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Knowledge transfer in developing countries: Capacity Building in the Ukraine

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Abstract

The present paper investigates how an integrated capacity building approach can aid the design, establishment and implementation of six knowledge transfer units (KTU) at selected universities in the Ukraine. Through the analysis of project and strategy documents as well as business plans, we find that each KTU developed its tailor-made approach to engage with internal and external stakeholders, and offer a valuable service to the academic community as well as to business customers. State of the art technology underpinning KTU services and institutional commitment are found to be key success factors. Although specific strategies and plans differ, they are based on a general strategy jointly developed and based on common tools and methods of strategic planning and business modeling. The paper concludes that this aids the process of inserting the entrepreneurial spirit and build up of strategic business partnerships on the part of higher education institutions which hitherto have adhered to classical teaching and research-oriented methods.

Keywords:

Technology transfer, knowledge transfer, entrepreneurial university, academic entrepreneurship, EU, Ukraine, capacity building, HEI

1. Introduction – Knowledge Transfer from University to Business

Higher Education Institutions (HEIs) play a crucial role in the development, well-being and socio-economic progress of regions, nations and society at large. Their triple role is defined in education, research and knowledge transfer. Currently, there is an uneven distribution in terms of quality, quantity and intensity, especially regarding research valorization. Consequently, policy-makers and institutional players aim to boost the knowledge transfer from public research organizations to the private sector. This transfer happens mainly through formal mechanisms, one of the most important being Technology Transfer Offices (TTO) or entities assuming such a role.

Knowledge and technology transfer in Europe is currently high on the agenda (EC 2013; Science-to-Business 2011; EU 2014; EMCOSU 2015). Yet it has a relatively short formal history and is currently working to develop best practices to exploit its full potential. A literature review shows heterogeneous performance among countries and regions and underlines the fact that the existing body of knowledge provides valuable examples from developed countries only (e.g. Shane 2004, Colyvas 2007, Jacob et al. 2003, Debackere & Veugelers 2005, Wright 2014).

In this context, the paper at hand explores how knowledge transfer can be supported effectively in developing regions by capacity building and international collaboration in the form of exchange of good practice and proven approaches. More precisely, the paper addresses the research question of how to successfully enable universities in post-communist transformation countries such as the Ukraine to develop tailor-made business models for TTOs and knowledge transfer offices (KTUs) supporting university to business transfer. In response to this, the paper provides insights into establishing and operating KTUs in HEIs located in the Ukraine, a developing country aiming to align itself with European and international standards in knowledge transfer.

Empirical evidence is derived from a Trans-European Mobility Program for University Studies (TEMPUS) project called “KTU – From Applied Research and Technology-Entrepreneurial Know-How Exchange to Development of Interdisciplinary Curricula Modules”, which started in December 2013.

The paper is structured as follows. The subsequent section provides an overview of the design of the project and elaborates on the specific components of capacity building involved. Section 3 outlines the methodological approach using content analysis and action research in the investigation of six particular KTU cases. Results are presented and discussed in section 4. The final section derives conclusions and highlights avenues of further research.

2. Project Design and Capacity Building

FH JOANNEUM, with its institute of International Management, initiated this capacity building endeavor for the development of the Ukrainian Higher Education System together with other European partners (Universitat de Girona, WUS Austria, KTH Stockholm and the Budapest University of Technology and Economics). Those provide different scientific profiles, macro-economic and legislative conditions as well diverse technology transfer approaches, maturity and management. They jointly mentor five public and one private Ukrainian HEI in establishing a new organizational unit for knowledge transfer and achieving academic entrepreneurship in a variety of forms. The integrated capacity building approach of the project aims to provide the following components: Staff resources financed via the project over a period of 3 years, KTU office installation, equipment for office and research (Office equipment, 3d printers, eye-tracker etc.), training program for KTU officers and tech-transfer staff, experience exchange through study visits and guest lecturing, general strategy as well as institution-specific KTU development strategies (including vision and mission statements), and tailor-made business plan including service portfolios, financial aspects as well as marketing strategies for each of the KTUs.

This process has been facilitated and harmonized by using standardized templates. The implementation approach was based on HEI strategic management aspects (Slovacek 1987; Martin 1992; Porter 1996) and on default practices on how to set up and operate TTOs (OECD 2005; Nelsen 2007, Young 2007; Campbell 2007; Fernandez 2007; Afonina/Chalupský 2012; IP Handbook 2015). Furthermore, the project employed the business model canvas approach developed by Osterwalder/Pigneur (2010).

To develop tailor-made visions and mission statements of each KTU, simple guidelines were used to receive uniformly structured input. With respect to the development of the units' service portfolios, Ukrainian universities produced a comprehensive list of all services either already provided at the institution or ear-marked for development within two to three years. The services were then grouped into standard practice service types seen regularly in TTOs and KTUs in Western European and Anglo-Saxon universities. Opportunities for cross-pollination among partners (e.g. one KTU already has experience in a service another KTU wants to offer) were identified and exploited.

To enable the Ukrainian partners to elaborate the strategy documents and develop their individual approaches in setting up a KTU, the EU partners provided workshops. The main objective of the training activities was to build up the competences of the designated KTU staff to effectively install and run the KTUs. Five trainings took place over a course of 14 months in the form of Study Visits and workshops at the EU partner institutions. Trainers of all workshops were selected based on specific professional experience in relevant topics such as knowledge transfer, labor-market oriented curriculum development, research coordination, rapid prototyping & 3D-printing etc. Apart from the training contents, participants highlighted the benefits of networking during this training.

3. Methodology

The methodology employed is of a purely qualitative nature and follows an action research approach. Having its main value in pragmatism, it is a process in which the researcher enters a real-world situation with a double aim, i) to improve it and ii) to acquire knowledge (Checkland & Holwell 1998). Citing its origins (Argyris et al. 1982), the crucial elements of this research approach are: collaboration between the researcher and people in the situation, a process of critical inquiry, a focus on social practice and a deliberate process of reflective learning. Since *education* is a social science, a *project* is a deliberate intervention with the built-in expectation of change, and *twinning* constitutes bringing together approaches between more experienced people with less experienced staff (in knowledge transfer), we strongly consider this methodological approach as adequate for our purpose. The main content is documented in the form of a case for each of the six Ukrainian partner universities participating in the KTU project. These cases focus on the establishment and beginning of operations of KTUs.

Data collection took place in the form of the documentation process of the project itself. The documents[1] elaborated serve as primary data. Combined, they form comprehensive cases for each of the six Ukrainian HEIs and allow for partial triangulation, as important in action research as in other methodological approaches (Eden/Huxham 1996; Checkland/Holwell 1998), and cross checking of results. Where data collection and documentation templates provided closed item answers, no further categorization was needed. For open answers and text fields, results were coded before analysis. The open text parts were also interpreted by the authors directly involved in the KTU development process, ensuring context related factors are taken into account.

The analysis of the cases takes place on three levels. Each step provides one part of the answer to the research question. First, organizational aspects are compared. This allows distinguishing according to factors such as ownership and size of the universities. It also helps to identify, whether knowledge transfer services exist and if they are to be integrated in the KTUs to be established. The analysis from an organizational perspective also shows at what level the newly established KTU is being integrated in the university's hierarchy, organizational chart and decision-making processes.

Second, the business models developed by each HEI for their KTU are analyzed. A comparison of cases identifies similarities and differences in the building blocks of business models. It further allows identifying novel and uncommon approaches. In connection with the organizational aspects, feasibility of implementation and potential for sustainability can be evaluated. Comparing business model approaches with classical corporate or start up models, serves as an additional instrument for optimizing KTU business models. This approach will consequently aid in answering the question of whether tailor-made viable business models were established by each of the KTUs.

Based on the business models, specific service portfolios of the KTUs are investigated as a third component of the analysis. Here the focus lies on whether the service portfolio is suitable for supporting the value proposition of the business model. Moreover, the integration of existing services of HEIs into the KTU service portfolio is scrutinized.

4. Results and Discussion

Out of the six analyzed universities in the Ukraine, five are public institutions and one is under private ownership, with sizes ranging from around 3.000 students to just below 9.000. On average, the teaching and research staff to student ratio is around one to ten.

Four out of six Ukrainian universities already had existing research support, technology transfer or research commercialization activities or services in place before establishing a KTU. These services are in all cases scheduled to be transferred to the newly established KTU within the first year of operation. Only two out of the six investigated institutions have no prior existing services that relate to knowledge transfer. One university provides a fully developed existing technology transfer office, which will merge with the newly established KTU, extending on and further complementing the existing

[1] Project documentation such as filled-in business model canvases by each university, strategy development templates, service portfolio descriptions, financial and sustainability plans, staff and equipment specification lists, workshop minutes etc.

service portfolio. Three universities provide services through other existing units, which will either collaborate directly or integrate services directly in the knowledge transfer unit. ==== INSERT TABLE 1 ABOUT HERE =====

In terms of placement of the units within the existing organizational structure and hierarchies, five out of six universities choose to implement their KTU at high levels of reporting or under direct supervision of high ranking university officials such as rector, president or vice rectors. One university chooses to install their KTU formally at the level of a faculty with direct reporting obligations to the vice-rector of international relations.

The strong connection of the KTUs to the respective organizations in which they are embedded is also visible in the business models. Five out of six KTUs mention the university as a whole as one key partner. Furthermore, the majority of KTUs will rely on their national and international project partners for future support. The core focus of the activities of KTUs will be in the area of grant writing, market research and training. The main value will be derived from the facilitation of knowledge transfer between the HEI and its partners in business and society. All KTUs will employ online presence and service provision via their websites as tools. The business models however also show different customer relationships and channels such as dedicated personal assistance through face-to-face interaction (workshops, conferences and exhibitions/road shows) as well as mass customization through automated web services (e.g. contact and project databases, self-service web portal).

Apart from market research, fund raising and patent consulting, further approaches with regard to the value propositions of the KTUs can be identified. Facilitating knowledge transfer as an intermediary, a matchmaking platform (connecting industry partners with researchers and students), or offering high-tech-equipment including an instructor for rent, all constitute examples. == INSERT TABLE 2 ABOUT HERE ==

Concerning the revenue streams, half of the universities analyzed expect the university to contribute some of its own resources to cover the operations. The other half of KTUs seeks revenue streams exclusively from sources not linked to the university budget. Contract research is identified as the most important source of revenue (four out of six universities). Fees levied for services (e.g. consulting, databases etc.), income generated through licensing, and renting out equipment are further common approaches for generating revenue for the KTUs. Furthermore, innovative approaches to actually operationalizing those revenue streams exist. Examples are the renting out of equipment including the instructor, or the use of laboratories to customers such as companies or other research entities. Revenue could be generated in those models through a yearly subscription fee, per actual usage of the services (e.g. hours/days) or even by taking a percentage from successfully implemented start-up projects. Participating in Start-Ups, however is only one aspect mentioned by one KTU.

The business models themselves cover some of the typical business model patterns addressed by Osterwalder & Pigneur (2010) such as the Freemium model (Anderson 2009). For the context of KTUs, this translates into basic components such as access to selected services. Furthermore,

projects and a contact database are offered free of charge to attract a large number of customers and potential future clients. Additional services will be charged.

In addition, all KTUs face multi-sided business models. The KTUs serve different internal and external customer segments, since a large number of stakeholders with a wide variety of needs is typical for universities and their operating units (e.g. Gross & Godwin 2005). At least two or more customer segments of the KTUs are interdependent on each other. These are, for instance, the researchers or students offering contract research or consultancy/solutions, and the external partners placing, offering and entering orders.

Another business model pattern is not yet fully exploited by the KTUs, but bears potential, the Open Business Model pattern (e.g. Chesbrough, 2006). First approaches in the direction “outside-in” have already been considered by inviting external stakeholders with their ideas about the universities’ facilities and offering them support with KTU equipment and human resources while at the same time entering contracts with them to profit from potential future revenue streams. “Inside-out” could be potentially offered by identifying patents or ideas lying around idle within the organization. By transferring usage rights to external parties, additional benefits and revenues can be generated. So far only one KTU explicitly mentions licensing as part of their revenue stream.

Preliminary tasks in the course of establishing each KTU were an initial status quo analysis and acquisition of basic knowledge about their market potential, as well as the gathering of human capital and institutional know-how through training, study visits and other networking activities in the course of the joint KTU development project. Moreover, all KTUs will undertake marketing and dissemination activities and provide informational services with regards to the KTU and its operations. These are not considered core tasks of value creation and are therefore not included in table 3, rather they are necessary complements and support processes. ==== INSERT TABLE 3 ABOUT HERE =====

A core result is that the technological base of the KTUs (i.e. specialized rapid prototyping equipment such as a 3D printer or eye-tracking systems) forms a main pillar for providing selected services. The business models underline and strongly link the key activities and specific services to the equipment which is being procured in the framework of the project. The purchase of rapid prototyping units (such as 3D printers) as transversal technology is new to the Ukrainian market and provides currently non-existent innovation services to industry and society. Additional equipment, such as an eye-tracking system, also aims to offer new innovation services to the market.

To demonstrate that real added value can be achieved, KTUs will employ their know-how and equipment in the form of initial pilot projects together with business partners to showcase new services and technologies in the region. Due to the tight economic situation accelerated by the current political crises in the Ukraine, potential industry partners of KTUs have to be approached directly and convinced with tailor-made value propositions selling the offered services. These projects with industry partners are foreseen by three out of six KTUs to be a main cornerstone for generating revenue from R&D contracts.

Patenting support is mentioned by four out of six KTUs as a planned service. This in turn reflects the high demand for specialized knowledge and competences in supporting patent applications and the patenting process as a whole. Grant writing and training are services only two KTUs will integrate in their portfolio.

As mentioned, the university itself is an important partner for many KTUs under investigation. Although all units have been installed within the university system (not as external separate entity), structural implementation within the universities' organization varied substantially among institutions and strongly reflects hierarchical set-ups and organizational traditions. Where some KTUs are located at central services levels, others are implemented as sub-units of departments or central service providers in the organizational structure. In most of the cases, the KTUs see their own university as one important revenue stream as they rely on the universities´ infrastructure, human resources and financial support. On the other hand, the KTUs need some flexibility to be able to react to the rapidly changing nature and demands of their markets and the overall environment in which they are operating. This results in a tough trade-off between either establishing the KTU close to the decision-making bodies in order to receive strong support by the university or as a sub-unit (or even external university-owned body), or retaining some autonomy in decision-making. Institutional support seems to be the preferred option of the Ukrainian KTUs.

5. Concluding Remarks

Through an integrated approach to build capacity for Ukranian HEIs, six selected universities in the country successfully established a KTU and are at the early stage of implementing a business model that has been developed specifically to meet institutional and regional needs. KTUs address their particular internal and external stakeholders within their region of operation and are in pursuit of expanding the reach and regional impact of universities. The existence of those KTUs and the level of development of their strategic planning apparatus as well as their capacity for practical operations is to a large extent due to the capacity-building scheme employed. The cases analyzed show that the scheme is able to generate output that holds scrutiny against international benchmarks.

Our findings show that no one-size-fits-all strategy applies and, even when part of the same country, the inter-case analysis reveals idiosyncrasies. The key drivers to initiating or boosting knowledge transfer activities, independent of size, prestige or financial endowments lie in willingness to align with third mission activities and international standards, coupled with complementing traditional teaching and research with knowledge commercialization and valorization activities.

The analysis further shows that capacity building is needed in order to transform existing HEI systems and structures, as well as to support such knowledge transfer initiatives at their inception stage.

The application of a variety of strategic tools and methods typical in business settings (Magretta 2002; Afuah 2004; Chesbrough 2010) and less used in HEI contexts is perceived as highly useful. As KTUs aim to bridge academia and business, they provide the ideal scenario for testing the universality of such tools. By deploying, for example, sustainability plans, stakeholder or benefits-maps for their

KTUs, HEIs are encouraged to switch to a business perspective and think entrepreneurially to at least some extent. This results in valuable learning for HEI management on a meta-level and is recognized as an important added value of this international capacity building initiative. The fact that a tailor-made approach was found by each of the KTUs based on a commonly elaborated strategy underscores the viability of the capacity building approach employed.

As any research, our study has certain limitations. As the study has been performed on universities that actively sought participation in a capacity building project, findings cannot be extrapolated to the wider group of HEIs, as, there may be self-selection bias. Moreover, we looked at HEIs from one particular country, the Ukraine, which exhibits very specific framework conditions. Subsequently, there is no generalizability of results to other developing countries without accounting for institutional and HE system differences. Some of the documents and data serving as a basis for the content analysis at hand are to be considered as preliminary or living documents. Hence, results noted in this paper take a certain snapshot in time of an evolving research subject. Finally, the current situation and context within the Ukraine creates specific circumstances that reduce intertemporal comparability even within the same country context.

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Table 1 – Organizational Aspects of Knowledge Transfer Units

	No. of Students	No. of Teaching & Research Staff	Existing services	Planned embedding in the organization
University 1 (private)	3.595	290	KTU partially integrates the functions of two existing units	high level unit supervised by Vice President
University 2 (public)	8.897	902	KTU will merge with the Technology Transfer Centre (TTC)	high level unit reporting directly to the Rector, taking existing TTC role
University 3 (public)	3.728	377	none	high level unit directly reporting to Vice Rector for International Relations
University 4 (public)	8.480	735	none	mid level unit reporting directly to the Vice Rector for International Relations, formally supervised by dean of faculty
University 5 (public)	4.053	667	four existing units will partially participate in knowledge transfer through providing services	high level unit reporting directly to the Rector
University 6 (public)	3.349	268	KTU cooperates and integrates selected functions of various existing units	high level unit supervised by Vice Rector of Research

Table 2 – Business Models of Knowledge Transfer Units

	Key Partners	Key Activities	Value propositions	Channels	Revenue Streams
University 1 **(private)**	- University - Investment and business clubs - Chamber of commerce	- Set up and maintain database - Marketing of information	- Patenting - Protection of IPR - Market research - High tech equipment and instructor for rent	- Website - Workshop - Face-to-face - Chambers	- Licensing - contract research - rent - consulting fees
University 2 **(public)**	- University - KTU network - Training institution	- Grant writing - Training and Seminars - Consulting services	- Facilitate knowledge transfer - promote economic development via start-up projects	- Website - Office - Telephone - Direct customer service	- R&D contract - Regular income from fixed-price of services - percentage from implemented start-up projects
University 3 **(public)**	- University - Chamber of commerce - Government - Independent researchers	- Set up and maintain database - Marketing of services - Training or instructors and maintenance of equipment	- Accessibility to potential partners - Market place for innovations and innovators - High-tech equipment and instructor for cheap rent	- Website - Workshop - Face-to-face	- Companies paying for equipment usage and instructor - free access to database but additional services costly -income from marketing / ads
University 4 **(public)**	- Industrial partners - External researchers and lecturers	- Development of web-portal - Consultancy on IP - Development for support for	- Risk reduction - Fund raising - IP and legislative support	- Online services - Workshop - personal	- paid services as basic financial support - External funding - University: minimal support (student,

	- KTU partners	preparation of applications	- Networking - Commitment to innovation and excellence	consultancy	rooms)
University 5 **(public)**	- University - KTU network - Business partners, companies - Consulting companies - Training institutions	- Catalogue of services - Grant writing H2020 Erasmus+ - Training - Market research - Knowledge transfer	- to facilitate knowledge transfer - Research commercialization - contracts - to connect and to help	- Website - Brochure - Telephone - “unique” contact point	- University budget - R&D contract (company)
University 6 **(public)**	- University - KTU network - Business Partners - Consulting companies - Training institutions	- Catalogue of services - Grant writing H2020 Erasmus+ - Training - Market research - Knowledge transfer	- to facilitate knowledge transfer - Research commercialization - contracts - to connect and to help	- Website - Brochure - Telephone - “Unique” contact point	- University budget - R&D contract (company)

Table 3 – Planned Core Services of Knowledge Transfer Units

	R&D contracts	Patenting and Licensing	Spin - off	Others
University 1 **(private)**	- Pilot projects - Networking - Market research - Legal issues	- Use of international Patent system (PTC) - Consultancy on PCT - Get high royalty rates through licensing industrial and business partners in Ukraine and abroad	- Establishment of Universities' spin-off network - Increase the earning capacity of the spin-off	- Establishment of technology park - Build strong Government relations
University 2 **(public)**	- Pilot projects - Commercial value of invention - promotion of technologies on the market	- IPR support - Licensing for companies	- Spin-off creation - Spin-off realization support	- none
University 3 **(public)**	- Eye Tracking Research -3D Printing Technology	- Patenting support	- none	- Fund raising and management - Training - Consulting services
University 4 **(public)**	- Pilot project in IT (supporting of student	- Patenting and licensing support	- Analysis of legal norms of spin-off	- Training - Creating 3D prototyping

	start-ups) - supporting of grant proposal preparation -University and Industry cooperation		- Development of university strategy for spin-off companies	service
University 5 **(public)**	- 3D printing technology - Transfer technology	- IIPR management and support	- none	- Support of grant writing
University 6 **(public)**	- 3D printing technology - Transfer technology	- Patenting support	- none	- support of grant writing