

## **Models of businesses' support for technical knowledge development in Wielkopolska Region – a qualitology approach**

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### **Abstract**

*Some businesses have noticed that technical knowledge resources are becoming ever scarcer on the market. They prevent situations in which that resource will run out or its quality will be too low, thus limiting developmental possibilities of the organization. Noticing limitations of educational systems, in particular formal ones, managers have started undertaking independent initiatives for supplementing the missing competences among future employees. Therefore, those activities are preventive in nature which makes it possible to connect them to the issues of quality management, instead of just knowledge management. The goals formulated in the article include: proposing a method for identification of technical knowledge support models in businesses with qualitology narration, justification of that narration, identification of some models. The identification was made in Wielkopolska, a region of Poland which is inhabited by about 3.6 million people. The studies on identification of the aforementioned models focused on the region since author of the article and other members of his research team take part in the development of the Wielkopolska Educational and Economic Network. The article presents recommendations for cooperation between businesses and schools as part of that social network. On the one hand, the network provides the businesses with autonomy of activities in cooperation with other entities and on the other hand, it makes it possible to accelerate those activities. The article proposes an imaging method of such a network in order to provide evidence of its existence and monitor changes which occur in it.*

**Key words:** region, activity, network, qualitology, prevention, network imaging.

**JEL Classification:** M12, R23

### **1 Introduction**

The growth and volatility of customer needs as well as the search for niches on competitive and often saturated markets contribute to the growth in the demand for technical knowledge. Businesses are affected by its shortage which might hamper progress in automation and improvement of the flow of information as well as creation of innovative solutions. The system of education is a natural source of development of technical knowledge, however unfortunately it cannot keep up with the expectations of the economy. Technical knowledge is linked with the economy as no other type of knowledge. Businesses need to get involved into its improvement as in an educational system which is detached from the economic practice, the quality of that resource will be low.

The changes dynamics in the economy require constant cooperation between businesses and educational entities, as an ever larger number of businesses are beginning to perceive. Hence their initiatives for acceleration of improvement of the quality of technical education in the local dimension so that to adjust educational processes to their own needs. The locality of the activities

makes it more likely that an educated graduate whose competences are adjusted to the requirements of a specific company will be hired by that company instead of its competitors. Activities for improvement of technical education quality in cooperation with technical schools are analogous to improvement of cooperation with other suppliers in order to improve the quality of resources at the entry to processes in businesses. It is a preventive action with respect to quality management.

Large businesses have developed model solutions with respect to supporting development of technical knowledge. Identification and analysis of those models will make it possible to get to know good practices better and transfer knowledge about the methods for supporting technical education to SMEs. Getting to know the mechanisms of cooperation between businesses and educational entities might be a stimulus for relational management in the regional dimension and creation of regional economic-and-educational networks.

## **2 Knowledge vs activity - a qualitology approach**

As an intelligent being, the human has the advantage of being able to act, i.e. behave purposefully and knowingly, over other creatures (Szafranski, 2006, p. 11). Their activities are caused by needs and motivation (Pszczolowski, 1978, p. 122). Their needs and the way they achieve their purposes are affected by external and internal factors. The category of internal factors includes the features of the human beings and their conditions. It's advisable to describe the features and their conditions in the qualitology approach (the theory of the quality). The set of all the features of the human beings is their quality while the set of all the conditions of the human beings' features is the condition of their quality. Such a statement is valid according to the description of quality and condition of quality which are understood respectively as "a set of features (Mantura, 2010, p. 47) and "a set of conditions of features" (Mantura, 2010, p. 51). By saying the "human beings" and characterizing them, one can refer to the idea of the human beings and to all the people at the same time (those who are alive and/or were alive and/or will be alive) or to a specific person. In the case of encompassing all the people under the notion of the human beings, it is possible to describe only the quality or the condition of quality common to them. It is possible to describe the common features of people and present the conditions of their common features in the statistical approach (if the features are measurable) or via general verbal descriptions. In the case of a specific person, one can speak of their individual quality and condition of quality. Most often, when speaking about the quality and condition of quality of the human beings one takes into account a significant part of their features and conditions of features since the number of human features is infinite, as it results from adopting the thesis on an infinite number of features of all the objects of cognition (Mantura, 1994, p. 43). The significance of human features is relative, the set of such features changes overtime. In reference to the human beings, one can examine sub-sets of their features and conditions of features. Such sub-sets are called characteristics as it stems from the definition of characteristics (Hamrol, 2005, p. 21). In connection with the fact that human features can be classified in various ways, it is possible to separate the human beings' various characteristics in an infinite number. One of the human characteristics is constituted by the set of their knowledge and skills whose conditions can be examined and described. Although knowledge and skills are often treated as separate categories of phenomena, in the further part of the article skills will be treated as one of the categories of knowledge - as "knowledge HOW?", according to the knowledge classification developed in the OECD report of 1996 (The Knowledge..., 1996, p. 12). This move will not affect the course of further deliberations, making the presentation of issues addressed by the paper easier instead.

The existence of the human beings is a necessary condition for activity. The human beings are the subject of activity. By definition, activity is always meant to reach an objective. The quality of reaching that objective depends on the quality of the human beings, among other things. Other factors which affect the quality of reaching the objective include the remaining resources at the entry to the activity such as tools, materials, methods, etc. as well as conditions of the environment in which the human beings act. Effectiveness of activity might be a measure of the quality of reaching the objective. The larger the extent to which the objective is reached, the higher the effectiveness of the activity and the better the quality of reaching the objective. Reaching the objective in full is a special case, stemming from maximal effectiveness of activity. It means that the actual result matches the planned result, i.e. the objective (Szafranski, 2006, pp. 11-21). Effectiveness of activities is affected by the knowledge the subject of the activity has, which is important from the point of view of reaching the objective.

Knowledge can be categorized in various ways. One can talk about it in general or about its separate fragments. Technical knowledge is one of the categories of knowledge which can be distinguished. In a knowledge-based economy it is particularly important, especially given that at its current developmental level, civilization could no longer survive in its shape without developed technology. The issue of the influence of technology on the human beings is being discussed in engineering sciences as well as in philosophy (Bańka, 1980, Dusek, 2006), and has also been addressed by the author of this paper (Szafranski, 2015b, pp. 67-77). Demand for technological knowledge can be approached in at least two aspects:

- needs of the economy - an ever larger technological knowledge resource is needed in businesses, the knowledge needs to be more and more specialist and advanced and should be acquired and developed by employees throughout their professional lives (the human beings in the function of the employees);
- individual needs of the human beings - in a world which is based on accelerating development of technology, it is necessary for every human being to continuously deepen their technological knowledge as otherwise, an individual who cannot catch up with the development of technology faces the risk of alienation; in particular such alienation might be the fate of a large part of civilization which obviously is only a theoretical possibility (the human being in the function of a consumer or a co-participant in the social system).

The following part of the article has been devoted to the needs of the economy and, to be more precise, to the growing demand for technical knowledge in businesses.

### **3 Influence of businesses on the development of technical knowledge in educational systems - between marketing and necessity**

From the point of view of goals of a business which employs employees in which there is a demand for technical knowledge, the employee is a carrier of that knowledge. Following the principle of effectiveness, as it is necessary in the conditions of market economy, businesses do not look for a human being on the market - they look for a resource whose use will make it possible to efficiently and effectively reach the objectives formulated in it. If e.g. a 100 people turn out to be the most effective carrier of technical knowledge, they will be employed but if it turns out that it is more advantageous to hire one man and buy an efficient machine (the human - machine system), then the latter solution will be chosen. On the labour market, the human beings compete against

machines, robots and computers to an ever greater extent (Brettel i in., 2016, Lu, 2017). The article will not touch upon the ethical dimension of this state of affairs.

Despite the fact that further progress of automation and robotization and development of artificial intelligence-based systems is expected (Cockshott, Renaud, 2016, Stevenson, 2011, pp. 93-107, David, 2015), at least for the time being there is an unsatisfied demand for technological knowledge (including technical skills) (Inskeep, Hall, 2009, Amadi-Echendu, 2007, Hrmo R., Mitina J., Kritofiaková L., 2016). First and foremost, such knowledge should be supplied to the market by technical schools, however in the opinion of e.g. Polish employees, they do not do it satisfactorily (Goźlińska, Kruszewski, 2013, Analiza kwalifikacji i kompetencji, 2014). Therefore, some businesses decide to support technical schools upon their own initiative. Such an activity can be located in the CSR or PR area, being treated as a widely understood marketing activity. In fact, treating schools as suppliers of technical knowledge, knowledgeable businesses are beginning to start activities for improving the level of its quality already at the stage of its shaping in the minds of young people in the schooling period. They treat those activities as preventive actions in the process of managing the quality of their resources. Factors which support the aforementioned awareness include the businesses' knowledge about knowledge and quality management, funds for knowledge management and quality management, in particular monies for ensuring budgets to undertake preventive actions. When ensuring financial and human resources, it is possible to initiate designing, implementation and development of cooperation with technical schools, in particular their students and teaching staff, in businesses. The activities of some businesses are innovative enough or standard but long-term enough that one can speak of models of cooperation between businesses and technical schools. Identification of such models of cooperation has a large cognitive and practical value because, firstly, it makes benchmarking activities easier and secondly, it makes it possible to look for the most effective methods of cooperation with schools from the point of view of businesses acquiring high quality technical knowledge. Moreover, acquisition of information about the models of cooperation between businesses and technical schools makes it possible to identify a wider dimension of cooperation between entities on the technical knowledge market and look for an answer to the question whether vast cooperation between entities can be characterized as networked or only individual cooperation. Networking the cooperation makes it possible to generate a new quality of that cooperation. Among other things, the topics connected with social networks developed after the publications of M. Castells (Castells, 1996) who pointed out to sociological and economic aspects. On a side note, he had his predecessors - philosophers and sociologists such as Max Weber - the creator of the social activity theory (Weber, 1978) or Talcott Parsons - the creator of the social action theory and structural functionalism (Parsons, 1951). The issues develop in various areas of social life, e.g. health care (Scott and others, 2005), transnational networks (Byrd, Jasny, 2010), as well as in the aspect of knowledge management as part of sciences on management (Perry-Smith, Mannucci, 2017).

#### **4 Models of businesses' support for technical knowledge development in the Wielkopolska Region**

Among other things, in his studies the author looks for the aforementioned models of supporting development of technical knowledge by businesses. In this article, he would like to address only a few examples of them and then propose a concept of combining those bipolar models of cooperation into a network of cooperation. The models presented herein were developed courtesy of MAHLE Behr Ostrów Wielkopolski Sp. z o.o. as well as Zespół Szkół Ponadgimnazjalnych im.

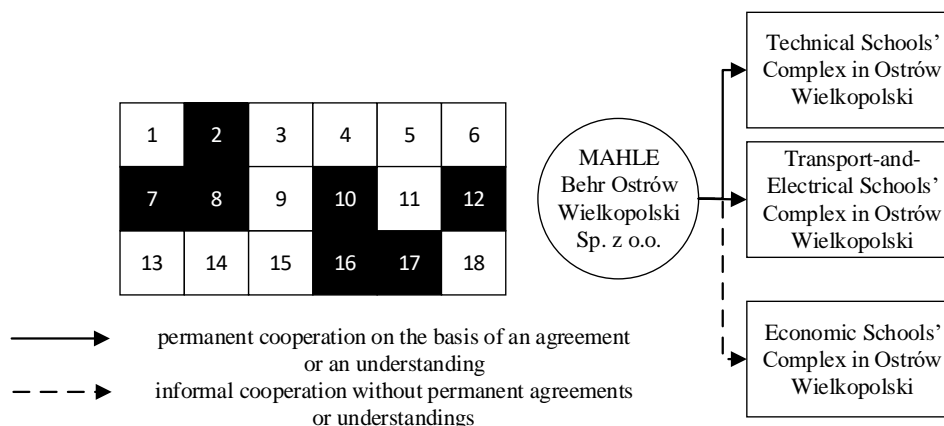
Józefa Nojego w Czarnkowie [the Józef Noji Upper Secondary School Complex in Czarnków] as well as a result of an analysis of online sources.

For the purposes of identifying models of support, businesses were provided with an electronic poll containing questions which mainly focused on support for vocational schools (basic schools and schools of technical education). The poll included 17 methods of cooperation for the development of technical knowledge, with the businesses having been given the possibility of supplementing the list. The following methods of support were listed:

1. organization of internships for students
2. organization of training periods for students
3. organization of internships for teachers
4. extending patronage over the school
5. co-organization of patronage forms
6. running a center school/technological park/open laboratories
7. participation in meetings with students at the schools
8. participation in local job fairs
9. participation in meetings organized in the city/district, concerning the local labour market
10. organization of contests for school students
11. funding scholarships for talented students or scholarships for teachers
12. announcing job offers in job centers
13. cooperation with career councilors
14. hiring students of vocational schools from other countries
15. additional cooperation with respect to vocational education with universities of technology
16. inviting student groups to visit the company
17. providing materials or schooling aids to schools or teachers
18. other (please name).

As part of the research works, to date 10 models of supporting development of technical knowledge by businesses have been identified in Wielkopolska, it being expressed as support to vocational schools. The article presents two model examples (fig. 1 and 2).

**Figure 1. Model 1: MAHLE Behr Ostrów Wielkopolski Sp. z o.o.'s support for development of technical knowledge through cooperation with vocational schools.**

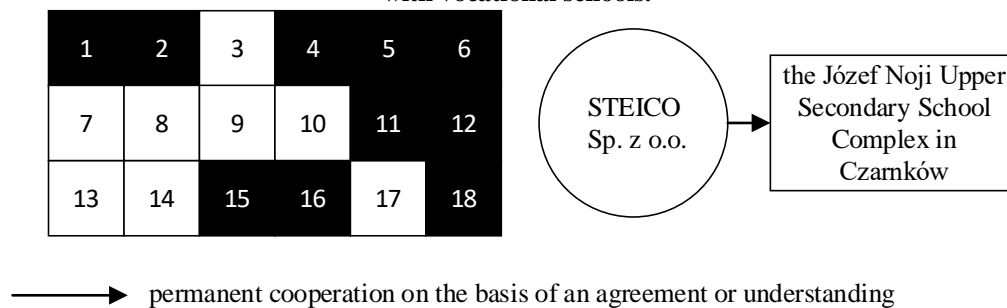


## Description of MAHLE Behr Ostrów Wielkopolski Sp. z o.o.'s model

2	The company organizes apprenticeship trainings, based on the educational process in schools. The average duration of a training period is 1 month. They are always free of charge. Until school year 2016/2017, no recruitment process was applied, however it will apply from school year 2017/2018.
7	Once a year, between March and April, the company organizes meetings with students in schools.
8	Once a year, the company takes part in the local Business and Entrepreneurship Fair.
10	The company organizes two contests for students: "the Best in the Profession" and "the Best Electronics Engineer".
12	The company sends job offers on production posts to job centers, according to its needs.
16	Students are invited to the company. The company organizes so-called shadowings during which students visit the site, take part in trainings, workshops and shows as well as other forms of activity.
17	The company sends its products such as radiators, charge air coolers, capacitors or CRFM modules to schools.

Source: Own study

**Figure 2. Model 2. STEICO Sp. z o.o. - support for development of technical knowledge through cooperation with vocational schools.**



## Description of STEICO Sp. z o.o.'s model

1	EU-financed internships for students are organized.
2	The company organizes curriculum-based apprenticeship trainings on an ongoing basis. Their scale depends on the needs of the school and the capacity of the business.
4	In its contacts with schools, the company applies the patronage agreement formula - its scope has been included in descriptions contained in this table
5	Together with the school, the company undertook activities for launching a new profession - mechanic - operator of machines used in tree production
6	Together with the school, the company co-creates a workshop for the carpenter profession and cooperates to expand the workshop for the mechanic - operator of machines used in tree production profession.
11	From 2017, the company will fund scholarships for students which will be accompanied by free transportation to work and a welfare fund. Just like the remaining staff, the students working in the company will also be paid the so-called thirteenth salary (information based on the company's newsletter).
12	Job offers are announced in job centers
15	A "Cash for Student!" contest is organized
16	The company organizes short-term practical trainings and internships for students (next to the aforementioned full-time ones), studio trips, trainings, classes in learning the profession
18	Other forms of cooperation with schools are also maintained, including: <ul style="list-style-type: none"> <li>- dual learning,</li> <li>- development and implementation of pilot vocational education programs,</li> <li>- cooperation in preparation for the vocational exam,</li> <li>- organization of profession teaching for underage employees,</li> <li>- joint projects in equipping laboratories, workshops and vocational learning,</li> </ul>

	<ul style="list-style-type: none"> <li>– cooperation in improving teachers' and students' professional qualifications via participation in trainings and courses as well as Polish and international projects,</li> <li>– participation in preparation and organization of conferences and seminars,</li> <li>– exchange of specialist knowledge, the so-called “know how”,</li> <li>– co-organization of dedicated conferences and trainings for the regional labour market,</li> <li>– support for projects aimed at popularization of science and modern technologies,</li> <li>– support for schools in building regional contacts connected with the fields of study matching the operational profile of the company,</li> <li>– mutual promotion of the company and the school.</li> </ul>
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Source: Own study

On the basis of observations it can be stated that there are conditions for the development of the Wielkopolska Educational-and-Economic Network in Wielkopolska.

## **5 Conclusion – recommendations for cooperation between businesses and schools as part of regional social educational-and-economic networks**

The concept and legitimacy of the development of educational-and-economic networks, including the Wielkopolska Educational-And-Economic Network (WSEG) were described in earlier publications (Szafranski, 2015a, Szafranski, Ganowicz, Goliński, 2016). They also presented overall strengths of organizations' co-existence in networks which are also being confirmed by other aforementioned authors. The question arises how to transform the bipolar business  $\leftrightarrow$  school/schools or school  $\leftrightarrow$  business/businesses relations into a network of entities and relations between them. How to monitor the condition of development of an educational-and-economic network (or an economic-and-educational one) is another problem. In Wielkopolska, the factors which started playing a supportive part for the development of such a network include systemic project known as *Time of Professional BIS - professional Wielkopolska* which is being completed in a partnership by the Wielkopolska Province Self-Government and the Poznań University of Technology in cooperation with 80 schools and several hundred businesses from the region (EU EFS funding). The project whose completion is expected between 2015 and 2022 is a continuation of activities started in its first edition known as *Time of Professionals - Wielkopolska vocational education* (2012-2015). Activities additional in relation to the formal vocational education program have been planned under it. They are oriented towards development of cooperation between vocational schools, in particular technical schools, and employers. The key areas of activities planned in the project include: vocational internships (at least 800) and specialist classes (at least 10000) for technical school students, preparation and provision of didactic materials for students and teachers (at least 50 schools), facilitation of communication and exchange of information between employers and students and graduates of vocational schools with the use of [system.zawodowcy.org](http://system.zawodowcy.org) and studying information about the demand for competences in businesses (via the system), student support in career counseling, also by including employers in the scope of the counseling, diagnosing student competences (at least 10000 students).

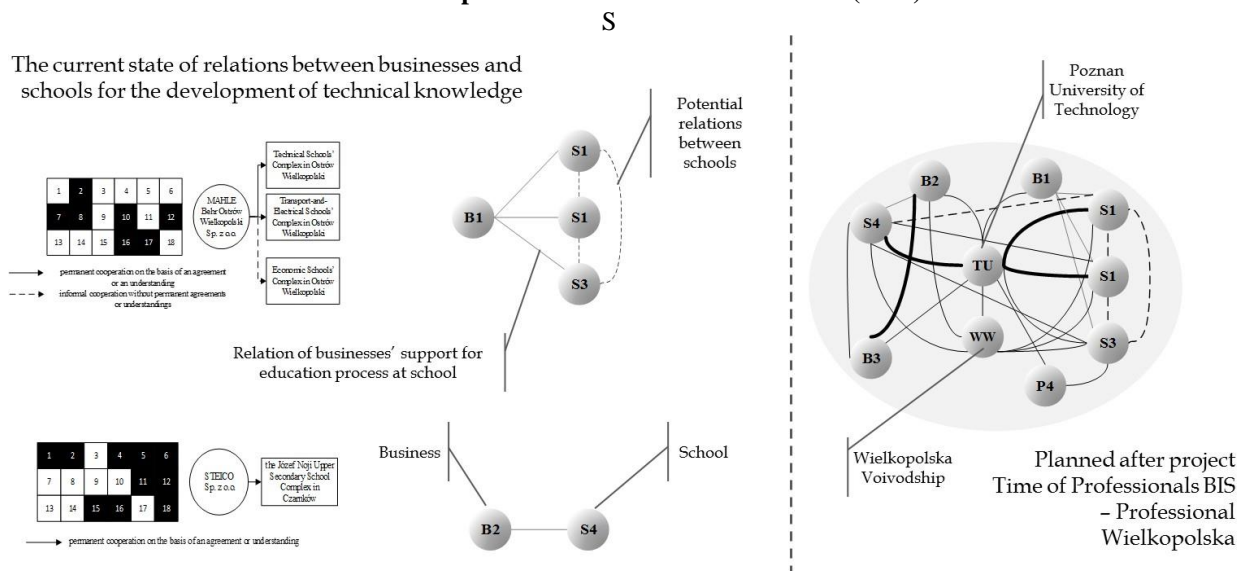
The aforementioned activities are being completed systemically. Their ties to the formal vocational education system are meant to generate a synergy effect in improving the quality of vocational education in Wielkopolska. In connection with the fact that employers are engaged in the activities, development of the aforementioned educational-and-economic network becomes possible in the project. The purposes of its existence include:

- acceleration of the flow of information about the needs of the labour market,

- expansion of educational opportunities stemming from the formal schooling process, taking the needs of employers into account,
- preparation of future graduates to adapt at the workplace sooner,
- reducing employers' costs stemming from recruiting and adapting young employees,
- acceleration of satisfaction of employers' needs connected with technical knowledge (including skills).

The concept of transforming the bipolar relations into a network has been presented on Figure 3.

**Figure 3. Concept of transforming bipolar relations into an educational-and-economic network of relations between employers (B), technical schools (S), technical university - the Poznań University of Technology (TU) and the Wielkopolska Province Self-Government (WW).**



The additional activities which have been planned for the coming years in *Time of Professional BIS - professional Wielkopolska* which are oriented towards development of cooperation should lead to strengthening of already existing relations, development of new relations and acceleration of diffusion of knowledge between entities cooperating in the network.

Monitoring the development of WSEG and studies on its development will make it possible to expand our knowledge about regional conditions for shaping economic-and-educational networks and their influence on diffusion of technical knowledge for the purposes of accelerating its development.

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