

## A New Role for Universities: Technology Transfer for Social Innovations

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**Abstract**--Universities have played a significant role in stimulating technological change and innovation, the focus has been commercialization of technical knowledge generated within science, technology and mathematics disciplines. Universities have increased disseminating knowledge as well as integration with industry in the form of entrepreneurial university. The transformation of university mission has supported university-industry-government interactions in creating commercial entrepreneurial spinoffs while it neglected to interact with a critical stakeholder of the university: society. To our knowledge, the transfer of knowledge generated within universities into social enterprises / social entrepreneurs has not been studied in the literature. This paper will present the gap in the literature review that might be an invitation for researchers to focus on the topic.

### I. INTRODUCTION

Universities have increased disseminating knowledge as well as integration with industry in the form of entrepreneurial university [1]. The transformation of university mission has supported university-industry-government interactions in creating commercial entrepreneurial spinoffs. Besides commercial ends, universities could play an active role in tackling inequalities and poverty by transferring social innovations from universities to social enterprises. For example, Nobel winner Muhammed Yunus was a university professor in Bangladesh when he transferred his microcredit banking idea into the establishment of the Grameen Bank, which had impact on the lives of millions of poor. However, this example and many others remain as individual and ad-hoc initiatives in universities.

The original United Nations (UN) Millennium Development Goals set in 2000 failed so they are revised in 2015 and priorities are given to eight goals: eradicate extreme poverty and hunger; achieve universal education; promote gender equality; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and global partnership for development. Even developed countries are suffering numerous social problems. For example, in the European Union (EU), social innovation has been decisively incorporated into two major policy documents: the EU 2020 Strategy for smart, sustainable and inclusive growth, and the EU budget; social entrepreneurship is being promoted as part of the agenda to improve the European economy and create employment [2].

To our surprise, there is no systematic research on understanding social innovations in universities and their transfer into social sector, consisting of social enterprises, non-government organizations, government agencies and

corporations. Thus, this paper attempts to lay the ground existing literature about the role of universities in social innovations. After this short introduction, second section summarizes the role of entrepreneurial universities and its technology transfer activities. Third section lays the background on social innovations in order to clarify the key concepts such as social, social innovation, social enterprise, and social entrepreneurship. Then, how social innovations might be integrated into the agenda of universities will be discussed. As a final word, a few research avenues will be listed for researchers to tap into this critical field that could establish the link between universities and society.

### II. ENTREPRENEURIAL UNIVERSITY

Historically the development of higher education is closely related to the growth of economy and society and university's mission evolved during the centuries to respond to the changing societal needs. At the end of the Second World War, a book titled as "Science: The Endless Frontier" was published [3] that demanded sustained involvement and investment in science, technology and research in the US. This was the base for the entrepreneurial university in the following years that has over the years spread across globe.

Part of the response to creating the entrepreneurial university was the development of academic fields and areas of research that were not just focused on "knowledge for its own sake" but rather oriented towards knowledge for the sake of solving specific and compelling problems and challenges confronting society. Thus, relevance and applicability emerged as the key guiding values in the research. In order to facilitate university entrepreneurship and technology transfer from the university, in an effort to penetrate such a formidable knowledge filter, the US Congress enacted the Bayh-Dole Act in 1980 [4].

The development of "entrepreneurial universities" is based on the university-industry technology transfer, research commercialization, and academic spin-offs [5, 6]. As universities seek to become entrepreneurial, so the development of effective mechanisms to integrate the two activities of research publication and research commercialization has become a major challenge [7]. By becoming entrepreneurial, universities have played a significant role in stimulating technological change and innovation, the focus has been commercialization of technical knowledge generated within science, technology and mathematics disciplines.

The importance and contribution of entrepreneurship driven from universities to economic development is well documented. For example, American university spin-offs

alone contributed a total of \$33.5 billion in economic value added between 1980 and 1999 according to the Association of University Technology Managers; this value excludes the value added from deals such as taking an equity ownership position in a venture, which may result due to technology transfer from an academic institution [8]. In fact, the study [8] highlights numerous benefits of spin-offs, including: encouraging economic development, generating significant economic value, creating jobs, inducing investment in university technologies, promoting local economic development, and enhancing the commercialization of university technologies.

Due to the importance of university contributions to economy, studying knowledge transfer from universities to industry has been a popular topic. There is a substantial amount of research examining the factors influencing transfer of knowledge from academia to industry [4, 8]. Nevertheless, studies show that only a small proportion of disclosures are turned into a license and hence commercialized. For example, the research in the US shows that only 20 percent of the disclosures are turned into patents and only 10 percent of those patents are licensed to firms [9, 10]. The unused body of knowledge is a waste for society in advanced countries but more so for developing countries due to their limited resources. All these undisclosed knowledge could be utilized at the social and public sectors.

Some studies also suspect about the mixed evidence on the societal impact of research commercialization at universities in terms of its financial benefits [4]. In short, there are still some gaps preventing a complete understanding of the university relationships that is mainly trapped in the observation of university-industry-government collaborations [1, 8]. Clearly, universities neglected to interact with a critical stakeholder: society. However, the current economic and social crises and the changes the world is undergoing can be an opportunity for building the link between universities and society [11]. In order to achieve equity and sustainability, universities might be the reference points for their communities; they could have an essential role in establishing local social dynamics through technology and knowledge transfer. Thus, as a recent [11] invites academia, it is time for expanding the role of universities in new dimensions in order to grasp the overall performance generated through universities.

### III. SOCIAL INNOVATIONS

SI is a trans-disciplinary concept and literature is building up particularly after 2010. A considerable number of conferences and summits on social innovation are organized across the world and the World Economic Forum [12] even puts social innovation on its agenda. Thus, all three sectors of the economy have acknowledged social innovations: the business sector, the government sector and the non-profit sector, including civil society [13].

Systematic literature review of SI along six decades (1950-2014) brings together an extensive number of works [14] which can be listed under four major categories: (1) studies based on what SI is (e.g. a law, organization, value, norm, code, role, etc.); (2) studies focusing who can 'do' it (actors and society sectors); (3) authors interested in how and where it is 'done'; and (4) studies considering it as an outcome and as a process just like innovation in general.

Social innovation is an umbrella term that covers a broad range of activity ranging from market-oriented social innovations such as Fair Trade products and renewable energy to innovations which cannot operate in regular competitive markets such as large parts of the fields of culture, youth aid, and other social services [15]. There are many definitions but a practical definition which is also used to a large degree by the Young Foundation considers social innovations as

“any novel and useful solution to a social need or problem, that is better than existing approaches (that is, more effective, efficient, sustainable, or just) and for which the value created (benefits) accrues primarily to society as a whole rather than private individuals” [15, p. 36].

A recent project on social innovation [16] simplifies this definition further by saying that social innovations are new approaches to address social needs. The 'social' in social innovation has a discursive fluidity in the meaning; so it can refer, at a minimum, to values, needs, well-being, and social impact. The term "social", by and large, confirms the non-material nature of innovation such as social behavior but it also highlights the achievement of socially desirable ends. These innovations engage and mobilize the beneficiaries and help to transform social relations by improving beneficiaries' access to power and resources [16].

As mentioned above, Muhammed Yunus is the well known example as the founder of Grameen Bank. Not all social innovations are radical. Some social innovations provide innovative, low-cost medical services for the poor. An example would be the Aravind Eye Hospital in south India which provides low-cost eye-care services and cataract surgery for the poor [17]. The hospital subsidizes these services from fees given by full fee paying patients and other donors. Some social innovators use technologies for social problems. For example, Arthur Zang developed the touch screen Cardio Pad, which allows reliable diagnosis and cardiac care in remote regions where access to electricity to run sophisticated medical equipment is scarce. Another example is Fair Trade practice [13]. It reconfigures market structures to empower local farmers and workers by providing education and information, offering a living wage and long-term contracts and by simply following labor and environmental laws. Moreover, Fair Trade seeks to modify consumer behavior by raising awareness and advocacy of trade justice. Ends include reducing poverty, empowerment and civic participation and more sustainable farming

methods. Wikipedia is another example that has the power of transforming social practices through the use of technology [14].

Social innovations might occur anywhere along a continuum of for-profit to non-profit organizations [18]. A recent study [19] gives 3M as an example of corporate social innovations. Herrera lists activities of 3M company as indicators of social innovativeness such as: working with the World Resources Institute and the Design for the Environment Program; adopting the triple bottom line approach; setting sustainability goals such as reducing volatile air emissions 15%, reducing solid waste 10% and improve energy efficiency by 25% during the period of five year period, 2010-15. Similarly, another study [20] defines corporate social innovation as “projects” in private companies that had a social aspect to them in terms of supporting a specific target group (often within the workforce) and addressing issues that are of concern for society in general: educational programs for elderly employees, diversity management, programs for integrating persons with disabilities, support measures for women (maternity leave programs), projects supporting external target groups (persons without bank access), etc. This study gives the following example: a company called as Deakon Degen, founded by a charismatic female worker who had experienced discriminatory practices against women in the labor market, provided occupational opportunities to mothers and women with disabilities.

Even though non-profit organizations and large organizations might get involved with the social innovation, a more popular actor and the main driver in the field consist of social entrepreneurs. These new stream of entrepreneurs pursue ‘innovative and effective activities that focus strategically on resolving social market failures and creating opportunities to add social value systematically by using a range of organizational formats to maximize social impact and bring about change’ [18, p.23]. These entrepreneurs are based on social innovation and act as a new form of organization dedicated to social value generation. . The major differentiation between an entrepreneur and a social entrepreneur is that the former’s primary goal is to make profit while the latter targets to generate social value with or without any profit made.

The “social sector” refers to a group of organizations that includes traditional nonprofits as well as an increasing number of “social entrepreneurial organizations” [21]. While traditional nonprofits hold to an exclusively social mission and rely solely on external grants and donor support for revenue, the latter form try to combine social and financial missions by generating revenue at the same time pursuing a social goal including poverty alleviation, issue-based education, and international development [22].

Major difficulty in social sector is the measurement of social value. A widely recognized definition considers social values as contributions to the welfare or well-being in a given human community [22]. Examples of social innovations that

fit nicely with this definition abound: innovations conducive to better education, better environmental quality and longer life expectancy are a few [23].

Social innovation is not undertaken in isolation by lone entrepreneurs, but is an interactive process shaped by the collective sharing of knowledge between a wide range of organizations and institutions that influence developments in certain areas to meet a social need or to promote social development [15]. Interactions not only promote the generation of new knowledge but also help social enterprises acquire and develop capabilities. Based on the new technologies and diffusion of open innovation paradigm, the development of an open-solution society is expected [24]. Different stakeholders are involved from the public sector, academia, NGOs, citizens, and companies. Information and communication technology is a key enabler for mobilizing and aggregating collective intelligence and creativity.

Due to major global challenges, there is a need for a new role to universities: getting a part in generating and diffusing social innovations. Considering that sustainability concerns are a key driver for innovation and technological change in the future. Constrained resources will open opportunities for R&D to return to solving some of society’s big problems in a way that is profitable to the organizations they serve and ethical to do for the welfare of the planet. Urbanization and the rise of the megacity will further influence R&D’s role in these larger, more transformational projects and there will be need for universities to consider integration of technology with sustainability. Considering that lifestyles in the developed world at present require the resources of around two planets and this will rise to 2.5 by 2050 [25]. This is not sustainable and there is an urgent need for social innovations including green buildings and renewable energies.

On top of the global challenges, economists also highlight that in a free-market society there will be under-investment in pure social innovations because social innovators will not have material incentives to devote their energies to the creation of pure social innovations [23]. These innovations have both of the central features of a public good: it is virtually impossible to exclude others from the benefits of the new idea, and the marginal cost of an additional person making use of the new idea is zero. Thus, there is need to support social innovations and universities have a large knowledge stock to contribute. However, the relationships of universities with social entrepreneurs have not yet attracted enough attention [26].

#### IV. AGENDA: CONNECTING UNIVERSITIES AND SOCIAL INNOVATIONS

While in 1945 Bush suggested technological commercialization as a new role for universities, in 1998 an EU report titled as “Society: The Endless Frontier” proposed a new role by pointing out the importance of society for academia [27]. This paper welcomes the paradigm shift with the belief that university provides a particularly fertile ground

for the generation and early development of social innovations.

To our knowledge, there are almost no studies attempting to understand the university society collaborations in order to increase social wealth. One exceptional study has examined the practical applications of social knowledge generated in six Canadian universities [28]. But even this study examines the use of social knowledge by business rather than social enterprises' point of view. Due to the neglect of the topic in the literature, a few recent articles call for further research in the social innovation field [6].

Since UN Millennium Development Goals failed and revised in 2015 once more, there are mounting social problems cannot be left to government and private businesses alone to be resolved. In 2012 G-8 Summit, leaders of the world's largest economies and four African countries built the New Alliance for Food and Nutrition Security, which set its sights on helping 50 million people out of poverty over the next 10 years through sustained agricultural growth [29]. As part of the plan, the New Alliance launched the Scaling and Seeds and Other Technologies Partnership in order to promote commercialization, distribution, and adoption of technologies that would improve seed varieties.

The problems, nevertheless, are not restricted to developing countries. A recent study complains from the fact that many factors and barriers currently prevent social innovation in Europe, advanced countries, from reaching its full potential [30]. It is well recognized that European societies face common challenges such as demographic change and migration which stretch the existing systems to their limits and challenge them to develop better or more adequate ways of social services. Thus, the Europe 2020 strategy acknowledges that innovations and a more direct interaction between the economic and the social dimension contribute to overcoming economic crises and identifying an appropriate response to societal challenges. Universities can play an active role in finding solutions to these societal challenges by helping to develop and diffuse social innovations based on technologies and knowledge generated at universities.

The new role of universities might take place at two main levels: research activities and mechanisms for transferring social innovations.

As management literature highlights, organizational culture is the pattern of values, norms, attitudes, assumptions, beliefs and expectations that powerfully shape the ways in which people behave and things get done [31]. Although technically skilled people might reflect more than average individuals on technology, because they are more often confronted with technology, they do not necessarily also reflect more on questions regarding technology's impact on society. In addition, "people do what you *inspect*, not what you *expect*" [32]. Metrics and organizational culture established in universities do influence academician behavior. As long as universities adopt new policies embracing social innovation into their culture and openly prioritizing the

transfer of technologies to society, universities might become a critical player in social innovations.

Understanding the need for change, in the UK, government policy induced Research Excellence Framework in 2013 requiring departments to develop Impact Cases showing how research impacts practice [6]. By measuring, it is expected to increase "Business Engagement" by universities. If such frameworks could expand the role of universities to integrate the wider audience not only companies to impact such as "social sector" participants, it will be beneficial for all society.

The literature is overrepresented with commercialization mechanisms such as licensing that are structured for the privatization of knowledge rather than free supply of knowledge. That is why existing commercialization models are not sufficient to understand knowledge transfer from universities to social enterprises and public sector and to accelerate the diffusion of social innovation? What might be the special features of transferring knowledge and technology to social and public sector to eradicate poverty? Because of their focus on commercial applications Technology Transfer Office (TTO) professionals are not aware of the possible social impacts of a technology/knowledge created at university labs. Even they are aware of the usage of knowledge/technologies for societal problems their technology transfer models are based on privatization of knowledge which is opposite to the nature of social innovations. Cycle of technology transfer starts with the disclosure of university inventions and followed by patenting and licensing stages.

Innovation based on social science and technology can be understood as the development of individual, enterprise and innovative organizations applying social science and technologies. It can be driven by political parties and governments (e.g. new growth models of public health), markets (e.g. open source software or organic food), social movements (e.g. Fair Trade), academia (e.g. pedagogical models of childcare) and social enterprises (e.g. microcredit and magazines for the homeless) [26]. The development and transfer of social innovations take place as a result of interactions between these different actors operating within the same social system and are developed through collective learning embedded in that specific social context [33]. Hence it is necessary to understand the environment where these social innovations are developed and adapted through transfer.

If universities could establish relationships with these diverse set of organizations in the form of transferring scientific knowledge generated at universities, they could deliver multiple benefits to society in addition to the pure economic ones. So, universities need to figure out how to establish and manage complex relationships with multiple stakeholders.

Setting relationships with social stakeholders is not an easy task. Social capital is a concept widely used by economists, sociologists and management researchers to refer

to benefits accruing to individuals from social relations. Social capital represents a resource in its own right, but can also help to get access to other resources [34] or be relevant in the acquisition of legitimacy. That is why it is perceived as the enabler of social innovation [35]. Thus, universities should build collaborative relationships with stakeholders, bridging diverse social groups and overcoming social exclusion by building new ties across social groups [36]. By doing so, they should capture and disseminate new ideas and knowledge within the region they operate in the form of social innovations.

## V. AVENUES FOR FURTHER RESEARCH

This paper presents a brief overview of literature on the relationship between universities and social innovation. We identified three main gaps that are promising avenues for future research for technology management academicians.

### A. Social innovation at universities

There is need for all types of support to social sector, especially from universities. Having an extensive role in developing knowledge, universities could increase social innovations and diffuse them across sectors in various organizational forms such as non-governmental organizations and social enterprises [37]. This could be only possible if universities start to reconsider their role in society and integrate social innovations into their missions in addition to technological innovations and technology transfer to commercial entrepreneurs and start-ups.

### B. Technology transfer mechanisms

Existing technology transfer mechanisms at universities are dominated with commercialization goals. Hence, due to the lack of TTOs' social innovation perspective, even if technologies developed in universities could carry out possibilities for social sector, they will not be advertised to social enterprises and governmental organizations. Thus, there is need to find out new mechanisms that could facilitate technology transfer from universities to social sector. Or some revisions that are required to transform existing TTO mechanisms to accommodate the needs of social innovations. For example, a recent study proposes to launch social innovation parks where social innovation/entrepreneurship can be fostered and where universities and social sector participants could meet and cooperate [38]. As widely acknowledged in the literature, incubators/technoparks/innovation parks are specialized entities providing small new ventures with resources that improve their chances of foundation and survival. They might also serve social enterprises.

### C. Social innovation metrics

It is necessary to develop an assessment scale that could account social aspect of innovations generated in universities. The measures developed for commercial innovations are not

applicable for social innovations due to their differences. For example, a few well known measurement models such as the Innovation Union Scoreboard (EU) not take into account social innovations. Some metrics such as European System of Social Indicators and OECD Better Life Index are particularly appropriate for capturing the social aspect but they are not targeted to understand social innovation [38]. If researchers could identify social impact measures of innovation, they can provide useful guidance to policy-makers, university researchers and practitioners in that they provide a kind of 'checklist' of policy/management objectives of social innovation against which the specific goals of a particular policy may be compare.

Even though the complexities, an example comes from the measurement of social entrepreneurship in a cross country study based on 47 nations that was carried out in 2009 by Global Entrepreneurship Monitor [33]. Another study attempts to measure social value [39]. There is need to develop new measures or transform existing measures for social innovations. For example, a study enforces to measure not only outputs (i.e. deliverables and stakeholder reactions) but also impacts (i.e. long-term changes in social, economic, environmental and governmental conditions and/or policies) as well as outcomes (short-term benefits, i.e., human condition, infrastructure development) [40].

As a final word, we would like to finish with a quote [41]:

“Technology cannot solve every problem in society; but there are very few problems that can be solved without proper utilization of technology. Proper utilization requires proper management. That is what our discipline does. Those who manage technology will be the winners in the coming generations, those who are managed by technology will be left in the footnotes of history. The challenge awaiting us is to make sure that our societies will be among the winners.”

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