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Extra-relational actors in networks of relationships

by

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Introduction

Whereas the importance of relationships between industry/economy and research/education is stressed by governmental, industrial and research agencies, in terms of the simultaneous deployment of actors, resources and activities, such relationships are often difficult to identify and account for. In terms of substance most 'relationships' between industry and university would fail to qualify as such in an industrial networks perspective. One implication is that unless a rather clear account of relational substance can be documented, the relationship between industry and university has usually fallen outside the traditional IMP research agenda. Whereas this implication may, and rightfully should not, cause much problem on the relationship level (after all, IMP is not primarily concerned about research on non-relationships), bells should start to ring when concerned about the network level. If not showing concern for extra-relational aspects within industrial networks, certainly one should show concern for the exclusion of extra-relational aspects within industrial networks research.

University – industry relationships in a 'West-European/American' market economy setting have been widely studied. Such relationships are held vital to for example innovation both on the company level and on more aggregate levels within boundaries of geographical or institutional entities such as innovation systems, etc. However, from an IMP perspective such relationships, as mentioned above, are difficult to handle as a result of their substantial character. They tend to be contractual, one-off or embodied within other agencies. The main bodies of research typically focus on how governmental agency can influence on the relationship through political instruments, alternatively on the impact of such relationships on various indicators of national and social welfare.

University – industry relationships in a 'Central&East European' command economy setting has received increasing attention after the collapse of this political and economical model. It is held that countries previously associated with this model need to reform their Science and Technology (S&T) bases to communicate with the needs and interests of a radically changed context of users and stakeholders. From a 'West-European/American' model perspective, the argument is made that existing S&T bases in former socialist and

centrally planned economic systems are required to overcome "a long legacy of institutional rigidities and dysfunctional institutional arrangements" (Watkins, 2003:2) in order to play a vital role in "an overall private sector development and enterprise development/restructuring strategy" (*Ibid*:5). Inzelt (2004:977) argues that "a common problem for the former command economies and for developing countries is that they were poor at distributing their own accumulated scientific knowledge, with only very simple types of collaboration existing in these countries". She, in a rather typical way, claims that "the way from long-range co-operation towards arm's-length co-operation and, further, towards the interactive, feedback loop model of innovation and the horizontal triple-helix are great challenges not only for transition economies and developing countries, but also for many (semi-) advanced market economies".

This paper is an attempt to use the example of such relationships in a 'Central&East European' command economy setting, that of Bosnia and Herzegovina (BiH), to argue that, whereas in the 'West-European/American' model there are relationships with questionable substance (from an IMP perspective), in the 'Central&East European' command economy model there were no relationships but lots of relational substance (as seen from an IMP perspective). I further attempt to discuss how such extra-relational agencies may facilitate networks of relationships. As such a conclusion should point to criteria for inclusion/exclusion of extra-relational agency in studies of industrial networks.

We have chosen to illustrate and exemplify these challenges by taking as starting point a case of a longstanding relationship between a former SFRY (Socialist Federal Republic of Yugoslavia) company in the energy industry and Faculty of Mechanical Engineering at University of Sarajevo. Within the relationship we have chosen to focus on how ties between two specific resource elements, a faculty *welding research unit* and a company *welding R&D unit*, gave the faculty-company relationship a reciprocal communicative meaning and value that facilitated its further development, and, which gave the faculty welding research unit a 'rightful' place within an industrial network. We have chosen to describe and analyse the industry – university relationship in terms of its characteristics

as a resource, rather than in terms of characteristics of actors involved in the relationship or of activities performed within the relationship. The theoretical and methodological approach adapted for this purpose comes primarily from the field of industrial network research, in particular Håkansson and Snehota (1995) and Håkansson and Waluzevski (2002).

Rather than contradicting Watkin's (2003) description of the transitional challenge with regard to reforming national S&T bases, we argue that a more general and fundamental problem of making S&T bases in transition economies communicate with its industrial contexts has more to do with characteristics of the present and emerging industrial networks than with features of the S&T base as such. That is, the value of the S&T base as a resource to in particular domestic industry is a function, drawing on a 'Penrose' style of argument, of the forms and extent to which domestic industries can utilise services S&T resources can render (Penrose, 1959:25), and whether this utilisation is consistent with the underlying rationales and capabilities of the existing S&T base. The distinction between Watkins' argument and the approach used here has wider consequences for S&T policies in particular, and rationales underlying educational planning in general.

Transition, disintegration and war: Bosnia and Herzegovinian Contexts

Transition to increasingly democratic styles of policy and emerging market based exchange systems, in combination with often harsh economic realities in what has been labelled transition economies, are important factors shaping the industrial context with which national S&T bases are to communicate. Another shaping factor is derived from an increasingly global economy where the S&T bases of domestic industries, as a consequence of internationalisation of trade and production, may gravitate relative to the rationale of the industrial networks domestic industries have become temporally or more permanently embedded in. Different cultures and religions, political turmoil, corruption and occasionally national disintegration and war, are other factors often adding to the confusing contextual layers of transition economies.

Some former socialist and centrally planned economic systems were superstructures, or federations, built over a historical infrastructure consisting of politically and economically autonomous geographical entities or nation states. The former Soviet Union and the Socialist Federal Republic of Yugoslavia (SFRY) exemplify such superstructures. Common for both are that they have disintegrated as a result of political collapse and sometimes war. They now appear as a set of 'autonomous' nation states where borders have been drawn anew. New borders may be based on historical geographical entities or nation states from a time prior to their federative existence, and they may be based on a combination of partly historical entities and partly on the federation they have disintegrated from. Examples of the latter are present Yugoslavia consisting of the historical entities of Serbia and Montenegro, and present Russia consisting of several historically autonomous geographical or political entities. Examples of the former with regard to SFRY are Croatia, Bosnia and Herzegovina, Slovenia and Macedonia, whereas with regard to the Soviet Union, examples are Belarus, the Baltic States and Ukraine to mention some.

For these new nation states, and in particular for those which have disintegrated from the political and economic centres of the former federations, like for instance BiH from the former Belgrade centre of SFRY, a backdrop elevating a different set of political and structural issues than for nation states or new federations that still contain the political and economic centres of the former federations is revealing. (Tihi, 2002:297) These new states have typically kept much of their inherited and regionally dedicated public infrastructure that was built during federation times to service the needs of regional user industries and other regional stakeholders. Many industries that were built and located in the region under a central planning regime, however, depended in certain respects on an infrastructure that transcended regional borders and often relied more on federation infrastructure and federative policy than regionally dedicated infrastructure and regional politics. Federal disintegration, thus, has left many industries not only geographically isolated, but, and maybe more important, cut off from their main political and economical centres and markets now residing in one or more nation states.

It is often phrased as if the markets to these industries have disappeared as a result of that their main customers often resided in other centrally planned and now transition economies. However, one should also to take into consideration that trade was to some extent a matter of exchange between states rather than between companies. (For a very interesting account of a very limited selection of business studies from SFRY see Palairet, M., 1997) Industries and companies were to some degree 'faceless and nameless' facilitators of transactions between supplier and buyer states that more or less directly interfered in the coordination of day-to-day activities. Disintegration of centrally planned economies, therefore, often tend to more or less randomly amputate and pulverise industrial networks by separating business relationships from the company actors coordinating the deployment of resources and activities. Therefore, an important obstacle for the S&T base to communicate with industry in transition economies is related to the absence of business relationships endowed with qualities within which it is reciprocally meaningful to communicate.

In the case of BiH this may represent an example of the more general context also facing other transition economies. However, BiH is not only disintegrated from its former status as a republic within SFRY. BiH has also been severely destroyed by war. It is divided into two separate entities, whereof only one of the entities has kept much central political power. The other entity is divided into ten cantons with more or less autonomous canton ministries that are in control of science and higher education within their cantons. Industry is physically destroyed by war actions, and the traditional trading channels have been severed. For much of the existing BiH infrastructure, this leaves for instance the educational system, to serve users and stakeholders that, if still existing in an identifiable form, cannot utilise educational services as before. And, to the extent that they can utilise educational services at all, they will do so at levels and in forms that do not correspond to or are complementary to the service provider's rationale. To sum up, we claim that the present BiH S&T system (to be exemplified by the welding research unit) is or was mainly related to or dependent on clients characterised by being primarily embedded in a former federal economic system that no longer exists, and that the present economic system does not provide clients enmeshed in business relationships and networks that are

foreseeable viable users of research based services consistent with the underlying rationales and capabilities of existing institutions.

Theoretical and methodological considerations

It is not straightforward to isolate the contextual layers of any particular actor, resource or activity in order to claim relevance to an example. Describing and analysing a particular relationship between university and industry, and two particular facilitating units within that relationship, in terms of their characteristics as resources, requires a discussion about what these resources are and how their particular characteristics have come into being. Furthermore, drawing conclusions with regard to what implications it may have for the scope of S&T policy and educational planning requires a discussion regarding the validity of doing so.

Mainstream economic theory explains the existence and behaviour of firms or actors in terms of market-based transactions. Industrial networks research approach the existence and behaviour of firms and actors in terms of transactions as episodes within business relationships between firms and actors. Most transactions or episodes are not isolated events, but build on a history of episodes between actors that, through linking activities and tying resources, have created actor bonds. A business relationship, thus, can be described and analysed in terms of the activity links, resource ties and actor bonds. Firms do, however, usually engage in many transaction episodes with several actors. Characteristics of links, ties and bonds in one business relationship carry consequences for how characteristics of links, ties and bonds in relationships with other actors can look like. Multiple relationships are therefore referred to as an industrial network where actor bonds, resource ties and activity links are interconnected. (Håkansson and Snehota, 1995:40)

When in this study we have chosen our focal to be a relationship between two actors in terms of its characteristics as a resource, we have also chosen ourselves a pair of glasses to see the world through that will colour our view of what we see in particular ways. We

have, for example, chosen to characterise the faculty – industry relationship as a function of interfaces and interdependencies between two resource units, the faculty welding research unit and the company welding R&D unit. In most cases a more common approach would be to think of these units as focal actors embedded within an actor network. Such an approach would be conducive to a description of the relationship in terms of, for instance, commitment, identity and trust that may induce a focus on behavioural activities such as matching of plans and strategies that would further link activities and tie resources. (ibid.:32-34) Looking at these two units as resources embedded within a resource network is conducive to description of the relationship in terms of technical and organisational interdependencies on a company, relationship or network level that may induce a focus on possibilities and constraints to behavioural activities. Since the paper started off with a notion of communicative challenges, we have already indicated the existence of at least constraints to behavioural activity directed towards efficient resource utilisation and development that tend to rest more on technical and organisational features than on actors intent. However, whereas a resource view does undeniably underscore the sheer power of human intent and motivation to intelligently or forcefully overleap or remove obstacles, it may be superior in identifying possible combinations of existing resources that can be utilised differently, and perhaps even to position the obstacles as resources within a resource network.

The relationship resource

The relationship between Energoinvest and the Faculty of Mechanical Engineering (FME) may be described in terms of series of 'transaction' episodes between several organisational units within each relationship party. These transaction episodes involve a large number of actors, and span over a wide range of activities and resources within both organisations over more than four decades. In fact, to an extent that sometimes blurs the distinctions between the organisations and resources within each organisation. One may even claim that the strength and quality of bonds, ties and links between industry and their S&T bases in BiH may have formed the strongest impediments to present requests for reform of the S&T bases, and that any reform will eventually lean stronger on state dependency than orientation to the private sector.

The background for the relationship starts in the aftermath of the Second World War. In isolation from markets, roads or skilled manpower, Tito[1], fearing Soviet invasion after the break with Cominform[2] in 1948, decided to establish and locate armaments factories and other strategically important industries in the more inaccessible parts of Bosnia[3]. (Malcolm, 1996:201-212)[4] In close relation with these industries a history of co-development with parts of what became University of Sarajevo on September 11th 1949 began. Following the establishment of Faculty of Medicine (1946), Faculty of Law (1947), and followed by Faculty of Veterinary Science and Faculty of Philosophy (1950), Faculty of Engineering was established in 1949 (Dizdar & Bakari, 1996).
Connections between BiH industry (referring to the above mentioned, and in particular four companies – Energoinvest, Unis, Famos, Soko) and Faculty of Mechanical Engineering were very close and substantial. They grew together from their establishment in the late forties until the outbreak of war[7] (in 1992). Energoinvest, for example, had substantive influence also on all other faculties. Energoinvest alone would typically fund about 1000 scholarships for students in one academic year[5].

Similar stories also apply to relationships between University of Sarajevo's faculties and *Unis* (production of mainly military vehicles, but also licenced production of constructions for VW vehicles), *Famos* (motors and components for military vehicles and heavy transport), and *Soko* (aeronautic construction, mainly for military) in Mostar. *Energoinvest* was maybe less dependent on military as a customer. *Energoinvest's* main area was complete engineering services (projecting, building, engineering), primarily for the construction of thermo energy and components for nuclear power plants and refineries. It is indicated[8] that Energoinvest had an annual turnover of $2 bn's all over the world, but in particular to former communist countries and some Arab countries. Energoinvest also had a factory in Mexico (EnergoMex) and representatives in many other countries. These companies, but Energoinvest in particular, would directly or indirectly apply research-based engineering techniques, and in different ways and to different extent engage in and make use of relationships to research-based educational institutions such as a welding unit at Faculty of Mechanical Engineering.

Immediately after the company Energoinvest was established in 1953 (Popovic, 1976), several study-groups were established. According to Selmanovic (interview), the rationale underlying Energoinvest's development was based on the following logic: Science □engineering □production □trade (market)[6]. The study groups (Popovic, 1976) were not organisationally connected. Laboratory for welding and defectoscopy, Laboratory for protecting of metal from corrosion, Laboratory for chemistry, and Study group for nuclear plants were established at this point. In 1961 there was established specialised research and development centres for thermal technique and nuclear technique, electro-energetics, and some later centre for automatics, standardisation and technology. (These specialised R&D centres we will however regard as 'facility resources' combining several resource elements that were to facilitate the relationship).

Faculty of Mechanical Engineering (FME) at University of Sarajevo is the legal unit with which any 'relationship' is formed. Transactions will have to be channelled through the faculty. A particular feature of BiH universities, and for universities in the West Balkan region at large, is the legal status of faculties. Whereas faculties are usually the legal unit, universities are described as 'loose' associations of faculties. Funding is a matter between the state and each particular faculty. Even if, for many purposes, that may be an adequate description also in a traditional western university model, the university would usually be the legal unit through which funding and contracts were channelled. The matter of importance here is that the relationship historically and formally would be between the faculty and the client, and it would be the faculty that was to ensure that it had the resources to facilitate the substance of relationship 'transactions'.

The facility resources

In this particular case the facilitating resources of the substance in the relationship between FME and Energoinvest are the FME welding research unit and the Research and development centre for thermo- and nuclear technique at Energoinvest, respectively.
The Research and development centre for thermo- and nuclear technique at Energoinvest was established in 1961 for the purpose to consider problems related to development and research in the field thermal technique, welding, nuclear technique, inspections,

protections and control of materials and welded joints. 260 persons of different origin and kind would be affiliated with the centre. More than 100 of these would hold a Bachelor degree, and the centre had its own buildings and equipment. R&D activities were conducted in specialised and modern equipped laboratories and departments with specialised educated personnel in two basic categories, whereof one category was more than the other related to welding. This category would deal with topics such as mathematics and physical research in field of welding, technology of welding, chemistry and metallurgy in welding, monitoring and defectoscopy, education and attestation/certification, protection for corrosion, chemistry analysis, development and production of equipment for welding and defectoscopy, and casting. R&D in the field of testing materials and welded joints with destructive and non-destructive methods had a special role in R&D activities of this centre. Laboratory for welding and defectoscopy had the longest tradition in the centre compared to the other laboratories. The other category was related to thermal technique, process techniques and development of products. Welding was less related to this category.

Through this R&D facility researchers from Energoinvest would teach and engage in research at the faculty, and faculty researchers would engage in applications and research at Energoinvest. In fact, after the 2nd world war, Energoinvest and Faculty of Mechanical Engineering co-developed throughout the latter part of the 20th century in Tito's Yugoslavia. Since applying welding techniques in the construction of full-fledged oil-refineries and components for nuclear power plants is a rather expensive laboratory exercise, however, there is a mutual benefit from such relationships.

The FME welding research unit consisted and at present consists of a professor, two teaching assistants and two laboratory assistants, laboratories for joining techniques and for materials testing, welding equipment and utilities. Furthermore, it consists of competencies, experiences and documentation of what it is and has previously been exposed to and utilised for. It has also a portfolio of courses and services that it has developed experience in carrying out and offer to a fairly specific set of users, and in particular to users that are or hope to be related to companies such as the mentioned ones.

Research, as a university activity, was mainly conducted at Energoinvest's premises for strategic and resource-related reasons.

Interfaces with other facilities

Most often the FME welding unit would be engaged in Energoinvest's 'projects' through Energoinvest's own Research and development centre for thermo- and nuclear technique. These projects would bring them in contact with facilities with which at least Energoinvest resources were tied to through maintenance and reconstruction, and which could and would be used for new projects. The faculty could use Energoinvest facilities for more or less any purposes related to other faculty activities. Through supervision in Energoinvest projects and relationships with their clients the welding unit would also be physically connected to buyers facilities in different parts of SFRY and abroad.

Interfaces with products

The products (and services) of firms FME had a relationship with can simultaneously be characterised by its variety and complexity, and by its exclusivity. They would be exclusive with regard to the specificity of suppliers, producers and buyers, and varied and complex with regard to their applications. Components for nuclear power plants in Russia, or deliveries of complete oil refineries to Iraq serve as two examples when concerning Energoinvest. Through Soko's relation-/partnership with Boeing, FME would work with components for Aeroplanes. Through Unis' relation-/partnership with VolksWagen, FME would work with components for the Unis' Sarajevo assembly of VW Golf for the SFRY and South (East) Europe market. All producers, maybe except for Energoinvest, however, relied heavily on military contracts with which (as far as we have found) the welding unit was less connected. FME welding unit interfaces to products are reflected in courses, competence and machinery.

Interfaces with business units

The technical director of any FME-industry relation would be the natural contact for the welding unit, but also with their researcher and operative welders. Energoinvest, in addition to the research & development centre, also had a production unit that would be

present at different construction sites inside and outside of Energoinvest, at their clients, with which the welding unit would cooperate. Social/representative connections to Energoinvest's client would also arise as a consequence of field visits. This would apply also with regard to other companies.

Discussion and Conclusion

The welding unit has a known use, and is, as such, to be considered a resource to someone. (Håkansson *et al.,* 1995:132) However, a fundamental problem is that as a consequence, firstly of the political and institutional turmoil of post-communist transition, and secondly of the post-war situation, the user side is not only in a difficult state of transition, it is 'gone for good' in a form known to incumbent service providers. These providers, such as a national S&T base, are facing, not a problem of negotiating and adapting its interfaces to the network in which it was previously embedded, but to identify industrial networks that it has little or no previous experience with, and to 'negotiate' themselves interfaces to these networks. The extent to which such potential interfaces will embed the welding unit in industrial networks having at best different experiences, if at all, in working with a research based welding unit makes it paramount that actors within these networks are able to see the welding unit as a resource, and that they have the organisational capabilities to coordinate activities in relation to different units of the S&T base. The welding unit's previous experience, history and view of themselves as a resource element, is not the most relevant frame of reference therefore, and may even be a hinder to embedding itself into a new industrial network.

Another related issue, as the faculty – industry relationship is dissolved, is the continuation of facilitating units activities wherever it is possible and meaningful, meaning also continuation of more 'individual relationships' between subunits. The absence of a faculty infrastructure for these relationships (except for collecting overhead) make coordination a most troublesome issue, highlighting organisational differences, lack of structure for cooperative culture and flexible professional arrangement between subunits and individual members within the faculty. We may say that relationships

become multiple and 'individual', and that coordination falls on the client. The current enterprise structure and economy of BiH is, however, far from adequate for client-coordinated industry – university relations. As faculties, and their subunits, are forced to draw more of their resources from their surroundings, and that clients are not in possession of facilities that are 'relevant' for subunits to provide substance to the relationship, there also exist an issue of investment in internal facilities.

Interviews:

Prof. Dr. Omer Pasic, university professor, 'welding unit', Faculty of Mechanical Engineering, University of Sarajevo, Sarajevo, Monday 24th of February 2003.

Mr. Fehim Selmanovic, Dipl.ing., Retired Chief Executive of department for metals and non-metals, Energoinvest, Sarajevo, 12.07.2003.

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[1] Josip Broz Tito, leader of the Yugoslav federation from 1945 – 1980.
[2] "Cominform." Encyclopædia Britannica. 2004. Encyclopædia Britannica Online. 9 Feb. 2004 <http://www.search.eb.com/eb/article?eu=25343>: The Communist Information Bureau, founded in September 1947. Yugoslav communists under the leadership of Tito gave it strong support; therefore, Belgrade was selected as the seat of the organization. Mounting tension between Yugoslavia and the Soviet Union led to the expulsion of Tito's party from the Cominform in June 1948, and the seat of the bureau was moved to Bucharest, Romania. On April 17, 1956, as part of a Soviet program of reconciliation with Yugoslavia, the Soviets disbanded the Cominform.
[3] Bosnia, then one of the six republics of the former Socialist Federal Republic of Yugoslavia (SFRY)
[4] From: Rusinov, D.1978. The Yugoslav experiment 1948-1974. Berkeley, California
[8] Interview at Faculty of Mechanical Engineering, University of Sarajevo, Prof. Dr. Omer Pasic, university professor, Welding Unit, Sarajevo
[9] According to interview with retired Chief Executive of department for metals and non-metals, Energoinvest, Fehim Selmanovic, the idea of establishing Faculties of Electrical and Mechanical Engineering in Sarajevo came from Energoinvest.