



ANALYSIS OF TECHNOLOGY TRANSFER PROCESSES OF INDIGENOUS MEDICINE SECTOR IN SRI LANKA

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INTRODUCTION

Innovation system, which is known as the cooperation between the social, economic, institutional, and organizational factors, has become a common tool for fostering economic and social development in developing countries like Sri Lanka (Jauhainen & Hooli, 2017). Technology has been assigned a critical role in enabling industrial growth which is important for improving the economy of a nation. In this aspect, universities, and the technical institutes play an important role not only as the inventors of the technology but also as the providers of the essential skilled personnel and as the media players who match the economic changes alongside the changes that occur in society (Lee & Win, 2004).

The indigenous medicine system in Sri Lanka which traces its origins back to pre-Aryan civilization in the country, being environmentally friendly and culturally appropriate with fewer side effects emphasizes the importance of improving and promoting indigenous medicine in the interest of achieving socio-economic goals (Padmasiri, 2017). The entire knowledge, skills, and practices which are based on theories, beliefs, and experiences which exist from strands of different cultures, used for maintenance of health and anticipation, diagnosis, advance or treatment of physical as well as mental health, whether it's explicable or not, is known as the indigenous medicine (World Health Organization, 2017). Indigenous medicine is also termed "traditional medicine", "complementary medicine", "alternative medicine" or "non-conventional medicine" (World Health Organization, 2019). In recent years, Sri Lanka has achieved tremendous progress in fabricating innovative methods and products in the indigenous medicine industry. The tremendous value of Sri Lankan traditional medicine has been drawn to the attention of the people especially during the unprecedented global health pandemic of COVID-19 as researchers throughout the world started to discover solutions to prevent the disease and to help with symptoms of the disease (Perera, 2020).

Research culture in the universities is developing several research projects which resulted in commercializable innovative outcomes. Research Commercialization in universities has contributed effectively to the growth of economies resulting in partnerships with the private sector, university startups, and developments in various commercial sectors in most countries (Malec, Stanczak & Ricketts, 2020). Nevertheless, commercialization of a research outcome is a challenging task due to several reasons and the number of outcomes that have been commercialized in Sri Lanka is less compared to other countries (Nisansala *et al.*, 2014). A study conducted using the technologies developed during the period of 2001-2008 revealed that only 13% technologies followed a successful IP right filing and only 4.9% out of the developed technologies proceeded to the commercialization stage after obtaining the protection (Perera, Mudalige & Liyanage, 2015). Even though research on indigenous medicine has been conducted for several decades in the local universities, only a limited number of research outcomes have been effectively utilized to commercialize on a large scale for the benefit of the public.

Therefore, technology transfer becomes a milestone for building social entrepreneurs leveraging on technology, while being able to exploit technological innovations to provide solutions for societal problems thereby contributing to redirecting innovation systems towards socio-technical problems (Gerli, Chiodo & Bengo, 2021). Technology transfer between university and industry can occur through various mechanisms depending on their motivations and available resources (Lee & Win, 2004). Spin-offs, collegial interchange, conference, publication, a joint venture of research & development (R & D), cooperative R&D



agreement, contract research, know-how based consulting and technical services provision, technology licensing, education, training for industry, and exchange of research staff between enterprises and research institutes can be termed as different mechanisms through which university technology transfer attempts to disseminate knowledge and technology to industry (Hsu *et al.*, 2015). Therefore, this study has focused on the technology transfer processes in the indigenous medicine sector. The objectives of the study are identification of the issues in IP filing, identification of the gap between the IP filing and commercialization, investigation of the sustainability of the commercialization, and socio-economic impacts on the local community from the commercialization of valuable research outcomes from the indigenous medicine sector.

METHODOLOGY

This study is a component of a research project, which is carried out to propose ideal technology transfer processes for Sri Lankan Universities based on their capacities. This research was carried out in several stages. Firstly, the available literature in the disciplines such as indigenous medicine of Sri Lanka, technology transfer, intellectual property was thoroughly investigated. A critical literature review was carried out based on peer-reviewed journal articles and publications at international conferences, World Health Organization knowledge repositories, national policy documents, University level policies, Ministry of Health knowledge hubs, etc. This was highly essential in establishing the research gap regarding the question of “an inadequate amount of successful technology transfer endeavors in the indigenous medicine sector in Sri Lanka”.

Data collection was carried out through an online (web-based) questionnaire survey conducted with the participation of about approximately 300 respondents. Respondent sample selection was done based on their connection to the indigenous medicine sector in Sri Lanka including research commercialization centers which are also known as technology transfer offices in respective Universities. Moreover, the researchers had several discussions with some respondents, regarding the indigenous medicine sector in Sri Lanka along with some of the responses provided via the questionnaire-based upon a data privacy policy concerning research ethics. After which the data from survey responses and further communications, was gathered and collated for analysis. Furthermore, commercial research databases were utilized to get a thorough idea regarding the number of Intellectual property rights generated and filed by universities in the said field and commercialization endeavors at the international level. From the results gathered via surveys and database searches, a statistical analysis has been conducted using Statistical Package for Social Sciences (SPSS) software to find the significant differences between the IP filing and commercialization. The gap analysis was performed to prefigure the solutions to reduce the gaps existing which concluded that there was 30% gap between the difference of IP filling and successful commercialization. Also, different data sets were analyzed separately based on the nature of data as both quantitative and qualitative were found during this study.

Furthermore, current technology transfer processes in respective universities were critically analyzed to identify root causes for delays found in processes and to better understand survey responses. Based on data sets and acquired knowledge via the literature review recommendations were proposed to enhance the visibility of identifying barriers that hinder the successful technology transfer in Sri Lanka in the indigenous medicine sector.

RESULTS AND DISCUSSION

The results obtained revealed that less than 5% innovative products have a significant impact on the community which means that clearly, the knowledge transfer in terms of products and services in the indigenous medicine sector has not been constructive thus far. From those impactful innovations, only 2% indigenous medicinal products have the potential to sustain itself in the market for a significant period.



The low number in fruitful commercialization of indigenous medicinal innovations are mainly due to the root causes which were identified via the responses from the surveys and are as follows. Lengthy time frames for obtaining approvals from authorities such as the National Medicines Regulatory Authority (NMRA) and National Pharmaceutical Regulatory Agency (NPRA) affect the commercialization of products. Furthermore, 30% of the researches interviewed revealed that, similar time-consuming processes involved in securing funding for clinical trials and for conducting clinical trials as demotivation factors for conducting large scale industry-directed research projects.

Within the technology transfer process, securing IP rights also play a major role, according to the data analyzed from different databases displayed around 75% of issues in the filing of IP rights for a particular product. Inadequate knowledge of IP rights among the majority of the researchers which impede the early stages of protecting an invention might have also contributed to unsuccessful IP filing and a remarkably low probability of granting for applied IP rights.

Results gathered from the survey revealed that not conducting a proper market analysis prior to the research as a barrier to commercialize the inventions successfully and 73% of the respondents indicated that that proper market surveys have not been conducted for the research. This has primarily affected the sustainability of the product in the market and the product's ability to conquer a major market in the Sri Lankan context.

Another challenge found which acts as a hindrance for indigenous medicinal products, or any related inventions is that misleading information concerning the value of indigenous medicine in local communities. Lack of collaboration between researchers in areas related to indigenous medicine may have also contributed to this as well.

Researchers, as well as technology transfer professionals, claim that some time-consuming procedures in the respective Universities for agreement drafting and bureaucratic delays in their central systems also reduce the success rates of technology transfers in the indigenous medicine sector. Peer-reviewed journal articles suggested that some researchers are concerned about bio-piracy events which affect the indigenous medicine sector in Sri Lanka. Nevertheless, the existing legal regulations may not fully protect their inventions based on the views of the researchers from developing countries. This also impacts the commercialization of indigenous medical products from Sri Lanka at the international level.

Also, some researchers believe that a considerable portion of indigenous medicine was taken away by foreign rulers who exploited Sri Lankan resources. Peer-reviewed papers displayed the social and economic impacts, innovative indigenous medicinal products have on the national economy and the community at large for a prosperous Sri Lanka.

CONCLUSIONS/RECOMMENDATIONS

Due to political, economic as well as knowledge dissemination barriers within the country, commercialization of innovations in the indigenous medicine industry has been restricted significantly. Infrastructure facilities, along with government assistance in legal and political aspects, should be developed in the future, for Sri Lanka to witness a revolution in the national economy as well as in the community. It should also be noted that some knowledge which can be categorized as traditional knowledge in the Sri Lankan indigenous medicine sector would not meet the requirements set by the definition of the intellectual property rights such as patents but anyhow the researchers should be made aware that there are other IP protection methods other than patents. Furthermore, not only senior researchers but also student researchers should also be made aware of IP rights to secure their inventions. Rather than utilizing a fit-for-all technology transfer model, it would be ideal to introduce a new model for universities that consists of indigenous medicine institutes as well as medical faculties due to their nature of commercialization being different from fields such as technology and Engineering.

Conducting proper market surveys/market-search and feasibility studies also play an important role during the technology transfer process and specially to combat market



competition. It could also be proposed that rather than commercializing a new product where a market isn't existing, would be rather an arduous task to capture an existing consumer market. This should be taken into consideration while conducting market research.

It could be recommended that policymakers at the national level should be made aware of the perceived deficiency for commercialization in the indigenous sector to uplift the nation's economy to reach a new height. Moreover, the public should be made aware of the certain benefits of indigenous medicine and rather than promoting only western medicine in the country by media as well as authorities.

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