

International Technology Transfer in Emerging Markets: A Case of Nepal

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By Yingying Zhang-Zhang, Sitaula Deepika, Henry (Hemin) Song

Introduction

The role of technology transfer in emerging market has been largely recognized by the scholars, practitioners, and policy makers for the economic development of emerging markets (Botchie et al., 2018). Through the investments, foreign direct investment (FDI) often bring new technology and advanced knowledge such as managerial system to the emerging markets along with the financial resources by the multinationals, which is eventually internalized by local employees and enterprises through a knowledge diffusion process internally and externally (Blomström & Kokko, 2003; Görg & Greenaway, 2004; Schaaper et al., 2013).

Among other modes of international entry strategies such as trading and licensing, investments involve more commitment of resources, corresponding higher risks and potentially higher returns (Grant, 2016). We are particularly interested in this FDI mode of international management through which technology transfer occurs and the consequent knowledge management at the organizational level in emerging markets. Based on the strategic people management theory (Zhang-Zhang, Rohlfer & Varma, 2022), we assume the people as the knowledge worker are the key embedded vehicle for the successful transfer of technology and knowledge in this FDI process in emerging markets, to enhance their innovation capability and develop business, industry and aggregately the economy at the national level. Therefore, our particular research interests are to explore the transfer process of technology, innovation, and

knowledge for the human resource and people's capability enhancement in emerging markets through the FDI.

The manuscript will be structured as the follow: First we will review the literature of international technology transfer and knowledge diffusion in particular relation with emerging markets and FDI. Then we will present the study context and the research methodology. Findings and results will be presented followed by discussion and conclusions with future research directions are also highlighted.

Literature Review

The fields of studying technology, innovation, and knowledge have reached a maturity phase after decades of attentions on the topic. This maturity could be represented by the well establishment of academic journals such as *Research Policy*, *Technological Forecasting and Social Changes*, *Journal of Product Innovation Management*, *Technovation*, *R&D Management*, and *Journal of Knowledge Management*. What is relatively new is how the management of technology, innovation, and knowledge happens in an international business context, and particular recently scholars have been starting to pay attention to the phenomenon in emerging markets (Parameswar Nakul & Dhir Sanjay, 2018; Zhang-Zhang & Rohlfer, 2020). In this section we overview the literature of the field to provide the theoretical background of the research.

International transfer of technology, innovation and knowledge

These three terms are often used in an interrelated manner in the international management literature, depending on the definition of the scholar. In the review work of Zhang-Zhang and Rohlfer (2023), they identify technology as a key component of the innovation concept, while

knowledge as a closely related concept. For instance, patent is often a common variable used to measure the innovation or innovativeness of a firm or a nation (World Intellectual Property Organization., 2020), which indicates the invention and breakthrough in a new technology. The intellectual property data of World Intellectual Property Organization (WIPO) is also popularly used to reflect the innovation capability of a nation which contains patents, trademarks, and industrial designs. On the other hand, innovation is also about the creation of new knowledge, and the innovation management inevitably involves knowledge management (Jovana, n.d.; Leber et al., 2015).

Not only technology transfer, but also skills, innovation, and knowledge transfer play a significant role in economic development (Sonmez, 2013). The transfer of technology, innovation, and knowledge can be carried out in multiple channels via FDI: from the headquarter of a multinational to its international subsidiary, from the international subsidiary to local competitors via horizontal spillover, and from the international subsidiary to suppliers or customers via external spillovers (Blalock & Gertler, 2008; Hale & Xu, 2016; Sinani & Meyer, 2004) In this sense, when multinationals invest in another country, it is not only its subsidiaries who are benefited from the technology and knowledge transfer, but also different local stakeholders. Therefore, FDI is said to bring positive knowledge spillover effects in an international context (Bitzer & Kerekes, 2008; Javorcik, 2004), particularly when the multinationals carrying out the FDI has a heavy investment on the research and development (R&D) (Glass & Saggi, 2002).

The transfer of technology, innovation, and knowledge from the headquarters to the subsidiary of a multinational could also be reversed, and bring the innovation occurred in emerging markets to developed economies, as the so-called reverse innovation (Govindarajan & Ramamurti, 2011). Indeed, multinationals could also have the potential to create and integrate knowledge

across their subsidiaries of different locations (Bartholomew, 1997). This process of leveraging knowledge around the world as global learning (Ghoshal, 1986) considers multinationals as social communities that specialize in the creation and internal transfer of knowledge. As a firm's ability to produce innovations based on its existing knowledge depends on the communication and distribution patterns of that knowledge within the firm (Cohen & Levinthal, 1989, 1990), Cohen & Levinthal, 1989, 1990), multinationals have the advantages in this process because they are more efficient in transferring knowledge than other types of firms (Kogut & Zander; 1992; Gupta & Govindarajan, 1993).

FDI and international transfer of technology, and knowledge

In recent years, developing countries have seen a significant influx of FDI (Mohanty, 2012; UNCTAD, 2017). Besides the financial resources that a multinational may bring into the developing countries, FDI is seen as an important vehicle for the transfer of technology, with a greater contribution to growth than domestic investments (Görg & Greenaway, 2004). These contributions are beyond the financial and technology, but also the introduction of new processes, managerial skills and know-how in the domestic market, employee training, international production networks, and increased awareness of access to markets and productivity gains through more efficient methods (Cheung & Lin, 2004; De Gregorio, 2003).

FDI has been found to have a positive effect on employment, particularly when the labor market is flexible. Technology and knowledge transfer occur through FDI, with foreign employees acting as the main channel for transfer. Studies have also shown that R&D expenditures of the parent company are positively associated with the productivity of their subsidiaries, and that knowledge gained through learning is an important element of technological competence for

subsidiaries (Javorcik, 2013; Santacreu-Vasut & Teshima, 2016; Siler et al., 2003). Additionally, FDI can lead to improved productivity and technical efficiency for manufacturing firms through the transfer of knowledge, skills, and technologies through open innovation (Sugiharti et al., 2022). Ricken & Malcotsis (2016) describe several methods through which a parent MNC can transfer technology to its foreign subsidiary, including training, provision of information and documents, exchange of personnel, provision of machinery and equipment, dissemination of management tools, and internal consulting services.

As a consequence of technology transfer, international investments also enhance the human capital level in a host country through its subsidiaries and improve the availability and supply of skilled labor (Bhaumik & Dimova, 2013; Blomström & Kokko, 2002; Fosfuri et al., 2001; Görg et al., 2007; Huang et al., 2002). To address the skills and knowledge gap in developing countries, MNC subsidiaries often invest in human resource training and development programs for their managers, professionals, engineers, scientists, and technicians (Gachino, 2012; Jain & Agrawal, 2005; Mcpherson & Roche, 1997). These programs are designed to improve human capital and increase productivity, as well as to transfer knowledge and skills to the host country. Subsidiaries may run these programs internally or through external sources inside or outside of the company's home country (Gachino, 2012; Mcgaughey & De Cieri, 1999).

Knowledge and people's capability enhancement in emerging markets

Emerging markets and developing countries are also two often interchangeably used terms to present economies that are lay behind the developed economies and in the process of catch-up of economic and technological development. In general, the term of developing countries was popularly used before 2000 and emerging markets in 21st century, while it is not uncommon to see

them mixed up in the usage. The main distinction between two is that emerging markets have gained stable and rapid economic growth while that is still unclear for developing countries even though the latter have opened its economy for development. Technology, innovation, and knowledge play a critical role in this process of transforming a developing country to an emerging market even though both intend to develop economies via FDI attraction. Even though FDI is suggested to increase a country's productivity and economic growth, this occurs through the introduction of new knowledge and development of the people's skill and capability (Gittens & Pilgrim, 2013; Miyamoto, 2003), which is also concluded by Soltanpanah and Karimi (2013) and Kumari and Sharma (2017) as a role of multinationals play in their FDI for positively contributing to local human capital development.

In the process of foreign investments in emerging markets, multinationals establish subsidiaries in host countries, and often corresponding investments are carried out in training and development programs as well for local employees (Blomström & Kokko, 2003; Schaaper et al., 2013), as local managers and workers at the initial stages of economic development generally lack the knowledge and skills required to carry out the tasks (Slaughter, 2002). While the human capital development may or may be the direct objective of FDI, as a consequence of a series of activities of necessities, multinationals often develop the skills and knowledge of their local managers and workers to enhance their productivity, leading to a positive spillover of human skills and knowledge (Sinani & Meyer, 2004). The relevance of the human capital development leads to the argument of a parallel relationship between this and FDI as key factors for the sustainable growth and development in developing countries (Soltanpanah & Karimi, 2013). Consequently, international organizations such as UNCTAD (1994, 2001) recommend multinationals expanding their training and human resource development programs to better connect and benefit the local

economy, and in some cases, spending a similar or greater amount on training than their parent companies in their home countries, specifically for local managers.

That also corroborates with studies which show economic development and FDI are closely linked to the level of human capital development (Borensztein et al., 1998; Kottaridi & Stengos, 2010; Nkechi & Okezie, 2013; Shen & Darby, 2006). Researchers have also found that in developing countries multinationals generally spend more on intensive training and development than local organizations do (Görg et al., 2007; Huang et al., 2002). These training programs could be of technical, of technology, but also of management and general human resource developments (Fosfuri et al., 2001; Miyamoto, 2003, 2008). In addition, from the perspective of the field of expatriate studies, these training programs not only support human capital development in the host countries but also help local managers to enhance their capabilities and enable them replace expatriates in the long run (Mallampally and Sauvart, 1999; Te Velde, 2002). As a result, from the developing country perspective, host country governments often offer multinationals incentives to encourage FDI (Cleeve et al., 2015) with the perspective to develop local human capital (Miyamoto, 2003; Zhao & Zhang, 2010).

Study context: Federal Democratic Republic of Nepal

As current researches in the international business have been focused on emerging markets, but mainly on large emerging economies such as China, India, Brazil and Russia. We attempt to explore a small sized economy in the process of development. Nepal, officially called the Federal Democratic Republic of Nepal, is our choice of study context. To give a sense of its size, Nepal is a landlocked country with an area of 147,181 square kilometers and a population of approximately 30 million people in 2021 (National Statistics Office, 2021; World Bank, 2022). This population

size is between the Beijing's (approximately of 21.8 million) and of Tokyo (approximately of 37 million).

Nepal faces several significant developmental challenges, with political instability, coupled with a lack of effective governance, which has hindered progress and rendered public services ineffective (Nayak & Lamichhane, 2022). This is reflected on that the country suffered from a decade-long armed conflict from 1996 to 2006; and no central government in Nepal has managed to complete a full five-year term, resulting in policy inconsistency and further instability. These factors have, in turn, deterred foreign investors from considering Nepal as an investment destination. The nation's traditional public service delivery system, which is lengthy and process-oriented, has contributed to this lack of investor confidence (Dangal, 2015; Nayak & Lamichhane, 2022; Pant et al., 2022). Despite these challenges, recently the major political parties in Nepal have come to a consensus on the importance of FDI for the country's economic growth, and intended to take advantage of the strategic location between China and India, and the possession of an abundance of natural resources (Pant et al., 2022; World Bank, 2021). Nepal's 2015 Constitution aims to strengthen the economy through private sector development and the maximum use of available resources, with emphasis on FDI and technology for infrastructure development.

Committed to achieve Sustainable Development Goals (SDGs) set by the United Nations (UNDP, 2023), Nepalese government also aims to attain an upper-middle-income status by 2030 (National Planning Commission, 2020). To achieve this goal, the National Planning Commission has created a report called the Needs Assessment, Costing, and Financing Strategy for Sustainable Development Goals, which outlines the financial resources needed to implement the SDGs in Nepal and identifies potential areas for acquiring those resources. However, there will be an annual

average shortfall of Rs.¹ 585 billion, with 218 billion and 367 billion from the government and private sectors, respectively. To cover this shortfall, the report suggests implementing domestic measures such as progressive taxation, improving tax administration, encouraging private investment, and mobilizing foreign aid and investment (Government of Nepal, 2020). Meanwhile, Nepal has developed the 15th Periodic Plan (FY 2019/20 - FY 2023/24), which estimates an investment of over USD 79 billion (Rs. 9,246 billion) in the Plan period. The private sector, including FDI, is expected to contribute 55.6 percent of this investment (National Planning Commission, 2020). That is, an average annual investment of approximately USD 17.45 billion (Rs. 2025 billion) is needed over a decade to meet the SDGs by 2030. Therefore, the attraction of FDI and its related technology and knowledge have become critical and essential for the economic development and SDGs in the political agenda in Nepal.

Over years of efforts, the investment climate in Nepal has been improved, with the Ease of Doing Business Index ranking 94th out of 190 economies worldwide with a score of 63.2 points, according to the Doing Business Report (World Bank Group, 2020). With this medium position, Nepal has also shown improvement in several other indicators such as securing construction permits, access to electricity and credit, trading across borders, and contract enforcement. While Nepal has been continuously improving the performance in indicators such as macroeconomic stability, road connectivity, and electricity access and supply, there is still much room for improvement in competitiveness rankings. According to the Global Competitiveness Report 2019, Nepal ranks 108th out of 141 economies in terms of investment competitiveness.

¹ Rs: Nepalese Rupees (NPR), is the currency of the Federal Democratic Republic of Nepal. According to xe.com on May 7th 2023, the exchange rate is 1 NPR = 1.03 JPY in midmarket rate.

Research Methodology

As the context of study that we aim to focus is lack of research in the field of international technology transfer and knowledge diffusion due to its relative recentness, a qualitative research methodology is advantageous to explore its process and phenomenon (Yin, 2009). In order to achieve its economic development and SDGs, the country established the Investment Board Nepal (IBN) in 2011 to attract large-scale investment and its correspondent technology in infrastructure. Since its inception, IBN has facilitated both Domestic Direct Investment and FDI in infrastructure projects and in the service sector, and managing Public Private Partnership (PPP). As a high-level institution responsible for investment-related matters, the IBN's board members include high-ranking officials such as the Prime Minister, Ministers, and the Chief Secretary. To achieve its objectives, the IBN was reconstituted in 2019 with the introduction of the Private Public Partnership and Investment Act (PPPIA), to expand the scope of the IBN and strengthen its authority, functions, and duties.

As the study context suggests a very current contemporary phenomenon, which is very probably different from other large scaled emerging economies, a qualitative case method using the inductive approach could better address the exploratory nature of the study. The inductive approach allows for a thorough understanding of the problem and the ability to collect qualitative data, as stated by Bryman (1984) and Hoepfl (1997). The inductive approach also allows for interpreting non-numerical qualitative data, providing insight into the respondents' experiences, feelings, attitudes, perceptions, and positions on the research topic (Saunders et al., 2019). As the population of study objects is small, a flexible research design such as case studies with semi-structured interviews could focus more on theoretical saturation and purposive considerations than on representativeness (Creswell, 2009).

Case selection:

In spite of seeing an increase of inward FDI in last decade, they are still insufficient to meet the objective of Nepal's 15th Periodic Plan and SDGs. IBN is mandated to approve infrastructure development projects with an estimated project cost of NPR 6 billion or above and hydropower and energy projects above 200 MW under the PPPIA 2019. Moreover, it plays a crucial role in this process and fast-tracks decisions on approvals of project-related activities and provides transparent and professional services to investors. Despite all the efforts, and adding the challenges accompanied by the COVID-19 pandemic which further increased the competition among emerging economies worldwide to attract FDI, the mega projects that the Office of IBN has attracted and successfully managed during the period of ten years totally summed up to six.

These six mega projects have been carried out by six organizations located in different sectors, ranging from construction materials to energy, and to environmental protection sectors. They are the study population of our research and we attempt to approach all them as our potential case study objects through this list identified in the Office of IBN as by definition they have been identified by Nepalese government as the FDI reference for its scale and technology involved. One of the researchers in this research project team has worked in the Office of IBN and through the ministry letters were sent to the contact of representatives of these six companies for coordination. Three companies accepted the collaboration and participated in the research project under the agreement of confidentiality.

Data collection and analysis:

After an initial research collaboration agreement was reached, an informed consent form was sent to the companies to set the research protocol and ensure an appropriate research ethics in place. The companies and participating managers and staff during the research process have been informed their voluntariness in the collaboration and the possibility to withdraw from the project collaboration any time that they desire so.

The primary method for data collection is in-depth interviews and observations as most qualitative case method deploys (Creswell, 2009). Interviews provide direct quotations from interviewees about their experiences, opinions, feelings, knowledge, and perceptions, while observations provide detailed descriptions of people's activities, actions, behaviors, conversations and interactions in the context. In-depth interviews are considered the most appropriate method for collecting data and conducting in-depth analysis of the research problem (Clark & Ivankova, 2016; Creswell, 2009). These primary first-hand data were also complemented with other secondary data sources such as company website, reports and other public publications. As well, the expert's views with these who have been in the IBN projects coordination were incorporated for the latent level understanding and analysis.

The first intent of prolonged data collection was during July-August 2022. It was difficult due to the COVID-19 pandemic situation and face-to-face data collection data, in addition to the remote location of some of the company sites in Nepal. After this first round of data collection, interview questions were refined to adjust to the company reality to facilitate the data collection in a semi-structured manner. A second phase of data collection were carried out in December 2022 – January 2023. As the COVID-19 pandemic situation got worse in this period of time, face-to-face interview were impossible, and the process of data collection mainly involved scheduling interviews at the convenience of each interviewee, and taking place online via digital tools such as

WhatsApp call, zoom meeting and google meet, chosen by the interviewee. Each participant was informed of the study's aims and objectives, given a participant information sheet, and informed that the interview would be recorded if possible and they could stop at any time. The researcher transcribed the recorded interviews verbatim and conducted data analysis afterwards.

Finally, a total 28 managers and staff from three Nepalese organizations collaborated in the data collection through semi-structured interviews. All these companies are in the industry area with mega projects in Nepal that have introduced new technology. Data was analyzed using thematic content analysis (Boyatzis, 1998; Braun & Clarke, 2006), which helped identify, analyze, and report patterns - themes within the data. The researcher used an inductive or bottom-up analysis method to identify richer data-driven themes. The thematic content analysis process involved familiarizing with the data, generating initial codes, searching for themes at various levels, reviewing and refining themes, defining and naming themes, and writing a report of the findings (Braun & Clarke, 2006; Sinkovics et al., 2008).

Brief case description

The three IBN approved mega projects are carried out by Firm A, B, and C. in FDI format currently under implementation in Nepal. These projects have been chosen for their use of advanced technology and the introduction of these technologies new to Nepal, as well as their focus on energy efficiency and greenfield projects. These three projects showcase Nepal's commitment to attracting investment in sustainable and innovative technologies to drive economic growth while preserving the environment.

Firm A

Firm A is carrying out an environmental protection and management project that aims to convert waste into energy resource. Founded in the year 2019, the company is a joint venture between a Nepalese citizen and an Asian enterprise with share ratio of 72:28 (Nepali 72% and foreign 28%). With a total investment in the mega project of around NPR 250 million, the project uses advanced technology to treat the waste and minimize its impact on the environment. With a focus on sustainability and innovation, this project is expected to have a positive impact on the environment and contribute to the country's sustainable development goals.

In this innovative new technology-imported clean environment mega project, Firm A introduced two technologies imported from India and Germany, in collaboration with a regional sub-metropolis of a long-term agreement. This environmental project does not only make the town prettier and cleaner, but also creates local jobs, by introducing the technology and implement the production site in Nepal, and reducing waste management costs and lower fossil fuel import costs.

This noble idea of waste management drew the interest of a central government agency that develop and promote renewable and alternative energy technologies in Nepal. Central government agency, Firm A, and a regional government signed a tripartite concession agreement in 2017, with a posteriori application to IBN for the investment approval, which was granted in August of the same year.

Firm B:

Firm B is a joint venture between a Chinese multinational (70% of share) and a Nepalese company (30% of share) approved in 2015 and started the commercial production in 2018. Both the

international investor and the local partner are reputed players in their corresponding territories. The Chinese group is experienced in the construction related with professional management team seeking to expand and grow in the same type of industry in Nepal. The parent company has a strong presence in Chinese market and also in some other Asian countries such as Laos, Indonesia, and Myanmar. A joint brand was established incorporating both partners' image which is seen as a positive factor for the company's growth prospects.

With the manufacturing plant located in Western region of Nepal and started the commercial operation in 2018, Firm B set the goal to produce and provide high-quality construction material, taking advantage of Nepal's mine, and compete with imported material from neighboring countries. In 2015, Firm B was designated as an IBN project after receiving investment approval from IBN. This designation was due to the fact that the investment amount exceeded 6 billion NPR and was classified as FDI.

As the largest greenfield construction material plant in Nepal and operating at increasing capacity despite the challenges posed by the Covid-19 pandemic and the recent economic slowdown, Firm B's economies of scale and economies of scope allow it to offer competitive pricing, supporting its strong growth in volumetric sales. It plans to primarily serve the domestic market in Nepal in the first phase and export to neighboring countries, e.g., India, in the second phase by increasing its expandable capacity in the near future. Firm B is not only a fruit of FDI to produce construction material but also provides employment opportunities for around 2,000 Nepalese workers during its production period. The production equipment and technologies are relatively advanced, which require production and management personnel of the main departments to have a high degree of expertise and knowledge, which is to be acquired via training in advance and during the process.

Firm C:

Firm C is also a joint venture in the construction material industry approved in 2015 and started its commercial production in 2019 between a Nepalese company (15% of share) and another Chinese multinational (85% of share) which has operations in several countries. This is the second largest construction material project being implemented in Nepal. An investment approval of about USD 140 million was granted by the IBN in 2015 for the establishment of a construction material production company.

The project's investment agreement was signed between the IBN and Firm C in 2018. Advance production equipment and technologies is introduced, and operators and patrol inspectors require a higher level of expertise and acclimatization to the operation and maintenance requirements for modern equipment. Equipment, production, and management staff were recruited in advance for technical training, with all recruited staff receiving training on the production fundamentals of modern plants to have a comprehensive understanding of the production principles and process of plants. The project creates local job opportunity and enhance human capital skills by learning from the foreign employees via on-site training, and technical training is also provided in China for plant operation, pollution control, troubleshooting, quality control, machine operation, and waste to energy generation system. While the COVID-19 pandemic and travel restrictions have hindered foreign training for the past two years, the company continues to provide online training to ensure their employees' skills are up-to-date.

The target market for the products is primarily central Nepal, with part of the products will be exported to the Indian border. The plant is expected to create employment opportunities for skilled and unskilled workers in Nepal, with the senior management of the company being assigned

by the Board of Directors, while others will be recruited in China and Nepal. Besides the technology of construction material production, at the core of the project is cutting-edge technology and equipment that have been carefully selected to maximize efficiency and minimize environmental impact. Another notable feature of the project is the utilization of waste heat to generate energy, enabling the factory to meet a portion of its energy demand while minimizing its carbon footprint.

Results:

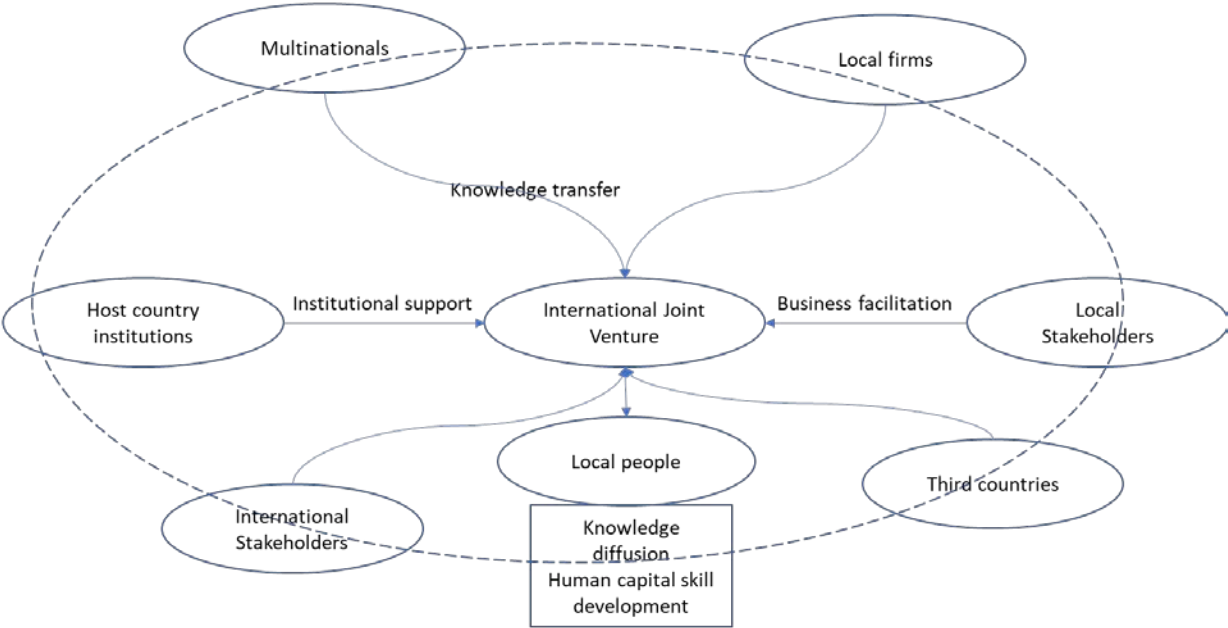
The analysis results of this research found that the three studied FDI mega projects carried out in a joint venture (JV) mode have brought novel technology, innovation, and knowledge to the host country, Nepal, and contribute to the human capital development of the emerging economy. Even though one source of the technology contributions is from Germany, an advanced economy, all others have been from China and India, two emerging markets, for both knowledge and FDI sources. This section contains subsections of FDI ecosystem, technology and knowledge transfer, and knowledge transfer consequences.

FDI ecosystem:

In a traditional international business field's FDI framework, often the perspective of multinational investors, typically from an advanced economy, has been taken. In our studies, we have taken from the viewpoint of emerging markets – investment recipients to study and explore the phenomenon. In the cases studied we a business ecosystem through the lane of FDI bringing multiple stakeholders into play (See Figure 1). In all three in-depth case studies, they are in the JV mode with the joint efforts of local firms with multinationals, also from emerging economy instead of

the advanced economy in classical FDI studies. In order to distinguish, we classify China and India as advanced emerging economies even though it is arguable, e.g., Cavusgil, Ghauri, and Liu (2021) have no definition for the term of advanced emerging markets, but a close term of mature emerging markets which defines representative countries such as South Korea and Singapore. The latter are often classified as newly industrialized economies. Indeed, for Nepalese, many perceive that China is an advanced economy indeed.

Figure 1: International investment ecosystem



In this advanced emerging economy to emerging economy FDI process, host country institutions play an important role to provide convenience of policy and supports. Meanwhile local stakeholders such as regional governments may provide supports or participate in the business agreements, and host country’s banks also facilitate the business process to give loans due to the strategic importance of these mega projects for the country’s development. The initiative of JV and the sequential transfer of technology and knowledge is not necessarily always carried out by

the multinationals, but could also be by the local. Firm A is the representative case of this type that the CEO of the IJV is a local who had international experience and devoted himself to the business and project with passion. As a consequence, he took the lead and initiative to commence this journey of learning by doing, importing foreign technology from Germany and India, as well as convince the Indian partner to invest, and applying for the IBN fund.

Other international stakeholders may be implied in the process such as the German party contributed the technology by selling their equipment and the corresponding technology utilization rights. Firm B involves several internal stakeholders in the process of investment through Hong Kong. As well, other third countries may be involved in both Firm B and C who are attempting to export their products to Indian market. Finally, local people, both at manager level and other lower levels such as operators and staff, are the object of knowledge transfer and subject of knowledge executor to make business operative at the same time, and fulfill the general objective of human capital skill development.

Technology and knowledge transfer

Although part of the principal interests of IBN is to support mega projects with certain strategic value adding FDI such as advanced new technology introduction to Nepal, we found that it is not only the technology transferred to Nepal, but also other types of innovative knowledge and know-hows such as the innovative production process, new applications, and managerial knowledge. In the three studied cases, all contained different degree of new advanced technology elements which were transferred from the international partners to the JV through headquarter-subsidiary relationship or acquisition. Some of these technologies were new to Nepal; some were not but the

application of that way of technology utilization was new to the sector, and some therefore generated a new production process which improved the productivity and cost efficiency to reduce the resource deployment. The technology deployed may not be frontier innovative technology on a global scale, but is fresh to the local market in that particular emerging economy. Additionally, it is important to note that the technologies introduced by these multinational firms were predominantly existing technologies within their respective industries. The research activities conducted in Nepal, as part of the joint ventures, were not focused on the development of new technologies but rather on adapting and implementing existing plans within the host country.

Although the technology transfer was a strategic interest for the host emerging economy, it was not the particular strategic purpose of the multinationals who made the technology transfer. When the technology was transferred through acquisition, it was part of business trading for the transferrer. When the technology was transferred through investment, it was a secondary effect of the main purpose of business expansion except the case of Firm A in which the local firm was taking more initiative to make things happen. The multinationals who have transferred the technology had the strategic objective to expand their business in Nepalese market with production center set up in the host country. In order to maintain the business sustainable, cost reduction and improvement of resource utilization were necessary to enhance the cost efficiency and productivity with their existing advanced technology but new to the host country. An additional purpose of this business setting was to potentially export the products from the Nepalese subsidiaries to neighbor countries taking advantage of the existing production capability in the host country. On contrary, in the case of Firm A as the FDI initiative was led by the local, technology transfer was the major purpose instead of being a secondary effect. For the passion to improve the environmental problems in his region for a better living quality, the founder and entrepreneur of Firm A has been

searching for a solution until he learned and identified the appropriate technology in the global market and determined to realize that in the host country. In this latter case, although it is also market oriented, the business purpose came after the mission of environmental sustainability.

Most technology and knowledge transfer are carried out in a formal setting and mode with training and development programs, but the knowledge diffusion within the JV organization also contains the informal mode such as learning by doing and peer learning. Through the equipment importation, the accompanied technology was transferred along with trainings. This technological knowledge also contains the functional and technical part such as machinery operations and maintenance. This knowledge related to the technology and other related know-how was transferred in an escalated manner. Firstly, higher level local managers and engineers received training of the fundamental technology and innovative production. Then, middle and lower level staff and operators were scheduled in the training program during the process of facility building. In all three cases, some technologies were so new to the host country that it was difficult to recruit local personnel who already possessed the corresponding knowledge to operate and make it function. Therefore, training with personnel from the home country of the technology exporter were indispensable. Part of these knowledge transfer were carried out in the mode of learning by doing as project implementation was an on-going process, and part in the mode of peer learning while making the operation, besides the formal designed training and development programs.

Knowledge transfer consequence

Even though the primary motive behind technology transfer is the business expansion of the multinationals, host country also benefits from it from multiple perspectives. One is the reception of the new technology and the correspondent and derived knowledge. As knowledge is embedded

on people as the knowledge school suggests (Nonaka, 1991; Zhang-Zhang, Rohlfer, & Varma, 2022), this technology and knowledge transfer involve the learning and knowledge absorption of people in the host country, which eventually enhance their capability. As a consequence, not only employment opportunities were created, but also the human capital skill development improved the talent pool in the host country beyond the political agenda of FDI attraction for economic development and further for the SDGs achievement. In the studied context, a secondary effect of these positive consequences also resulted a strengthened diplomatic relationship between the host and home country of FDI.

Within this context, although the objective of knowledge diffusion from the investors' perspective was to ensure the organizational capability to be aligned with the business need, in the dimension of human resource management it fulfilled the gap of knowledge and skill at organizational, industrial, and country level by developing the competency of employees. In addition, this competency development at individual levels aggregately adds value to the general people capability enhancement in the society of the host country.

Corresponding to these objectives of knowledge transfer of the interests at multiple levels, the effects that we identified on the knowledge diffusion include the enhanced knowledge sharing and exchange experience and culture within the organization, increased productivity and performance, as well as the organizational effectiveness. Both Firm B and Firm C have contributed valuable managerial knowledge to Nepal, resulting in various positive outcomes. For instance, Firm B has introduced a quality control system and implemented efficient supply chain management practices. These initiatives have led to increased productivity and a reduction in waste within their operations. Furthermore, both firms have brought in managerial expertise in key areas such as human resources, marketing, and strategic planning. They have implemented modern

human resource practices, including performance evaluation systems and training programs, to develop the skills of their workforce. In the realm of marketing, they have shared their knowledge of market research insights, branding strategies, and effective customer relationship management techniques in their specific industry. Additionally, their expertise in strategic planning has enabled them to make informed decisions and develop effective business strategies.

Discussions and conclusions

Our study on the international technological transfer in emerging markets have been focusing a small-sized country which may be more representative as a developing and emerging country rather than the context of large and advanced emerging economies such as China and India. Indeed, the other three mega projects that did not participate in this research project were also from these countries. Different from a large-population developing country with international logistic convenience, landlocked small sized countries such as Nepal have more challenge in attracting FDI and technology transfer from multinationals due to limited market potential and weaker negotiation power. A perspective taken from this type of emerging economies has been important to differentiate from large BRICs type emerging economies to achieve the economic development objective and various dimensions of SDGs set by the United Nations (UNDP, 2023).

In our study, we found the three studied cases are JV firms with emerging markets' investors instead of multinationals from advanced economies, which is the most common in the existing international business literature. The study results identify an eco-systematic view of FDI with multiple stakeholders participating in the process to interact and prompt the performance achievements. The current international technology transfer in emerging markets has seldom be

explored from an ecosystem perspective (Parameswar Nakul & Dhir Sanjay, 2018), and the uncovered framework could be interesting to set a future direction of research for further exploitation. Especially, all investors are from emerging economies in this current study which may differ from the existing matured theories on international transfer of technology, innovation and knowledge. Even though we define the home countries of these investors as advanced emerging economies, both sides of the FDI still fall into a big category of emerging markets.

On the one hand, it corroborates the emerging interests on understanding the internationalization of emerging market multinationals and their innovation from their countries which are emerging economies (Zhang-Zhang & Rohlfer, 2020). On the other hand, the internationalization from emerging markets to emerging markets may contain a more holistic perspective with the view of an ecosystem. As indicated in our study, in addition to the business expansion and potential exportation from the host country as strategic objectives for multinationals, the host country perceives the FDI as positive in terms of technology enhancement, human capability enhancement, as well as diplomatic relationship strengthened. Future research on the emerging markets to emerging markets technology transfer requires more attention and study for exploration.

We also found that an international joint venture led by the initiative of locals has comparative higher alignment with the host country's institutional interests on sustainability goals' achievements. Instead of the environmental protection technology was transferred from multinationals to international JV as a secondary effect accompanied with the business expansion purpose, Firm A highly proactively sought the technology for a clean and beautiful city that one would like to have and live in. With this sustainability goal as the major mission, the sustainable

development is naturally balanced without any needs for a tradeoff. However, in this regard and also in some other conclusions that we suggest, we need to take much caution in make generalizable statement due to the limited case number of studies as the nature of the methodology suggests. We propose these findings as propositions for future empirical examinations and a test with other south to south technology transfer researches.

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