition to the government and industry acting as financial providers, benefactors, and collaborators in NUS’s entrepreneurial undertakings, the experts in the academic community are essential in stabilizing entrepreneurial activities through their contributions. The documents have acknowledged the performance of faculty members in entrepreneurial activities; they are considered experts in their respective fields. The university is committed to helping these professors and other researchers in obtaining the necessary and appropriate funding to excel (NUS Annual Report, 2012) and in developing their knowledge in various fields.

Faculty members framed the situation of entrepreneurial activities at NUS in their own ways, based on each individual’s involvement in such activities as professional experts (Asci & Lovell, 2011). Among the tensions (and sources of possible collision) are defining boundaries and competencies, including issues

related to who, precisely, should set standards in properly undertaking entrepreneurial activities (Ascuí & Lovell, 2011: 992); this was illustrated by the case study vis-à-vis the institutionalization of the entrepreneurial university model. Interviewees in this study had expertise (e.g., specialized backgrounds in engineering, science, or public policy), and they may have relied on frames as a strategy for interpreting the complexity of the issues related to the notion of the entrepreneurial university (Nisbet & Huges, 2006: 13). Despite the perceived weak role of certain actors in the academic community, some of them are mostly tested and trained by experience. Thus, their efficiency, subject-specific knowledge, and experience (Huber, 1999) are valuable in considering decisions that are essential to the university's transformation and long-term goals.

In another perspective, the power frames in this study have determined the logic of appropriateness that the interviewees exercised. According to March and Olsen (2008: 689), actors attempt to satisfy obligations encapsulated in a role, an identity, a membership in a community, a group, and the ethos and practices and expectations of its institutions. Being experts in the field, the academic community assesses what they see as being appropriate for themselves in a particular situation. In this analysis of power frames, I focused on the interviewees as institutional members and experts at NUS, because the idea of institutionalizing the entrepreneurial university model means that they have to “bend efforts and experience to adapt existing rules and tools to fit the situation” (Owen-Smith, 2011: 68).

Risk and information frames may have the tendency to change over time as entrepreneurial activities expand, policies are enhanced, and disciplinary interactions develop (Powell, 2007: 188), especially with the involvement of social sciences in certain projects. In this study, institutional members who were actively engage in entrepreneurial activities mentioned that it was difficult to apply what other countries were doing (i.e., entrepreneurial practices) in Singapore's context. Due to their perceived power as experts in entrepreneurial undertakings, risk is perceived by mainly benchmarking the university activities in Singapore (specifically at NUS) from other universities abroad. While it was my intention not to reveal the exact number of Singaporeans and foreign academics involved in this study for ethical considerations, most of the institutional members who expressed this view were foreign talent recruited by NUS. The “university-pushed” model of MIT and Stanford (Göktepe-Hultén, 2008: 657) is the ideal setup of most institutional members for NUS as an entrepreneurial university. Discussions of issues involved in institutionalizing the entrepreneurial university model of NUS

could not avoid comparisons with how MIT and Stanford operate, particularly the entrepreneurial culture at these institutions. The issue of comparing MIT's and Stanford's operations with NUS comes in when activities are not organized, or when administrative decisions are pinpointing faculties or research groups to push through certain entrepreneurial initiatives.

The opportunity to conduct interviews in Singapore was enthusiastically accommodated by institutional members, because they felt that the university administration needed to know their insights about improving entrepreneurial activities, and to emphasize the impact of the entrepreneurial university model on certain disciplines. Likewise, I found at the individual level that scientist-led entrepreneurial undertakings (Göktepe-Hultén, 2008: 665) were evident in the NUS documents, but were less explored in terms of their views about how members influence new sets of behaviors, and how members come to terms with the acceptance of such behaviors in their respective faculties or laboratories.

7.1.1 The First Research Question

This section aims to address the first research question, on the extent that the entrepreneurial university model is institutionalized at NUS. The study confirmed that NUS's entrepreneurial university model is primarily concentrated on activities related to the commercialization of research and the conversion of research to enterprise. In practice, those disciplines that merely prioritize commercialization activities have come to accept the model by expressing commitment and support to pushing entrepreneurial activities at the faculty or department level. Examples of entrepreneurial activities mentioned in the case study cover engagements in spin-offs, start-ups, government–university–industry (triple helix) collaboration, and entrepreneurship education programs. Renovations of teaching and research programs (Clark, 1998a) take place continuously. All of these activities seem to be essential in positioning NUS as the key hub for entrepreneurship and innovation, both in Asia and in the rest of the world.

In addition to the entrepreneurial activities mentioned above, technology transfer offices that include MIT and Stanford as model institutions are institutionalized features of the entrepreneurial university concept. NUS operates in the same pattern, and its entrepreneurial path has been accounted for in the internal documents since 2006. The pathway has not had specific phases or stages, however, as is often encountered in the definition of institutionalization.

Awareness, implementation, and trial were clearly presented as features of institutionalization, especially in disciplines that apply entrepreneurial activities as part of their tasks. These aspects cannot be considered stages or phases, because up until now they are still progressing. In the documents, although some reports mentioned the productive performance of faculties, departments, institutes, and centers in entrepreneurial undertakings, there were no clear indications of how the university has generally progressed in terms of phases and stages for achieving full institutionalization of the entrepreneurial university model. Indeed, it is important to examine how the patterns of practices and behavior have self-reproduced themselves, and have attempted to achieve stability. In the case of internal documents, the motive of the university (in addition to transparency and branding) is to emphasize that entrepreneurial activities are moving forward, and that there are plans for continuity (e.g., as presented by the NUS annual reports). It may be easy to assume that entrepreneurial activities are spread or diffused (Colyvas & Jonsson, 2011) across disciplines, but it is not possible to conclude this in this case, because more participants need to be involved in this study to provide evidence. The interview data also did not reveal the process of fully integrating the entrepreneurial university model, since the study participants mostly presented issues and situations related to the acceptance and commitment to this idea.

From the results of the interviews, even if there are abundant resources in implementing initiatives to develop entrepreneurial activities, this is not an assurance that everybody will have the same approach to income-generating activities, or that they will be fully committed to addressing the policy goals about entrepreneurship. Silimperi et al. (2002) wrote that institutionalization (particularly in this case) should be everyone's business. In examining the results, the issues and situations presented by the case study have shown interpretative differences in motivations and interests in pursuing entrepreneurial activities. When innovations are introduced at the university, or reforms are about to take place, some members notably continued to question who really benefited from these undertakings. In some aspects of this study, certain practices within the entrepreneurial university model were considered appropriate because of the reality that funding had already become competitive.

The results also provided a few facts that the real targets of the entrepreneurial university model at NUS are those disciplines that can contribute to commercialization. Even if (from the policy perspective) social science and the humanities can contribute, they have to continue competing with other disciplines, especially with those that have direct links to practical applications. This case study

encountered the same situation raised by Novotná, Dobbins and Henderson (2012: 2), that some practices can be sustained in organizations without being institutionalized: for example, practices that are supported by soft money that is provided to organizations or by other forms of temporary supports. Many of the interviewees mentioned that they operated under soft money. Some received continuous donations, while others had applied for grants to establish their centers or institutes. This study found that Wong et al. (2011) were not clear about how the arrangement should be done in the situation of attracting foreign talent as another feature of the entrepreneurial university model in the context of emerging economies. Their study did imply, however, that working in a multidisciplinary environment that includes foreign talent will be advantageous for seeking better opportunities. If attracting foreign talent is another solution to encourage more people to participate in entrepreneurial undertakings and to be committed in entrepreneurial ideals, it is not clear whether the authors suggest that universities like NUS will have to make this arrangement on a permanent basis (knowing that some faculties or institutes only receive soft money for some projects), or if the intention to accept foreigners will lead to competition with local talent in terms of skills, grants, and other funding opportunities.

The current study finds that the institutionalization of the entrepreneurial university model is something dynamic but is still in progress, because of the reality that in addition to their disciplinary identities, most interviewees had roles in multiple spheres (Colyvas & Jonsson, 2011: 43) that may somehow affect the way they viewed the effectiveness of entrepreneurial activities (Dimitrova & Dragneva, 2009: 854). For example, one of the interviewees (from the engineering department) agreed to support the entrepreneurial university model because of personal involvement in a spin-off company that focused on software and other technologies. The department's needs to address the pressure of finding additional sources of funding to support other projects was a secondary priority, because the interviewee runs a center and it is the main priority. Though the positive result of the center's spin-off performance may be considered stable over time, this particular respondent's view on the institutionalization of the entrepreneurial university model seemed to be different from others as a faculty member of his department. The empirical data in this study had sufficiently provided information and assessment on the extent of institutionalization being experienced recently by NUS. There was enough data to demonstrate the strengths and challenges of NUS in building up the entrepreneurial university model since its corporatization. However, the profile of interviewees or sampling needs to be expanded if we are to

consider the weight of significance of other possible issues that may arise in the upcoming years in relation to trends in entrepreneurial university development and the diverse exposures in entrepreneurial undertakings of institutional members (or other actors).

7.1.2 The Second Research Question

The second research question deals with the four main factors that contribute to the institutionalization of the entrepreneurial university model at NUS according to the perceptions of institutional members.

7.1.2.1 First Factor: Government Policy Framework

The results found that the government's policy framework on entrepreneurship is the primary factor to influence the functions of most institutions in the country, especially universities. This certainly has bearing on the institutionalization of the entrepreneurial university model at NUS. Implementing activities that contribute to fostering economic growth, and making the financial resources available to pursue projects within Singapore's priority growth areas, are two of the most important tasks contained in that framework. As clearly mentioned in the results, change toward a knowledge-based society will continue to commence without preference to any set of higher education models. NUS has aligned its institutional configuration according to the changes expected by the government, since it is the main provider. The government's strategy of increasing funding for universities is mostly dedicated for projects that are beneficial for the country, and in motivating institutional members to work hard on their output. Funding as a mechanism does not serve as a guarantee that financial resources will become stable; in fact, the system was enacted to promote a more competitive, performance-based environment, and it comes with various accountability measures.

This situation also reflects the pragmatic characteristic of the government in providing investment with favorable returns. Other than the research funding that is allocated for universities, the government strongly encourages income diversification, because collaboration with industry and receiving donations from alumni get corresponding matching grants from the government. While corporatization has a purpose of improving the management and organization of universities by granting autonomous status, the government ensured that all—and

especially NUS as a national university—are headed in the same direction. In addition to the internal support system, the government has thoroughly planned that public agencies that promote entrepreneurial activities in the country will work closely with HEIs. For example, the A*STAR Foundation not only supports universities in terms of grants, but also in assistance in commercializing research and technologies. Entrepreneurship education is enhancing people’s mindsets to be entrepreneurs. The interviewees’ perceptions were compatible to most of the information that was presented in the internal documents, which points toward entrepreneurship as an institutionalized policy and activity in Singapore.

7.1.2.2 Second Factor: KPIs

A second factor that contributes to the institutionalization of the entrepreneurial university model is connected to the KPIs, which concentrate on targets and measurable outcomes at different levels (e.g., the individual, faculty, department, center, or institute levels). As mentioned previously, the interviewees were engaged in various tasks other than being faculty members. For the results of the interview, most institutional members who participated in this study were department heads or institute directors. Income-generation is not part of their tasks, and entrepreneurial activities are not imposed on them. Based on the exploration of the “spirit of enterprise” statement, the issue of KPIs became important for analyzing the situation of institutionalizing the entrepreneurial university model, because it is linked to routines, practices, priorities, contributions, motivations, behaviors, and outcomes at the individual or faculty level.

From the perceptions of interviewees, generating income and becoming involved in entrepreneurial activities are both driven by personal interest, and they depend on the disciplinary orientation. If a colleague from one’s own department or institute is in need of support to facilitate his or her initiatives for funding applications, it is a reasonable activity for someone who is managing a number of people. As elaborated in the results of the study, it is a bit unfair to secure outside funding because of the administrative load, but another task of department/institute heads is to help other members who do not have more time to be active in research. For institutional members who regularly engage in commercialization as part of their activities (e.g., engineering and life sciences), they believed that KPIs have implications on the entrepreneurial ecosystem at NUS. People will not engage in entrepreneurial activities unless it is clearly mentioned in their individual or group’s target that they must do so. If institutional

members only focus on clearly defined tasks, it will be difficult to solve more long-standing issues. The issue of KPIs is relevant when the university is thinking about relationship-building and promoting trust during internal collaborations, or in working closely with offices that facilitate most of the entrepreneurial activities. This is synonymous with intractable conflicts in environmental issues, because the lack of trust can lead to the risk of escalating tensions. If the university aims to institutionalize the entrepreneurial university model as an accepted framework (Reyes, 2016), there should be ways to “promote creative problem-solving and help find win–win solutions” (Raitio, 2008: 17).

7.1.2.3 Third Factor: The Meaning of Entrepreneurship

The third factor to influence the institutionalization of the entrepreneurial university model is the perception of institutional members that pertain to the meanings of entrepreneurship and the entrepreneurial university. The majority of the interviewees instantly connected the function of NUS as an entrepreneurial university to commercialization and the creation of enterprise. This was noticeable during the start of every interview, where institutional members (e.g., life sciences and engineering department members) began the conversations by providing general background on the situation of entrepreneurs in Singapore, or of how patents are processed. For the rest of the interviewees, the meaning of entrepreneurship was still all about business and requiring universities to bring novelty in ideas and results.

These issues bring the discussion back to the statement mentioned in the empirical results, that entrepreneurship and an enterprise environment had different meanings for the interviewees. Entrepreneurship at the university for some institutional members may be related to how they can attract venture capital, secure government funding to fund private business, and seek additional investment funds. For others, it may be closer to academic capitalism (Slaughter & Leslie, 1997), in which individuals try to be entrepreneurial while conducting research and managing their studies, and in the way in which they handle their laboratories. From the case study results, institutional members from the social sciences, humanities, and biological sciences mentioned that they could not foresee making money in the next five to ten years. They could only anticipate improvements in the outcome of their activities, and in the training of their students. In the end, this drive to entrepreneurship in Singapore affects two groups at the university: those disciplines that can generate money (e.g., practice-oriented

disciplines) and those that only seek to improve their entrepreneurship activities for survival (e.g., social sciences, humanities, and basic sciences).

7.1.2.4 Fourth Factor: Risk Perceptions

Finally, the fourth factor that contributes to the institutionalization of the entrepreneurial university model is related to risk perceptions. Interviewees presented the strengths, benefits, consequences, and challenges in the setup of NUS. Global changes that affect universities' operational environment is the rationale for taking the entrepreneurial path. Promising industries are coming to Singapore and being developed there, and the immediate response of a national university is to be prepared in addressing various concerns in education, research, and service to the community. Within the internal documents, risk was expressed in the decision of NUS to focus on actions, resources, and investments that can meet the demands of Singapore's growing economy. In the interview data, risk also manifested commitment and confidence. This was in relation to fulfilling the government's policy goals, as well as its confidence that NUS can be a successful institution like MIT and Stanford. The results from the interviews confirmed that NUS is going through an "isomorphic development path" in its entrepreneurial transformation (Etzkowitz et al., 2000: 313). Due to the expertise of the people involved in this study in relation to entrepreneurial activities, however, they perceived that NUS was still different from the MIT and Stanford prototypes. They associated these differences with MIT's and Stanford's coordination of entrepreneurial activities (e.g., responsiveness of their TTOs), and not on their production output (Philpott et al., 2011).

This study also revealed that institutional members' views of risk could be a barrier for institutionalizing the entrepreneurial university model, because they looked up to their expertise and other institutions' ways of managing activities. The members communicated that the MIT and Stanford experiences were "good" risk for pursuing the entrepreneurial path. There is trust and credibility in the message source (Covello et al., 1989: 6), because previous studies have proven the success of these institutions. Consequently, institutional members who are actively involved in commercialization and start-up formations are utilizing the MIT and Stanford experiences as frames of reference (Levin & Chapman, 1990), which allows them to assess the actions and choices of NUS, including its offices (such as the ILO or the NUS Enterprise).

Individuals' expertise adds to the tension because their years of experience in collaborating, creating spin-offs, or patenting form the basis for risk assessment due to their knowledge of the process and past outcomes. In terms of resources, some interviewees would prefer to have more time (rather than to receive large grants) because lack of time can affect the quality of the research output. This is an example of how institutional members assess financial gain versus value gain in the idea of an entrepreneurial university.

Another important message is the reality that it is difficult for the academic community and students to participate in entrepreneurial initiatives because of their attitudes toward risk. Even if NUS puts a lot of effort into promoting an entrepreneurial culture, the relevance of the "spirit of enterprise" vision and strategy statement does not apply to all, and will remain vague.

7.1.3 Implications of Research Findings

This study has implications not only in the NUS case but also for other universities experiencing entrepreneurial transformation. As described in the literature, the entrepreneurial university concept is still developing and many scholars continue to seek new methods, frameworks, and case studies to understand the responses of HEIs. Although Singapore is a small country, some important findings here can be utilized in analyzing other countries' situation concerning their efforts in building up the role of HEIs in cultivating entrepreneurship and in broader policy initiatives for economic development. Whether there are positive or negative views attached to the entrepreneurial university concept, the aim of most governments is still to produce competitive and self-sustaining HEIs. Industry engagement and the massive support given by the government in promoting entrepreneurship are beneficial. However, as demonstrated in this study, university actors are defined by two opposing sets of values—*traditional vs. entrepreneurial*. These values have manifested in patterns of conflict and agreement in academics' responses to the changes in their environment (Lam, 2015: 21). With the concepts "entrepreneurial" and "entrepreneurship" being used in a fairly broad sense, it is noticeable how these concepts can increase the pattern of polarization (Campbell & Docherty, 2003) among institutional members as more policies are implemented and more actions are demanded by the government and university administration in the future. While most renowned universities are described as ideal places to engage in entrepreneurial activities, the semantic malleability of the concepts

“entrepreneurial” and “entrepreneurship” can be challenging. According to Mautner (2005), semantic malleability illustrates how concepts try to fit particular agendas (e.g. as promotional text or stylistic variation) and affect individual’s way of evaluating the content of concepts. Semantic malleability was also evident in the way the entrepreneurial university was defined in the empirical findings of this study. Documents and interviewees defined it as either an institution developing students to be entrepreneurial, or an institution operating in an entrepreneurial way. In addition, the results of the interviews were similar to Mautner’s observation with regard to the nature of frames, in which the “entrepreneurial” and “entrepreneurship” concepts suggest differing degree of salience (Entman, 1993). Institutional members thus selectively adapt the meaning that is more relevant to their intentions or initiatives.

In this study, attention was given to investigating operational barriers because the conduct of entrepreneurial activities and achieving entrepreneurial goals take time to flourish. A greater involvement of university actors and opportunities to frequently discuss the challenges in undertaking entrepreneurial activities were found to be crucial in this situation. Kretz and Sà (2015) explain that qualms about the presence of entrepreneurial activities at HEIs has been challenging over time. Hence, they emphasize the role of boundary spanners (i.e., entrepreneurship centres) as facilitators in developing initiatives, programs and communities of practice at HEIs. These are expected to bring ideas, practices, organizational models, expertise, and other resources to help promote and maintain entrepreneurial activities. Individual obstacles in achieving initiatives will be addressed more if these boundary spanners are active and committed to assist in pursuing entrepreneurial goals.

This study contributes to understanding the complex situation of achieving institutionalization. The ambiguous goals of the entrepreneurial university have implications on performance and it is also unclear how HEIs are working on identifying specific measures or attributes for determining the extent of institutionalization. For practical consideration, universities can establish metrics for this purpose. The development of metrics was similarly raised by Etzkowitz (2016) in the recently launched Global Entrepreneurial University Metrics project, which aspires to improve the abilities of HEIs to increase their performance level in education, research, and innovation. Etzkowitz believes that there is failure in assessing the contribution of HEIs to economic and social development as well as in evaluating problems related to enhancing development strategies, internal academic progress, and broad societal policy issues. From an institutionalization

perspective, the establishment of metrics can look upon the diffusion of entrepreneurial activities and the possible consequences of strategies at different levels (e.g., effects of altering the criteria for evaluating patent applications at faculty or institutional levels).

Another implication of the results of this study is on rewarding entrepreneurial efforts at universities. Universities need to review their rewards system to encourage more individuals to participate in entrepreneurial activities. Most of the interviewees have associated rewards to success in conducting entrepreneurial activities. This means that if they thrive in producing output (i.e., publications, patents), they will be able to secure additional resources for maintaining their laboratories and future projects. The chosen case study has valued the entrepreneurial university concept through the years in terms of significance and application. However, for universities experiencing similar transition, there is a need to closely monitor and analyze the effects of institutionalization at each phase³⁸ to determine the aspects that have conditioned the expansion of entrepreneurial activities (Colyvas & Powell, 2007).

Finally, frame analysis proved to be invaluable in examining the ambiguous setup of HEIs. Similar to modern business organizations, universities are made up of factions with contradictory interests, preferences, and power bases. A typical scenario among organizations is when change efforts are disrupted by individual differences (Gioia, Nag & Corley, 2012: 371). This situation was present in the findings about the institutionalization of the entrepreneurial university model and uncovered through the categories of frames adopted from conflict research. The method of frame analysis has been useful in exploring how university actors struggle for meanings as they recognize the issues and situations affecting their environment. In the case of conflict research, resolving issues and disagreements are often handled by professional mediators. It is also challenging for mediators to consider the inclusiveness of all stakeholders even if some are not directly involved in the issue (Raitio, 2008). However, intractable conflicts in higher education are mediated through dialogue between administrators and individuals or units concerned. In issues concerning entrepreneurial activities, the role of expertise in settling conflicts is necessary. Experts at universities can identify key people that will help in the planning process and suggest applicable solutions in resolving conflicts toward the purpose of sustaining the entrepreneurial university. As Bienkowska et al. (2015: 67) pointed out, managing the entrepreneurial university should not overlook the need to create tailor-made strategies and utilize multiple

³⁸ Or period effects of institutionalization as described by Colyvas and Powell (2007).

channels to communicate with students, faculty, and staff. The framing perspective underscores that frames and institutions are mutually constituted through practice (Scott, 1995; Raitio, 2008). Therefore, this study has provided relevant insights on frames and institutionalization by taking into consideration the interpretations of university actors on entrepreneurial practices, and those practices that delineate policy goals related to entrepreneurship.

7.2 Suggestions for Future Study

This study contributes to our understanding of entrepreneurial activities, and the notion of an entrepreneurial university in the Asian context and at the organizational field level. To some extent, choosing the National University of Singapore as a case study was my way of revisiting and advancing Wong et al.'s study (2011) by putting together the concepts of the entrepreneurial university, institutionalization, and the frame analysis method. The study was able to present the situation of institutionalizing the entrepreneurial university model through the framework used in the healthcare organization, as well as categories of frames adopted from conflict research.

The results have proven that it is possible to apply established approaches that are utilized in other disciplines in order to analyze the transformation of HEIs and other conditions that affect their management, people, practices, interactions with stakeholders, and roles in national economic development. Singapore is a small country that can offer an interesting case of how universities respond to their environment by being entrepreneurial, and it would be worthwhile for future studies to explore entrepreneurial activities in other HEIs in Singapore. For example, Nanyang Technological University is another top-performing institution with an entrepreneurship center that would make it a potentially interesting case study, as well. The insights of the academic community from other HEIs would be relevant to address, since entrepreneurship is covered by the Singapore government's policy framework, and it is not enough to only focus on the country's national university.

The intractable issues and situations (Shmueli et al., 2006) that confront institutional members in accepting and committing to practices within the entrepreneurial university paradigm were the main focus of this study. Tapping more participants from various disciplines can shed light on determining the extent of institutionalization, because the results of this study suggest that other practically

oriented disciplines can attest to this phenomenon. Given the factors that contribute to the institutionalization of the entrepreneurial university model, this study can be replicated by revisiting the perceptions or frames of institutional members in terms of KPIs, governmental policy frameworks on entrepreneurship, the meaning of entrepreneurship and the entrepreneurial university, and the risks that come with the entrepreneurial concept. Designing a survey questionnaire that would include a set of criteria to measure the extent of institutionalization could be feasible for targeting other institutional members (including students). The questionnaire might still contain inquiries about the “spirit of enterprise” and the kind of entrepreneurial activities that institutional members engage in. While the results of this study indicate that the location of the NUS campus has nothing to do with entrepreneurial atmosphere, I believe that this should be further explored. Different campuses are characterized by different resources, practices, programs, events, and people, which may or may not contribute to the promotion of the “spirit of enterprise” (Reyes, 2016).

While the entrepreneurial university is becoming an attractive label for higher education institutions undergoing massive transformation, some alternative concepts were found to be relevant in the context and condition of other countries. For example, the *higher education-community partnership model* was proposed by Subotzky (1999) for the South African context. The focus of this model is on the organizational characteristics of new knowledge production such as addressing issues on community development goals and reconstruction. Some of the activities involved are action research projects that aim to solve social problems and community service learning (i.e., addressing community needs through the involvement of different disciplines and fields). Subotzky believes that the broader social purpose of higher education will be more highlighted in the higher education-community partnership model instead of the negative effect of globalization. In addition, it can alleviate the impression that universities are like charitable institutions. The primary concern on the transformation of universities is to build stable relationships with various stakeholders towards social development, equity, and public good. A similar view was found in the context of Australian universities (Winter, Wiseman, & Muirhead, 2006). Although in another study, public universities can also be considered as social enterprises due to efforts of balancing the traditional mission of education, research, and community engagement while remaining economically sustainable (Miles et al., 2017). In the recent study involving the context of Brazilian universities, “systemism” is believed to be the more appropriate term to understand universities as complex systems

(Schmitz et al. 2017). In the same way, it covers individuals, organizations, and interactions within universities and provides explanation on how innovation and entrepreneurship serve as mechanisms that allow universities to contribute to socioeconomic development while aiming to achieve sustainability.

Due to the limited scope of this study, researchers who wish to utilize frame analysis can focus on the government's interpretations of entrepreneurship, since it is the primary definer of the policy framework (Miljan, 2011). Government documents in Singapore are quite difficult to access, but they can offer promising results that will enable the audience to understand national policies about entrepreneurship, including their impact on a university's decision-making processes. Even beyond this chosen context, governmental frames can be discussed according to how the media or researchers follow debates or track policy documents that discuss entrepreneurship's role in reforming universities.

Alternatively, other theories can be utilized in order to advance our understanding of institutionalization being a dynamic process. According to Barley and Tolbert (1997), structuration theory addresses the interplay between actions and institutions, and examines how institutional maintenance and change in organizations emerge. They emphasized the identification and analysis of scripts (e.g., documenting the behaviors and decision-making processes that describe the diffusion of certain activities) to study the behavioral and structural, rather than the cognitive and the cultural components of institutions. The structure of laboratory life and scientists' research networks are interesting topics to explore within structuration theory as the opportunities and environments providing adequate support to the academic community can be further analyzed (Colyvas & Powell, 2007: 223). Higher education policies commonly demand an ideal set-up for universities. Accordingly, the topic of institutionalizing the entrepreneurial university can apply prospect theory (see Kahneman & Tversky, 1979) to examine group-based behavior, choices, and decision-making under conditions of risk and uncertainty. Categories that will depict causal effects on mechanisms that encourage actors to participate and contribute to efforts (e.g., a more focused examination on framing effects as suggested by Aroopala, 2012) that will sustain the entrepreneurial university and other university strategies can be a valuable contribution to this theory.

Future studies can also focus on the importance of institutional entrepreneurs in supporting the transition toward the entrepreneurial university model. Institutional entrepreneurship in some of the findings in this study has partly shown the impact of entrepreneurial behavior (Williams Middleton, 2010) on the

roles and responsibilities of various actors: particularly the efforts that are exerted in promoting an entrepreneurial environment at the university, even if it is beyond the scope of their tasks. Hence, this study recognizes the reality that certain actors help promote changes at the university level through their strong leadership and their attempts to change the conception (Fligstein, 2001) of the entrepreneurial university to go beyond merely being a profit-making initiative.

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APPENDICES

Appendix 1: Interview Invitation Letter

Dear Professor _____,

Greetings from Tampere!

I am Charisse Reyes, a doctoral student from the University of Tampere, Finland currently doing research on the National University of Singapore as an entrepreneurial university. The aim of the study is to examine the institutionalization of the “Entrepreneurial University Model” covering the years 2006 up to present. For this reason, I am interviewing key university actors about their views on the institutionalization process. In addition, I am also interested on how the entrepreneurial university model supports the goals of Singapore.

The contribution of Faculty/Department/Institute/Office of _____ to research, education, and training is of particular relevance in the exploration of the NUS "entrepreneurial university model", and I believe the insights and opinions of its faculty members would be invaluable. May I humbly ask if you are available on:

Proposed Date:

Time:

Place:

The interview will take for about an hour. In addition, I am planning to use digital recorder during our conversation. Please let me know if you are comfortable with this arrangement.

Thank you very much for considering this request.

Sincerely,
Charisse Reyes

Appendix 2: Interview Questions for TPS Respondents

1. The phrase “spirit of enterprise” is visible in all NUS documents and online information about the NUS as entrepreneurial university. Please describe how the “spirit of enterprise” applies to your academic activities.
2. How have you observed the changes at NUS from the time you started working at the university and held academic positions?
3. Does your position involve leading or promoting income generating activities?
4. Are you aware of certain policies concerning entrepreneurial activities at the university? What are these policies?
5. In what ways does the government, industry and other stakeholders influence the activities of your department/faculty/institute/center?
6. How is the information on funding opportunities disseminated?
7. Could you please describe how your activities/programs are usually funded?
8. What is your observation on the participation of faculty members when it comes to income generating activities)
9. How does the university respond to initiatives of the faculty in bringing opportunities (e.g., collaboration and partnership, start-up creation, new programs, patents, new research projects) for NUS?
10. In what ways does the university encourage its members to contribute to entrepreneurial activities?
11. What are your views about the planning, facilitation and embeddedness of entrepreneurship education at NUS? Is entrepreneurship education extended to your department/faculty/institute?
12. What type of trainings or support services do staff and faculty receive in developing income generating activities?
13. How do you see the importance of leadership in promoting the “spirit of enterprise?” What can you say about the academic leaders’ role in taking initiatives related to the “spirit of enterprise?”
14. Do you think the transition of NUS to become an entrepreneurial university is necessary and appropriate? Is there something to criticize about NUS having an entrepreneurial orientation?

Appendix 3: Interview Questions for UA Respondents

1. The phrase “spirit of enterprise” is visible in all NUS documents and online information about the NUS as entrepreneurial university. I would like to ask how is the “spirit of enterprise” reflected in the activities of your office?
2. Have there been recent policies or new developments in driving the “spirit of enterprise?”
3. How have you observed the changes at NUS from the time you started working at the university and held academic positions?
4. Have there been barriers in executing the plans to become an entrepreneurial institution? What was the strategy? How did institutional members express their commitment?
5. According to the literature on entrepreneurial university, Including the word “enterprise” and “entrepreneurship” in the mission statement connotes institutional commitment. What is NUSs rational for including the word “enterprise” in the vision statement?
6. Not all students and even faculty from other fields would be able to accept easily the word “enterprise.” In what ways does your office make the word “enterprise” comprehensible and acceptable to most institutional members?
7. How have the activities of the Office of _____through the years resulted to (1) long-term/ sustainable partnerships? (2) improving NUS education and research?
8. What are the communication tools used by the Office of _____ to disseminate information on various activities?
9. What units/departments are directly reporting to this office?
10. What is your involvement on policies related to entrepreneurial undertakings in terms of what should be taken or applied in practice and how activities are coordinated?
11. One of the studies about NUS mentioned that there was no debate when the entrepreneurial university model was adopted by NUS (Leong et al., 2008). What is your view on this claim?
12. Do you think the transition of NUS to become an entrepreneurial university is necessary and appropriate? Is there something to criticize about NUS having an entrepreneurial orientation?

Appendix 4: Profile of UAS and TPS Interviewees

Profile of Interviewees	
	<i>Number</i>
<i>By position</i>	
University Administrators	3
Head of Departments & Directors of Institutes	7
Head of Units/Center Head	4
Faculty Members without administrative responsibilities	1
Program Manager/Program Director	3
Total	18
<i>By Discipline</i>	
Biological, Physical & Life Sciences	5
Mathematics	1
Social Science & Humanities	4
Engineering	4
Multidisciplinary Background (e.g., business & psychology; design & computing)	4
Total	18
<i>Based on the Year of Hiring</i>	
1980-prior	3
1981-2000	9
2001-2013	6
Total	18

Appendix 5: Coding

Identity Frames	Content, interview quote example	Number of Sources	Number of References
"I"-What I do at NUS	Task of the interviewee and its connection to entrepreneurial activities: "I give updates to them and inform them what's going on"	18	22
"We" and "Our" - What we do at NUS	Clarifying the task of the interviewee's department/faculty/institute/center: "We hope that people with the entrepreneurial mindset will find this opportunity."	18	111
Influence of NUS	Describing one's affiliation with the university and its influence to interviewees' activities: "...I have access to alot of information on what is going on with other higher education institutions."	18	10
Total		18	143

Characterization Frames			
Code	Content, interview quote example	Number of Sources	Number of References
Positive	Positive depiction of the interviewee regarding the policies, mechanisms, support and incentives to conduct entrepreneurial activities: "One thing about this university right now is that we are nicely exposed."	18	73
Negative	Negative depiction of the interviewee regarding the policies, mechanisms, support and incentives to conduct entrepreneurial activities: "So we're not blessed with the same level of support."	18	62
Process	Describing the process and coordination of entrepreneurial activities at NUS: "And after that, the Development Office would help because it is just preliminary discussion..."	18	53
Leadership	Describing the importance of leadership in the entrepreneurial university setup: "The price is that while you can lead, you should not interfere."	18	31
Singapore	Characterizing Singapore as a country, its ideas, strategies and attitude toward entrepreneurship: "Singapore buys the whole scientific team."	18	70
Total		18	289

Note:

This study treated process as a category under characterization frame, which include interpretations connected to typifying an institution (e.g., procedures or methods observe in an institution). In Shmueli (2008), "process frames" contain interpretations on decisions- whether they are considered fair or if legal protocols have been followed.

Power Frames		Number of Sources	Number of References
Code	Content, interview quote example		
Expertise	Emphasis on the expertise of the interviewee with regard to managing and developing an entrepreneurial university: "Finally, I found that some of these guys are making decisions...for a guy who never started a company on their own."	6	16
Voice	Emphasis on the voice exerted by the interviewee to improve entrepreneurial activities at NUS: "I've approached the university a few years ago. It's not that they don't have money."	3	8
Role of Government	Recognizing the role of government in the entrepreneurial activities of NUS: " I think it was really the government putting in more money into the universities for research..."	10	23
Role of Industry	Recognizing the role of the industry in the entrepreneurial activities of NUS: " Actually, the board members are from the industry. "	10	8
Vulnerability	Perceived weak actors in the entrepreneurial university setup. "Sometimes, we're a bit of a loss here."	6	9
Actions	Ways in which important actors oversee and manage entrepreneurial activities at NUS: "There is top down encouragement for grant applications."	10	21
Total		16	85

Risk and Information Frames		Number of Sources	Number of References
Code	Content, interview quote example		
Benefits and costs	The perceived advantages of entrepreneurial and efforts needed to work on several related initiatives (No debate claim by Leong et al., 2008) " If you can achieve that, you actually have a lot of room to maneuver."	7	15
Expert assessment	Perception of experts based on their experience and involvement in entrepreneurial activities and related process: "I believe it's still very different from America...where I lived. "	10	25
Uncertainty, doubt and worry	Insights on the outcome of entrepreneurial activities at NUS (past, present and future): "...but the government has changed a bit. They would always ask what is the outcome of this piece of research?"	9	16
Alternatives to minimize risk	Options suggested to resolve issues in the handling of entrepreneurial activities and related process: "You have to deal with people not knowing about it. I don't think that we couldn't get rid of that kind anytime soon."	11	22
Total		16	78

Note:

Silverman (2006: 159) and Marvasti (2003: 73) suggest that identifying the categories or features that will become the focus of the research is essential to the task of building a coding frame. Campbell and Docherty (2003) and Shmueli et al. (2006) did not emphasize this particularity in their respective studies. However, I find the approach of Vuori (2011) suitable in organizing the coding frame based on her study of Bolman and Deal's (1984) reframing theory.