

Public or private in online technology transfer?

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Abstract

The paper proposes a presentation of the main online technology transfer platforms at international and national level in terms of type of ownership, highlighting the functioning criteria, the cost and the advantages or disadvantages specific to the public or private initiatives. The analysis has highlighted the success of public initiatives in the field and a low survival rate for private platforms. Public-Private Partnerships can be a solution to optimize the work of specialized technology transfer platforms. Romania does not currently have a specialized technology transfer network, functional at national level. There are some governmental initiatives or based on European funds, but the information presented is brief, the number of participants is low and the offer of technology transfer partnerships is limited. The study highlighted the need to develop tools tailored to technology transfer, including technology platforms, but government support and measures to support public and private research are needed to increase the success rate.

Keywords: technology transfer, online platforms, case studies, Romania;

1. Introduction

Applied research, development and innovation are necessary components for economic development, as benchmarks of European and national strategies and policies. Technology transfer is an important step in the use of scientific results in the economic and social spheres. Research and innovation can help transform the EU, delivering better jobs and living conditions for European citizens. The EU promotes the encouragement and stimulation of innovation, including the setting up of small companies. In Romania, the link between research and the economic environment is reduced, being disadvantaged at the level of research units by the research promoting policy, based almost exclusively on publications. The evaluation of the research/promotion activity is done only through the publication of articles and not inventions or applications beneficial to the economy.

2. Definitions and European legislation

According to Ecommerce Europe (2018), there is no clear definition of the online platform, being generally characterized as a digital environment that promotes e-commerce. According to the cited source, the notion of online platform does not refer to online stores selling only their own products/services, but to complex systems operating in the virtual environment, differentiated according to the buyer-to-buy interaction: market-place, shopping mall, brokers, search engines, or online comparison systems that provide consumers with products and/or services, sales and purchasing and other related items, advertisement, the possibility to compare the price, quality or variety of products/services put up for sale, etc.. The variety of online platforms draws the need for a vertical and differentiated approach: an online platform can offer many types of services and the variety of possible contractual relationships between platforms, consumers and sellers cannot be managed through a horizontal approach. National and community legislation needs to be adapted to new virtual e-commerce systems.

The Infocons Consumer Service (2018) uses the term online platform to describe business models that occur with the digital economy. Platforms typically provide infrastructure

and allow interactions between vendors and users to provide online goods, services, digital content and information.

The European Commission (2017) states that there is no single, legally relevant and future-oriented definition of online platforms at EU level due to factors such as the wide variety of types of existing online platforms and their fields of activity, as well as the rapid evolution of the global digital environment. The EC considers that a single European definition or a "universal" approach would not facilitate the European business environment, regulations in the field being more useful. Given that more than 1 million European companies are currently using online platforms, the EC proposes to regulate this by the European Parliament resolution of June 15, 2017 on online platforms and the digital single market (2016/2276(INI)).

3. Short literature review

The study conducted by Lichtenthaler and Ernst (2008) on 25 companies showed that online 'TT' platforms in the European area covered limited fields of activity, with outdated technology offers, provided by a few companies that were trying to reap its own results. Platforms that are successful on the market must offer new, unexploited technologies, not just use classical technologies.

Mortara's et al. study (2010) shows that the viability of a 'TT' platform business involves significant financial resources, active brokerage and qualified staff. Only 53% of 'TT' intermediaries surveyed survived, part of them operating online platforms. The provision of legal support and the negotiation of IT contracts is the main activity of 19% of the operators still functional at the time of the study.

The report made by the Japan Science and Technology Agency (2012) highlighted the importance of government - university - business environment collaboration in promoting technology transfer and the remarkable results achieved by the Japanese economy as a result of the government agency's activity.

The Indonesian Ministry of Agriculture (2014) report showed the importance of the Platform for Co-Development and Transfer of Technology -within the context of non-monetary benefit sharing of ITPGRFA, developed with FAO support and internationally specialized in the transfer of agricultural technologies, for the sector in Indonesia.

Eun Ha (2016) carried out an analysis of the technology transfer platforms for SME's in Korea. The author mentions a 10-fold increase in the number of technologies transferred to Korea Technology Finance Corporation's platform in 2015 compared to 2013, amid an increase in the R&D sector's budget effort estimated at over \$ 15 billion in 2015.

Bichescu, Chivu and Stanciu (2017), have conducted an analysis of the RDI system in Romania, highlighting the need for specialized platforms, functional in the virtual environment, for increasing visibility and promoting the research results of the Romanian system.

Stanoevska Stanoevska-Slabeva, Lenz-Kesekamp and Suter (2017) make an analysis using a 124 samples of functional European Sharing Economy Platforms in Europe. Most of these applications operate in Western Europe, Romania and Bulgaria, and have a single functional platform. A complex platform must serve at least three stakeholders: suppliers and consumers, regulators and their own interests.

The UN study (2017) conducted by the InterAgency Task Office on 35 online technology transfer platforms (23 governmental and 12 private) assessed performance conditions and specific technology transfer (TT), their viability and success factors. The first part of the study, conducted by two consultants, targeted the developing countries area (CISISD) and developed countries (Overseas Development Institute London (ODI)). Part two is the DNV GL, Netherlands's contribution to online 'TT' platforms. The analysis

highlighted the importance of public support or a strong international organization to ensure the viability of specialized TT platforms.

Stanciu et al (2018) highlights the importance of online technology transfer platforms, with the example of China's agricultural platforms, a real benefit to Chinese farmers.

4. Material and methods

Information on the development of online technology transfer platforms has been collected from the websites of the European Union, the United Nations, the Ministry of Research and Innovation (MCI). For specific information on the platforms under consideration, the websites of the platforms in question were verified. The bibliographic documentation has been produced using specialized articles from the Web of Science, Scopus, and Google Academic databases. Information has been centralized, processed, interpreted.

5. Functional criteria required for online platforms

The UN Assessment (2017) evaluated online platforms operated by multilateral international organizations (UN and EU), or the OECD in collaboration with governmental national agencies. The UN study was completed by 3 phone interviews conducted by ODI with platform operators, user surveys (53 respondents, of which 40 in China, 7 in other developing countries and 6 in OECD-operated countries), respectively direct interview with 5 potential platform users in Thailand. Research has collected views and needs expressed by potential users using a prototype platform provided by IATT (Antic and Liu, 2015). The study has resulted in general criteria for TT platforms to work: the platform must allow for permanent online matching (not only presentation of scientific information, patents, technologies or development strategies); network of networks system is recommended; in the evaluated situations, a simple online TT platform is not enough, requiring additional tools for an effective TT transfer support, the need for a multi-specialization team.

Three categories of actors are needed in the proper functioning of the platforms: distributors and technology transfer beneficiaries (manufacturers/distributors of goods and services); technology transfer vendors (supporting technology transfer, technology transfer intermediaries, suppliers of validation and certification systems, financial services, legal services, or other categories to one of the parties involved); TT policy strategists/policy providers (developing rules, norms, TT market regulation criteria) (Gawer, 2009). The CASISD Beijing study has identified the following success requirements for the platform: the need for active online transactions (including between TT specialized agencies); inclusion/access of specialists with technical expertise in TT; up-to-date information; paying close attention to each potential customer/user. The platform database requires IATT background, with a medium level of information (scientific publications, blueprints equipment and technology, patents, software and access to technical and legal regulations); open access funded by the platform; modern trading systems; payment methods for electronic payment; information safety. Developing and maintaining a successful TT online platform requires significant human and financial resources, estimated at \$ 2,000,000 for start-up and development, or about \$ 1,200,000 annual maintenance costs (at UN-level, in six international languages), but there are cost-reduction alternatives by attracting external resources.

6. Evaluating some online platforms specialized in TT

6.1 Private platforms

TT trading platforms offer TT trading based on demand and supply. The innovative service portfolio includes technical information, expert advice, patents, technical analysis and standard trading contracts for TT. TT's specialized platforms are generally private.

Yet2 (established in 1999), has 3 offices in the US, Europe and Asia promoting innovative open global activities. Yet2 has 1,500,000 users (most SMMs or individual

companies looking for the development of technological solutions at the request of large corporations - Unilever, DuPont and Anheuser-Busch, or their own needs) and 800 brokers. In the early years, the company made about 10,000 TT transactions (550-600 per year), but today their number is reduced (100 successful TT contracts in 2009 and 150 in 2012). Yet2 operates as a search platform (marketplace) with around 1,800 listed TT requests and about 4,750 TT offers. The current trend of the platform is transformation into "Open Innovation consultants" expert. The Yet2 membership fee ranged from \$ 4,000 to \$ 30,000 in 2008 (Aspheramedia. com, 2008), the consulting fee in 2008 was between \$ 30,000 to \$ 40,000, including a commission for a successful transaction (part of the transaction but not less than \$ 10,000).

NineSigma (established in 2000), with offices in the US, Europe, Asia (Japan and Korea), South Africa, Brazil and Australia. The platform offers over 2 million 'solution providers' and has received over 35,000 proposals. It has made about 1,000 projects in 2007 and 1,500 in 2009. Transactions are targeted at major corporations (Nike, Cisco and NASA). NineSigma requests a consulting fee and a commission on a successful TT contract.

Innocentive (established in 2001 by pharmaceutical company Eli Lilly, of which it separated in 2005). In 2012, it acquired OmniCompete, a British company specializing in TT transfer. The activity is focused on crowdsourcing technologies and declared 380,000 members in 2000, with 62,000 TT solutions offered and \$ 50 million contracts since its inception. Innocentive pays special attention to 'solvers' and 'seekers' transactions and connections. Innocentive requests a fee/commission for successful transactions.

Imaginatik (2000, UK, listed on the London Stock Exchange AIM in 2006). The main business is the 'open' innovation support given to large companies, based on innovative ideas from employees to customers. At the end of 2016, the company had 39 client corporations and was suffering a loss, according to their annual balance sheet. Imaginatik is an example of 'semi-open innovation'. Currently, the online platform's management is undergoing restructuring.

Ideascale (Seattle, 2009), has over 25,000 customers, most of the public sector and 4.5 million users. The platform offers crowd innovation for 'communities', and an open innovation platform for companies.

Innovation Exchange, described by online sources (Wikipedia, etc.) as a currently closed online TT platform, was founded in Canada in 2006 to support open innovation, being perceived as a competitor to Yet2 and Ninesigma. The website was not operational for a long time (Board of Innovation, 2018).

CrowdSpirit (founded in France, 2007) was closed in 2010. The business concept was crowdsourcing for product conception, design and marketing. (Board of Innovation, 2018).

Patent & License Exchange and **IP Exchange International** (IPXI) are currently closed. The platforms were initiatives to create intellectual property markets that proposed direct sale through bilateral bargaining, based on simplicity, speed and low cost. High cost of operation has led to SME's discrimination, unusable patents or unnecessary innovation, according to The Economist (2012) in the article on IPXI, quoted by Forbes (Groenfeldt, 2013) and WIPO Magazine (McClure, 2014). IPXI began its business in 2013, after 4 years of consulting and market development, listing corporations as potential licensors, but closed in 2015. Prospective intellectual property clients have requested clarification of licensing and copyright issues. Although it was not a classic TT platform, Intellectual Property Exchange aimed to make TT more efficient by reducing transaction costs.

6.2 Public platforms

One-Way Information Platforms are specialized platforms that offer TT and unilateral technology information to a select group of members (Defense Innovation Marketplace and the Technology Match Market of the National Defense Service, NASA's

Spinoff Database, Patented Technology Exhibition Website). Access to the platform is limited to subscribers who receive technology-specific information, and the platforms are supported by the public sector without the need for profit.

Two-Way Information Platforms are platforms that offer exchange of information in a double direction, between bidders and TT applicants (e.g. the Patent Transaction Website, or Guangdong Province Intellectual Property Public Information Service Platform are linked to SooPat, Jiangsu Province Intellectual Property Public Service and other governmental websites specialized in patents). The platforms are funded by the Chinese government and also offer "technology available" modules, i.e. "technology demand".

South-South Global Assets and Technology Exchange (SS-GATE) (founded in 2009 by the UN Office for South-South Cooperation, Shanghai). The platform is focused on 3 sectors: agriculture, green energy and health. SS-GATE operates through an online platform where technology vendors and applicants can list offers/requests. The matchmaking platform is complemented by TT related services including technical analysis, evaluations, legal and financial support. SS-GATE has recently been supported by 50 country centers, pre-existing organizations such as business associations or public agencies (for example, the National Institute of Design and Technology in Vietnam). National centers that have affiliated with SS GATE provide support (self-service and marketing). The staff of the SS GATE platform is low (10 people working in Shanghai). The platform is conceived in the network of networks system, with national centers being nodes of the network. The SS-GATE reports show about 7,000 projects, of which 2,300 in the offer and 1,000 traded by 2015. About 10% of the contacts were made at live events, usually at international conferences. The platform charges a fee for successful TT contacts. (SSGATE, 2018).

European Cluster Collaboration Platform (ECCP) is not a proper platform for TT, but more a contact platform for cluster management organizations in Europe. ECCP facilitates the growth of cluster networks in voluntary bottom-up processes. By forming partnerships and consortia with clusters, member companies and organizations grow, establish partnerships in production and innovation, grow in terms of profit, exports and productivity. ECCP supports European clusters in internal collaboration and with third countries. The ECP works with EU support, currently being reorganized and comprising 500 members in Europe. The online platform, rebuilt in 2016, is hosted by EU-funded European Strategic Cluster Partnerships - Go International (ESCP-4i), being accessible to clusters but not to companies. Information is frequently updated with events (conferences and workshops, meetings, seminars and webinar, training and studies). The site is easy to access and the information is easily identified, and events are presented in chronological order with clear graphs to identify sectors of interest. The platform has a Twitter address but does not allow forum interventions and is not directly connected to social networks (LinkedIn or Facebook).(ECCP, 2018).

European Enterprise Network (EEN) is a structure parallel to ECCP, set up in 2008 with EU support. The EEN platform provides SME support in the field of international relations, internationalization of business, especially in the growth of exports and innovation. It functions as ECCP in the network of networks system, with 600 members, innovation organizations, universities and research institutes, regional development organizations, and chambers of commerce and industry. EEN members, belong to the 27 Member States and 38 non-EU countries, 23 being outside the CEE. Private business initiatives cannot be affiliated, but access is free through the platform. EEN access points are functional at national level and provide information in the country's language on business innovation (policies, local support services, funding). Although national information points do not connect to the entire EEN platform, they allow contact with national agencies and individual consultants. Some local EEN points have search facilities for partnerships and technology requests/offers (EEN, 2018).

Nordic Innovation Accelerator (NIA) and **Global Cleantech Cluster Association (GCCA)**. The NIA was established in 2006 with Finnish government support on a local network in the Lahti area, as the cleantech platform for 4 sectors of national interest. Since 2010, it has been linked to other European clusters in cleantech (12 currently) and other clusters in North America, forming the Global Cleantech Cluster Association (GCCA) network. The online platform is operational since 2013 with the support of the Finnish development agencies (Lahti and Veolia), the areas of interest being water, waste and energy, developed on the open-accelerator portal of the NIA. Since 2016, the network has been used by cleantech clusters in Finland, Sweden, Denmark, Norway and recently Estonia. Starting with 30 members, the network that operates as a network of networks currently has 57 partners, out of which 10 are from developing countries. Each member is an independent network with its own policies for development and a allocation of resources (multi-track network). Access is free for SME's but it is based on a substantial corporate tax. The network is currently licensed for use in Canada, Switzerland, China, but only clusters can become members. The main focus area is to identify potential technology and buyers, with acquisitions being supported by clusters. The trend is to grow into other areas, not just cleantech. Board of Innovation, (2018).

Kibo Technology Management System (KTMS), established in 2014 with support from the Korean Technology Finance Corporation (KOTEC), provides TT support to small companies in South Korea, serving as an online platform. KOTEC includes the Technology Appraisal Center (with 160 technology technicians and 600 other technology experts from 54 locations), supporting the needs of SMEs in identifying technology needs, outsourcing consultancy to other 1,000 experts outside KOTEC. KTMS includes 240,000 technology offers and 1,000 applications, providing support and consultancy for TT, negotiating contracts, accessing funds, licensing, development and production. In 2015, 262 transactions were made for 456 technologies transferred to Korean SMEs on the online platform (up from 166 transactions for 254 technologies in 2014). The model cannot be generalized for other economies (KOTEC, 2018).

Start-up Nation Central (SNC) is an online TT platform in Israel, established in 2013, which now includes 5500 start-ups and 350 corporate-owned R&D centers. From three areas of prime interest (cybersecurity, agricultural technologies and health), the platform has expanded to 12 other sectors, including fintech, robotics and machine learning, ecommerce and biotechnology. Its search engine offers little information about start-ups and technologies. The platform does not provide information about its members (SNC, 2018).

Asian and Pacific Centre for Transfer of Technology (APCTT), is a UN center of ESCAP in India, with a platform specialized in TT. The keyword search engine enables the identification of technologies, demand/offer and partnerships in TT. Currently, the platform lists 1,150 offers, 530 technology requests and 66 partnership offers (APCTT, 2018).

Innovation Policy Platform (IPP) Site set up by the OECD and the World Bank in 2013 for access to technology, learning resources, etc. Does not provide information about TT transactions (IPP, 2018).

China International Technology Transfer Centre (CITTC), is an initiative of China's Ministry of Technology and Science which proposes TT for the Chinese economy. The online platform offers matchmaking and TT services, listing thousands of Chinese companies. The English version, available at the end of 2017, is no longer available today (CITTC, 2018).

7. Online TT platforms in Romania

Researchforindustry.ro (2013), is an initiative of the Romanian Institute of Science and Technology (rist.ro) designed to increase the visibility of Romanian applied research, for international collaboration and support of researchers and research institutions. The network

operates on the principle of network of networks. The latest news is from February 2017, the platform does not provide information about concluded contracts or a clear offer of patents and technologies. In June 2017, a number of 1,201 industrial companies from different sectors (predominantly IT) were listed (Stanciu, et al, 2018).

National Network for Innovation and Technology Transfer (ReNITT) was established in 2003 at the initiative of MEDC-ANCS, aiming at increasing the visibility of R&D units, capitalizing on the results of national research, improving the competitiveness of SMEs by developing transfer services for knowledge and technology and creating new technologically oriented companies that are active in the market especially in poorly developed areas. The latest news was posted on the site in November 2013. According to information from the MCI (Innovation and Technology Transfer Infrastructure) website, the network includes 50 specific organizations: technology transfer centers, technology information centers, technology and business incubators, 4 science and technology parks. No information is available about contracts or TT partners in the business environment (ReNITT, 2013),

Romanian Association for Technology Transfer (ARoTT), established in 2006, is a professional organization of technology transfer and innovation profile units, a non-governmental and non-profit organization. In June 2018 the network included 6 founding members and 42 technology transfer centers, scientific parks, research institutes. On the site there is a single SME partnership offer, the presentation of a business incubator, and 14 POSDRU projects. There are no other patents, TTs or contracts (ARoTT, 2018).

8. Conclusions

Technological transfer should aim at a dual exchange of information, to identify and better meet the needs of the business environment, at a minimum cost for technology transfer, but which cannot be imposed, the participants being the ones who decide the level of involvement from an economic standpoint. An element of reference in a platform's work is the start-up phase, in which the platform must demonstrate its role for users and justify the development of its activity. Successful membership fee/commission fee for TT contracts is essential for private platforms. The large number of closed private platforms shows that opening online TT businesses is not yet a well-developed business idea. Private platforms have a large number of TT bidders, but a low share of demanding companies. TT internationalization and related service offerings can increase the success of online TT platforms. Romania has launched some public initiatives in the development of TT platforms, but the examples presented demonstrated the incipient phase of the process and the lack of real partnerships for technology and information exchanges at national level.

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