NEW MODELS OF RESEARCH AND TECHNOLOGY ORGANISATIONS: ICTI CASE STUDY

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I.   INTRODUCTION

Recent studies of innovation have pointed to the growing relevance of external sources of innovation. Rather than relying on internal R&D, organizations are reported to increasingly engage in 'open innovation' (Chesbrough 2006). This means that innovation can be regarded as resulting from distributed inter-organizational networks, rather than from single firms (Coombs, et al. 2003; Powell et al. 1996). In the same vein, various concepts of 'interactive' innovation have been put forward to understand the non-linear, iterative and multi-agent character of innovation processes (Kline 1985; Lundvall 1988; Von Hippel 1987).

National Innovation System is an interactive system of existing actors, including private and public firms (both large and small), universities, government agencies and others, that aim to produce, diffuse and utilise knowledge within national borders. Previous studies have shown that advanced countries have historically had capable actors and systemic linkages, which resulted in intensive technological learning and rapid advancement. Most developing countries, in contrast, have had weak actors and a fragmented system, causing them to fall behind technologically (Intarakumnerd, 2010).

Research and technology organisations (RTOs) are important actors in National Innovation Systems. In the context of developing countries, in which private firms usually have limited technological capabilities, RTOs may be even more important, because they are the nexus of these countries' leading scientists and engineers. RTOs have the potential to play critical roles in the process of building technological capabilities. With the right strategies, they can also act as intermediaries or 'fixers of systemic failures' in innovation systems (Intarakumnerd and Virasa, 2002).

II.   RESEARCH DESIGN

The aim of this study is to illustrate new model of Research and Technology Organisations. The author conducted an in-depth exploratory case study, as this method is particularly suited to answering "how" questions (Yin, 2003), and appears appropriate to gain in-depth understanding of how Research and Technology Organisation are generating, transferring and commercialising know-how through frugal, jugaad and open innovation models.

III.   RESEARCH SETTING

The case study organisation is "ICTI: International Centre for Technological Innovations", a Research and Technology Organisation based in Alleppey, a small city Kerala state of southern India. This organisation was selected for four main reasons. First, the organisation can be considered an insightful example of open innovation centre. Here external ideas as well as internal ideas, and internal and external paths to market for technology commercialisation is visible. Second, the organisation is very well known for its high quality socially relevant research, and the contributions researchers are able to make in changing lives of people by disseminating technologies and creating spinout venture, as evidenced by the number of prestigious scholarships like Commonwealth Scholarships received by the researchers. Third, the organisation is well known for collaborative culture, and for executing projects through efficient use of existing research infrastructures in the country by collaborating with research organisations, universities and companies. It embraces frugal and jugaad innovation models to increase efficiency of research, reduce costs and risks, and to attract external talents and resources through open innovation. Fourth, the author had easy access to data and information as the author has developed good relationship with the organisation, founders and director over more than three years through past and ongoing collaborations on a number of research projects. Thus, this case was chosen as it offers a distinctive and extraordinary setting to observe the phenomenon under investigation and considerable access to the organisation was granted.

IV. DATA COLLECTION

Information was collected through 20 direct interviews, triangulated with other sources of data (Gibbert et al., 2008), such as the analysis of archival documentation, project reports, participation in meetings held at the company on innovation issues, and direct observation during ten days spent in the organisation. These ten days of observation enriched the development of documentation, the identification of workplace behavior, and other particular details (Locke, 2011). The interviews were conducted face-to-face and lasted between 30 and 60 minutes. The author conducted 10 interviews. The interviews were recorded and transcribed, and focused on the organisation's innovation process and strategic initiatives to promote open innovation. Data on the organisation's open innovation processes were collected in multiple stages between May 2018 and April 2019. In particular, formal interviews were conducted in three waves (May 2018, June 2018, August 2018), while informal talks and meetings took place during the one year. These data allowed the author to identify the barriers to knowledge management in open innovation and how the research organisation was able to overcome these. During the next round of interviews in January 2019, the author conducted two additional interviews. In particular, to enrich understanding of the case, the author interviewed a new researcher who had joined the organisation six months previously. This allowed gaining insights from a newly hired person, thus providing further evidence on the role of the organisation from a new researcher's perspective. Regarding the interview protocol, the first questions related to the informant's general background (e.g., name, position, experience), followed by questions on the innovation process (e.g., what are the organisation's main sources of ideas? How do you exchange knowledge with your colleagues? What are the challenges in managing knowledge?) and the role of collaboration in this process (e.g., How do you exchange knowledge with other organisations? What are the challenges in executing collaborative projects? , How do you commercialise new technologies? , What are the programmes to attract and nurture young talents?) The interview protocol was thus very broad, while digging deeply into the specific aspects that emerged during the interviews. Trustee members were also asked how they perceive their role within the organisation.

V. FINDINGS
Setting the scene: ICTI: International Centre for Technological Innovations.

Established in 2012, the International Centre for Technological Innovations (ICTI) is a unique initiative that boosts research, innovation and entrepreneurship for sustainable development. Its activities are implemented in partnership with community based organizations, academia, research labs, government agencies, companies and small medium enterprises. Together, with these partners it develops innovative products and services, start new companies, and nurture future leaders.

International Centre for Technological Innovations (ICTI) is a research organisation and educational institution. Its work focus on changing people's lives by developing new products and services based on technological innovations and commercialising it through spinoffs, technology transfer and other outreach initiatives. International Centre for Technological Innovations is a Charitable Society registered in Kerala India under Travancore-Cochin Literary, Scientific and Charitable Societies Registration Act XII, 1955. It is a tax exempt charity.

ICTI is located in Alappuzha, Kerala – popularly known as the Venice of East. Alappuzha is one of the most beautiful places in Kerala. It is called the "gateway of backwaters" and, is a hub of Kerala tourism.

Founders:
The organisation was founded in 2012 by:
- Aaron Joseph George
- Nellikunnath George Punnoose
- Grace J Mampallil
- Dr. Trissia Mary George
- Sr. Theresita OP
- Fr. Thomas Nellikunnath
- Marykutty Joseph

Director: Aaron Joseph George
Associate Director: Nelli George

Initiatives at ICTI
PgCert Research

This Research Programme is offered to those seeking a pathway between undergraduate and masters or doctoral studies. By undertaking the research programme, students have the opportunity to make an important contribution to the development of new knowledge and work alongside ICTI's researchers, partners and industry to implement it for the benefit of the society. The flexibility offered by this course enables students to pursue research that suits their interests and career aspirations. This course meets the growing need for well-trained scientists to work in applied, commercial and innovative industry environments, government departments and non-governmental organizations nationally and internationally.

ICTI Researchers who have received Commonwealth Scholarship:
1. Aaron Joseph George, Cambridge University, 2010

2. Habel V, Durham University, 2013
3. Biji K Pillai, University of Westminster, 2014
4. Robin Mathew, Loughborough University, 2015
5. Sandeep John, University of West of England, 2015
6. Nicku Abraham, Queen's University Belfast, 2016
7. Keerthi Thodiyil, University of West of Scotland, 2017
8. Geo Mathew, University College London, 2017
9. Rishikesh S, Heriot-Watt University, 2017
10. Kevin J, Durham University, 2018
11. Sony Thomas, University of West of Scotland, 2019
12. Sreeram Valsalakumar, University of Exeter, 2019

Spinout Venture

International Centre for Technological Innovations turns research into successful, independent business ventures. ICTI has a culture of scaling technologies and innovations. Some of these capabilities have become spin-out companies that represent an important step towards the creation of a positive impact on the Society. The creation of new spinout companies, promotes research and benefits local economic development. It has created many new jobs and better livelihood opportunities for youth, women and farmers. ICTI's spinouts include hi-tech start-ups in electric vehicle to cooperatives and farmer producer organisations.

ICTI encourages social and commercial entrepreneurship, ensuring that its research is taken out of the lab and into the real world. International Centre for Technological Innovations provides support to spinout ventures in developing sustainable organisation structure, formulating business plan, business incorporation, providing training and capacity building support to different functionaries, and nurtures the startup by providing necessary handholding support for initial 3 years.

The list of supports offered include:

- Training and capacity building
- Licensing intellectual property
- Technology sourcing
- Business incorporation
- Constitution of Board and CEO
- Fund raising and grant assistances
- Preparation of Business Plan, DPR
- Project Monitoring and Implementation Committee

ICTI is also a recognised Producer Organisation Promoting Institution. Recipient of grant funding from the National Bank for Agriculture and Rural Development, Government of India.

Skill Assessment and Work Integrated Learning:

Through its skill development programme ICTI creates smarter workforce for the industry. ICTI's Skill Assessment Tests can verify that individuals have the skills needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It enables individuals to be benchmarked against their peers. Based on Skill Assessment Tests candidates are provided Certification, which helps to get a job or to progress within their existing careers. Also, jointly with partners ICTI offers Work Integrated Learning Programmes that provide industrial experience through on-job training and paid internship opportunities.

Internship & Volunteering Programme:

International Centre for Technological Innovations (ICTI) offers volunteering opportunity for students and recent graduates from all over the world with the primary objective of sharing their skills and exploring development scenario in India. Over the last few years several qualified and motivated women and men of different nationalities have volunteered with ICTI. Volunteering is offered in areas of technology and innovation management, community development, social entrepreneurship, rural and urban development, agriculture, etc. The programme provides both postgraduate and undergraduate students an opportunity to discover entrepreneurship in India as well as experience the richness of India's culture. This is an ideal opportunity for candidates planning for a career consulting, national and international development, sustainable engineering, technology commercialization etc. The volunteering helps consolidate their concepts on the different facets of technology and innovation management in emerging economies.

ICTI's programmes are inspired by the conviction that volunteerism is a powerful means of engaging people in tackling global development challenges. Everyone can contribute their time, skills and knowledge through volunteer action. ICTI provides opportunities to those are inspired to take concrete action for sustainable development through promotion of science and technological innovations.

Volunteers come from various professional backgrounds and all of them are catalysts of positive change. They are encouraged to be creative and entrepreneurial, and foster volunteerism for global sustainable development both within and beyond their assignments. They work at the heart of communities in partnership with governments, businesses, academia, and civil society. Many of the past volunteers be it from Italy, or Russia, Europe or America, Far East or Middle East have been able to use the skills gained to get jobs in

International Organisations, WHO, WTO, and other UN organisations. Some of them have setup their own start-ups and consulting firms.

Collaborative Culture:

ICTI executes interdisciplinary projects by collaborating with resources at research organizations, institutions and companies. This makes it inclusive and efficient. Using equipment at Shared Research Facilities and collaborating with external organisations offers many advantages. No high investment or fixed operating costs: pay only for your own use. Easy to test new technologies. Use up-to-date knowledge and expertise available with associates.

VI.   DISCUSSION AND CONCLUSION

The ICTI case study offers some insights into the new model of Research & Technology Organisation distinctive capabilities that allowed it to overcome the barriers to knowledge acquisition and transfer in executing an open innovation strategy. The case study illustrates three components to enhance knowledge transfer in Research & Technology Organisations:

First, nurturing future leader through innovative programmes (educational, independent research, volunteering, skill development, work based learning) that enhance capabilities of young people in research, technology transfer, enterprise building and solving societal challenges.

Second, collaborate with existing research organisations, universities and shared research facilities to develop new products and services. This reduces investment, risks of research and enhances efficiency.

Third, facilitate knowledge transfer by collaborating and offering research consultancies to companies, start-up for developing need based products and services. Furthermore collaborating with business incubators and creating in-house capabilities to nurture spinout ventures based on intellectual properties generated.

VII.   REFERENCES

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