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MACROECONOMIC, LEGAL, ADMINISTRATIVE AND CULTURAL FACTORS OF TECHNOLOGICAL INNOVATIONS[1] IN POLISH INDUSTRIAL ENTERPRISES

STANISŁAW SUDOŁ[a],

[a] *Warsaw Management University, Poland*

ABSTRACT

The article begins with presenting the objectives and methods. Main conclusions were formulated here based on part of the results of this study.

The primary factor of technological innovativeness in enterprises is the state's economic and social policy. The paper presents the main causes for the negative and positive assessment of this policy.

A very important reason for unsatisfactory innovativeness of Polish enterprises is the low level of funding for research and development as well as innovation activities.

An important factor negatively affecting the entrepreneurship and innovativeness is the low quality of Polish law: its quite small precision and instability. The bureaucratisation of public institutions has also a negative impact on the entrepreneurship and innovativeness.

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[1] In Poland, the term "technology" has been used from time immemorial, both in literature and in industrial practice, to express the manner /methods/ of manufacturing products or services. In the engineering industry, there was talk about the structure and the manufacturing technology. A great authority in technical sciences, professor Janusz Tymowski, wrote (Tymanowski, (1971 p. 23)): "A technological process is part of the production process during which shape, properties and appearance of the processed material change...". The Dictionary of Words and Phrases of Foreign Origin by Kopaliński (1989, p. 506) states that technology is a study of methods, modification and processing of materials. However, under the influence of American "technology", the word "technology" has been given in Poland a broader meaning of technical science in the last decades of the 20th century. Although this change is considered unfortunate, the research team adopted the revised meaning of the word "technology" as already widely accepted in Poland.

The vast majority of experts participating in the study positively assessed the cultural conditions of technological innovativeness in Polish enterprises. Experts also provided negative cultural characteristics of Poles.

INTRODUCTION

This article was prepared on the basis of part of the results of the study entitled *Conditions for boosting the technological innovations in Polish industrial enterprises* carried out in the years 2014-2015 at the Warsaw Management University based on the grant of the National Science Centre in Kraków. The study was conducted by the team of employees of the Department of Management: Stanisław Duchniewicz, Michał Jaksa, Alfreda Kamińska, Piotr Mikosik, Krystyna Poznańska, Stanisław Sudoł, Dorota Wójcik-Kośla under the guidance of the author of this article.

The study had the following objectives:

1. Identification of factors facilitating and hampering the innovativeness in the sphere of the state's policy.
2. Identification of factors occurring in industrial enterprises that encourage to undertaking technological innovations /product and process/ or that hamper them.
3. Identification of factors occurring in scientific and research centres, which favour or discourage undertaking, realising and implementing the research results.
4. Formulating the proposals /recommendations/ of changes in each of the above areas, which can lead to boosting the technological innovativeness in Polish industry.

The practical aspects of the technological innovativeness in the industry were primarily a determining factor in formulating these research objectives. The idea was that the research results should be useful in undertaking tasks for boosting the innovativeness. It was primarily about pioneering and revolutionary innovations, which are particularly valuable for the economy. If the enterprise has such unique innovations, on this basis it can gain a competitive edge[2] with competitiveness at national, international and even global level.

In addition to the analysis of the scientific literature, business journalism and public statistics, three empirical research methods were used to achieve the objectives of the study:

- opinion polling of industrial enterprises,
- interviews in scientific and research centres, and
- the Delphi method in the correspondence version.

The opinion polling covered 100 enterprises, in which micro-sized enterprises accounted for 20%, small-sized enterprises – 30%, medium-sized enterprises – 40% and large-sized enterprises – 10%. Among the surveyed enterprises, the food industry accounted for the largest share /19%/, followed by the engineering industry /14%/, clothing and textile industry /13%/, building materials industry /12%/, timber industry /8%/, met-

[2] Freeman (1986, pp. 103-105) strongly the possession of pioneering product innovations by a company as a competitive edge pillar.

al and tool industry /7%/, and chemical, electrical and pharmaceutical industry /5%/. Other industries accounted for 12%.

Direct interviews were conducted in eight research institutes and two university technology transfer centres. The interviews were conducted with directors of these entities.

The use of the Delphi method in the study was justified by the multitude and variety of factors affecting the technological innovativeness and the repeated presence of difficulty in defining the direction and strength of the impact of various factors on the innovativeness. One must agree with M. Jacek Stankiewicz (1988, p. 172) that the main advantage of the Delphi method is that it "allows to create an effect of interdisciplinary synergy arising in consequence of the interaction between experts representing different areas of expertise, experience and psychological attitudes". 18 experts were invited to participate in the study. The postulate of diversity of their education, profession and experience was also met. Among them were academics and practitioners in business activity.

This article presents only factors that have a positive or negative impact on the innovativeness in the Polish industry occurring at macro level, i.e. in the economic and social policy of the state's central authorities and local governments, in legal regulations, in the system of the state's administration authorities, in the functioning of many institutions, which could be considered the infrastructure for industrial enterprises as well as scientific and research organisations, such as capital market institutions, or in the field of marketing. A few comments on the cultural conditions of innovativeness were also provided[3].

ECONOMIC AND SOCIAL POLICY OF THE STATE AS THE FACTOR OF INNOVATIVENESS OF ENTERPRISES

The policy in the Third Republic of Poland was variously assessed, although the state was undertaking various pro-innovation activities associated largely with the financial contributions on the part of the European Union as well as it developed and implemented various development programmes, such as "Operational Programme Innovative Economy", "Operational Programme Intelligent Development" and "Operational Programme Knowledge Education Development". Pro-innovation programmes were also conducted by the Polish Agency for Enterprise Development /*PARP*/ and the National Centre for Research and Development[4]. These activities are generally assessed as hardly effective. Despite making various positive changes in policy and management, especially after the Poland's accession to the European Union, there are still many factors that do not stimulate, and even hamper innovative ventures[5].

[3] The factors of technological innovativeness occurring in industrial enterprises themselves as well as in science and research centres will be presented in another paper.

[4] These programmes and projects are presented in Jasiński (2014, pp. 86-99).

[5] Polish Confederation of Private Employers "Lewiatan" (2013, p. 11) stated in its report that during the last decade the number of barriers in business activity has not been decreasing, but on the contrary – increasing.

The following main causes of a negative assessment of the innovative policy /strategy/ of the state can be provided:

1. Deficiencies of the long-term, stable and ambitious state's policy on the high-tech industrial technology development, including the re-industrialisation of the industry after a period of transformation from a centrally-planned to market economy in the 1990s. The experience of highly developed countries shows that the best results in the economy are achieved by supplementing the market mechanism by a relevant government's economic policy, which allows to achieve an impact on favourable to the country industrial restructuring or the creation and development of its new and attractive industries[6]. Koźminski (2016, p. 134) talks about a catalogue of possible and used at different times and in different countries actions of the state belonging to the industrial policy.
2. Key decisions on the directions of development of the industry were not always taken with regard to the objectives of the entire economy of Poland. Often those decisions were dominated by the departmental or regional point of view, which had negative economic and social consequences.
3. Experts, except for one, expressed the view that the effectiveness of funding for research and development activity reduces their dispersal in the country between many industries and directions of technological development. This is due to the deficiencies in the state's industrial policy.
4. In the course of the study it was observed that in Poland there is no organisational unit, which would be the centre of strategic research in this area. It is postulated to establish a high-class strategic centre, which will analyse problems in the scale of the whole national economy, including the most advanced and developmental industry specialisations[7]. Doubts were cast as to whether Poland can accurately identify these fields and institutions, which would correspond to the above high requirements.
5. One of the experts pointed out that in Poland we do not have a serious study on the effectiveness of funding for innovative activity. The results of such study should be made public. They could influence the direction of the allocation of public funds for innovative activity in enterprises and research centres. Instead of directing public resources to areas that do not have much significance for the technological development of the country, the funds from the budget should be forwarded primarily to those areas which are the specialities of Polish industry and that have been already successful in their activity.
6. Although launching the grant system in government agencies /the National Science Centre in Kraków in the scope of basic research and the National Research and Development Centre in Warsaw in the scope of applied research/ advanced, to a certain extent, the conditions for research and development activities, however, the functioning of the system needs to be improved, especially in terms of objec-

[6] It should be noted that the free market is not able to produce sufficient and appropriate funding of enterprises for research and development activity as well as innovative ventures (Hausman, & Rodrik, 2003 p. 603).

[7] Such strategy centre should, among others, develop specific industry /and even for narrower groups of products/ comparative analyses of competitiveness of Polish goods with foreign goods (Sudoł, 2005 p. 242).

tive and substantive evaluation of submitted research projects and the results obtained in the study. The current grant system has not created an effective system of cooperation between enterprises and scientific research centres, which is a condition for highly innovative industrial products and services, and particularly for achieving the original product progress. Based on the relationship between enterprises, the source of innovative ideas were mainly their employees and own R&D facilities. Innovation projects from scientific centres were of secondary importance (Grzelońska, 2016 p. 242). To obtain own innovative projects, it is necessary to build strong research and development units in enterprises and create a rational system of their cooperation with scientific institutions[8], which is understandable, since the development of science leads to progress in innovations.

7. Cooperation between enterprises and scientific and research centres in the country and abroad is too poor[9]. This applies in particular to cooperation with leading centres. Through the accumulation of the results of works, such cooperation leads to new technological solutions and revolutionary innovations[10]. Some authors (Tidd & Bessant, 2012 p. 224) write about the synergy effect, which is considered by many researchers to be a very important factor for the innovativeness. The lack of constant flow of scientific and industrial ideas, and then innovative projects designed for practical use in industry, and often the lack of sufficient interest of scientific centres in cooperation with enterprises in commercialisation of their research results are factors slowing down the technological innovativeness.
8. Economic operators, including first of all industrial enterprises and scientific and research centres, their management staff, engineers and all employees, were insufficiently motivated to innovation activity. This is an important issue for further discussion.

IMPACT OF LOW FUNDING FOR RESEARCH AND DEVELOPMENT ACTIVITY ON THE INNOVATIVENESS

The results of scientific and research activity as well as research and development activity should be the main source of technical innovations. They often require large or very large funding, especially when it comes to creative and revolutionary innovations, causing sometimes ground-breaking changes in technology, simply upheavals across industry sectors. But one must also remember that such innovative activity is associated with high risk.

[8] Absolutely correct is the statement that "...in today's economy innovations usually arise as a result of merger of works of... scientists and entrepreneurs" (Weresa, 2001 p. 339).

[9] It should be noted that more and more sources of scientific and technical knowledge in international corporations are formed outside their home country due to differences in the strengths of innovation systems of individual countries (Poznańska & Kraj, 2014 p. 129).

[10] Clarke (1997, pp. 36-37) notes that in the 1980s, after the recession and a wave of failures in 1981, big American companies developed cooperation in the form of strategic alliances in research and new technology projects with many organisations, reaching beyond national borders, often in a situation where today's partner has previously been a competitor.

In the course of the study, all the experts expressed the view that funding for R&D activity in Poland is far too low[11], "far below the European average, but also considerably lower than in the Czech Republic or Hungary, not to mention European leaders of innovativeness, such as Sweden and Finland" /statement of one of the experts/[12]. The existing financial support for innovative activity from public funds should be significantly strengthened. 87% of surveyed enterprises, in particular small- and medium-sized ones, is of the same opinion. Władysław Janasz (2011) said that funding in the country at less than 1% of the GDP threatens in the long-term with a significant weakening of the forces behind economic development and social progress.

64% of polled enterprises expressed the opinion that the lack of financial support for innovation on the part of state's administration authorities is a factor hampering their innovations. 40% of enterprises recognised the lack of this support as being of great importance for them, 24% – significant importance and 16% – medium importance. The state's financial support for research and development activity would contribute to boosting the technological innovativeness.

Experts found the following as the most expedient forms of support:

- tax concessions granted to enterprises implementing effective R&D activity, leading to technological innovations, which in Poland are granted to a very small extent[13],
- granting by banks credits to enterprises for innovative activity on favourable terms[14],
- giving enterprises, especially large-sized ones, a state guarantee for the repayment of credits taken out for R&D activity.

[11] A number of studies on the technological innovativeness in Polish industry indicate the shortage of funding as an impediment to innovative activity. The signal paper of the Polish Central Statistical Office entitled *Działalność badawcza w Polsce w 2014 r.* indicates that the share of total internal funding for research and development activity in the GDP amounted to: 2010 – 0.72%, 2011 – 0.75%, 2012 – 0.87%, 2013 – 0.87% and 2014 – 0.94%. These data show that the share of funding for R&D has gradually increased in these years.

[12] One of the experts expressed the opinion that the budget funds for R&D activity, aimed at industrial and research centres, especially small ones, for various reasons are wasted. For example, small-sized research centres begin some research and prepare product or process projects, but – due to the lack of sufficient funding for the usually costly experimental and implementation phase – they do not bring research to practical application. Small-sized enterprises and research centres require financial support for R&D activity, which should be combined with an analysis of the effectiveness of the use of their previously allocated funds.

[13] Kluzek (2015) states that "Currently, almost 40 countries in the world offer tax incentives for investment in research and development" and that these incentives vary depending on the country. The author adds that "compared to other countries, Poland has one of the lowest levels of tax benefits per one dollar invested in research and development.

[14] Financing by industry enterprises of innovative ventures with bank credits is hindered for several reasons: firstly – these ventures are often associated with high risk, and secondly – the period of reimbursement of the enterprise's funding for ventures is long. Both of these circumstances discourage financial market participants from lending credits for innovative ventures. 50% of surveyed enterprises indicated the difficulty in taking out credits. In particular, this limits the innovativeness in small- and medium-sized companies. It is difficult for them to obtain a bank credit, as they do not have sufficient assets that could provide collateral on the credit granted to them.

Many of the innovative ventures are financed by the European Union under cohesion policy. Obtaining these resources and the settlement of their use is associated with a complicated procedure, the obligation to keep relevant project documentation and conduct a cyclic control, which is tedious and stressful for enterprises. In Poland, there are entities providing services of preparing an application for EU funds and their settlement. Using these services, due to their high fees, is problematic for small-sized enterprises. Moreover, a major issue is incomplete adjustment of Polish law to the law of the European Union, often resulting in questioning the eligibility of costs, which is associated with the risk of entities and even imposing sanctions on them. One can hope that these intentions are turned into reality, but this requires an active attitude on the part of many organisational units.

In the EU financial perspective for 2020, there is to be a significant increase in funds allocated to Poland, with a clear targeting of these resources on research and development activity, thereby providing a strong base for the development of innovativeness in Poland.

In Poland, very small is the share of the financial support for innovative enterprises by venture capital companies, which in highly developed countries fulfil a very important role in the financing of innovative ventures involving high risk, particularly in small-sized companies, both in their formation, and later in the course of their development. In Poland, the amount of capital managed by venture capital funds relative to the GDP remains relatively low and is only about 0.10% (see Kowalewski (2015, p. 215). The proposals for the development of venture capital funds in Poland should be supported (see Koźmiński (2014, p. 204)).

The share in funding for research and development on the part of industrial enterprises themselves is very low[15]. More than half of the enterprises polled in 2015 declared the deficiency in their own financial resources for the costly innovative activity. Many companies do not see the point in developing R&D activity from own funds, which is usually associated with high uncertainty and risk of achieving the assumed results, and which is characterised by high level of postponing reimbursement of funding incurred /almost all the enterprises believe the latter circumstance to be important/. These factors constitute a deterrent to undertaking innovative ventures, although there are exceptions in this regard[16]. It is usually cheaper and less risky to base the innovations on purchased licenses, which is highlighted by enterprises.

Some of the experts emphasised that the situation presented above occurred in our country throughout the period after the Second World War, which they consider to be the main cause of the low level of innovativeness in the economy. Władysław Janasz expressed the view that "one per cent participation of science in national income means the threshold of social disaster and threatens with civilization collapse" (Janasz, 2011, p. 72).

[15] Funding for enterprises in relation to the GNP according to the Polish Central Statistical Office (2014) amounted to: 2007 – 0.17%, 2008 – 0.19%, 2009 – 0.19%, 2010 – 0.20%, 2011 – 0.23%, 2011 – 0.23% and 2012 – 0.33%. The fact of extremely low funding for R&D activity on the part of enterprises is emphasised by W Orłowski (2013, p. 3) who stated that "in the country at Poland level one should expect business expenditure on R&D several times higher than it is in reality".

[16] Such positive exception is the Polpharma company, which is one of the largest investors in research in Poland.

IMPACT OF THE QUALITY OF LAW ON THE INNOVATIVENESS OF ENTERPRISES

An important factor affecting the innovativeness in enterprises is the law, through which the state and local government authorities establish system regulators in the economy. Good law is an important foundation of social life and the entire economy. The lack of legal regulations or loopholes in the law is unfavourable in many aspects. Imprecise and unstable law in Poland hampers entrepreneurship and innovativeness, although the society is not always fully aware of this.

There is quite common opinion that in Poland there is a low culture of law, starting from its making. It is assessed that when establishing legal regulations their possible consequences for economic entities, often very unfavourable, are insufficiently analysed.

The experts were unanimous in the conclusion that excess legal regulations in the economy, its over-regulation, have a negative impact on the innovativeness. More favourable is the situation where we have to deal with fewer legal regulations, but more integrated, which complement each other. Too many law provisions discourage undertaking entrepreneurial actions and block many science and business initiatives, also in terms of the innovativeness, often associated with a threat to the enterprise's existence.

The basic requirement in relation to the law is its clarity and unambiguity, which does not require later in their application complex and formal interpretative provisions. With imprecise legal regulations, there is a threat of a large margin of their free interpretation in place of their common interpretation.

The law should not be changed too often. It should be stable. Its frequent changeability[17] causes the uncertainty and unpredictability of economic activities resulting from the lack of certainty of whether all legal requirements have been met and what is the extent of the risk of carried out ventures, including innovative, which sometimes inherently involve substantial risk. This circumstance often threatens the existence of the enterprise. This encourages to follow the beaten paths, rather than searching for new innovative solutions. Legal norms, which are regulators of the economic system, should stabilise it.

In economic circles, tax law is particularly critically assessed. It is allegedly a serious hamper to economic development. Tax regulations in Poland are extremely complex, interpreted differently in tax offices and courts to which taxpayers appeal. In addition, it is characterised by very high volatility. It has long been postulated the adoption of a new and better taxpayer-friendly law, including economic law. The public opinion expects positive effects of the new tax ordinance, one of whose main objectives will be to protect the rights of the taxpayer in accordance with the *in dubio pro tributario* principle, namely if in doubt, when the regulations are ambiguous, problems should be resolved in favour of the taxpayer as the weaker party to the proceedings.

[17] It is estimated that in the period after the Second World War there were almost 500 amendments to the Act on Tax on Goods and Services introduced in Poland (Kiełbasiński, 2015).

High ineffectiveness and inefficient functioning of the judiciary system also have a very negative impact on enterprises. Collecting dues is lengthy and costly[18]. The process of bankruptcy of enterprises is also similarly viewed (Polish Confederation of Private Employers "Lewiatan" (2013, p. 7)[19]. Postulates on improving Polish law are made from many sides (see Chmaj, (2014) and Polish Confederation of Private Employers "Lewiatan", (2013)).

IMPACT OF BUREAUCRATISATION IN PUBLIC INSTITUTIONS ON THE INNOVATIVENESS

The high degree of bureaucracy in Polish public institutions, especially the deficiencies in competences of their representatives, is considered in the eyes of all experts participating in the study as a significant obstacle to the management, and indirectly also to boosting innovations in industrial enterprises. The impact of these institutions is usually of the hampering, rather than stimulating nature. The source of high bureaucratisation of these institutions is most often the desire to reduce the risk of decisions made by the officials of these institutions. For this reason, the administration frequently justifies its decisions with elaborate and detailed regulations, procedures and controls, often to the point of absurdity, which makes rational business activity very difficult.

The expression of formalisation and bureaucratisation of economic life in Poland is the need to complete by a large number of enterprises, often extensive and complex forms for various offices. This is particularly burdensome for small companies, for which the use of consulting companies in this field poses a heavy financial burden. It can be assumed that not all the data compulsorily provided to offices are not needed to them.

The development of the economy in Poland requires serious improvement of work and culture of public institutions, a major change in the attitude of their employees to entrepreneurs. Public institutions represent the state to them, from which the enterprises should expect help and not an oppressive attitude. There should be mutual trust between these parties, instead of hostility and suspicion.

[18] This problem is mentioned in Polish Confederation of Private Employers "Lewiatan" (2013, p. 6). It is written here as follows: "This lowers the payment discipline, since dishonest customers and entrepreneurs feel unpunished and honest ones feel powerless. It hinders the efficient allocation of capital, since it is taken over by unscrupulous entrepreneurs and not those most effective. Shortening of court and enforcement proceedings is necessary to reduce the risk and costs of conducting business activity in our country".

[19] It is written here that: "Lengthy and inefficient bankruptcy process prevents quick restructuring and the efficient use of enterprise's resources. This leads to waste and increasing the losses of owners, employees and partners. It increases the risk and costs of conducting business activity in our country".

CULTURAL CONDITIONS OF THE INNOVATIVENESS OF ENTERPRISES

The innovativeness is affected by cultural conditions, i.e. social attitudes, people's attitude to changes, entrepreneurial spirit, attitude to risk, the spirit of tolerance and other characteristics established in the society. No one disputes that cultural conditions have an important, but generally difficult to quantify, impact on innovative activity in Poland (see Zakrzewska-Bielawska & Flaszewska (2014, p. 27)).

During the study, 12 out of 18 experts assessed that cultural conditions in Poland promote the technical innovativeness, and 5 of them expressed a negative opinion.

By assessing cultural conditions positively, experts have found that in Poland there occur the following favourable circumstances:

- The introduction of the principles of the market economy in Poland in 1990 triggered the spirit of entrepreneurship and innovativeness in the society. This applies particularly to individuals with higher education and self-employed persons who generally show a willingness to introduce modern technical solutions and to continuously adapt products and services to market requirements and thus to implement technological innovations. Since 1990, many new enterprises, including innovation companies, which are a testament to innovative attitudes of citizens, were established in Poland.
- Economic successes of many companies abroad are evidence of entrepreneurship and innovativeness of Poles.
- It was also noted that Polish consumers demonstrate openness to new products and services, higher than in some other European countries[20].
- Changes in attitudes of the society from centrally-planned to market economy require a relatively long time. It should be noted that the Polish society is still undergoing mental transformations. Organising the society around the idea of common good and creating an appropriate culture is a process not yet completed.
- Experts stressed the following problems among the unfavourable cultural conditions for technical innovations:
- Scientists working in scientific institutions and employees of industrial enterprises, including their managers, belong to social groups of varied, to a large extent, culture between whom there is no relationship and mutual understanding, which makes understanding and cooperation between them difficult. Hence the conclusion that "studies should more often take into account the interests of groups traditionally left outside the world of science" (Kleiber, 2004 p. 42).
- A significant part of the society thinks of changes with a large detachment and takes a risk-averse stance.
- The Polish society lacks tendency, skills and habits in terms of teamwork and the spirit of tolerance.

[20] Different results of empirical research on the readiness to accept the product innovativeness by Poles are provided in Baruk (2010, pp. 19-20). The author wrote: "Poles are... one of the thriftiest nations in the EU in terms of willingness to pay higher prices for innovations, while they are the European leaders in terms of the percentage of persons declaring unwillingness to change the products considered as innovations".

- The society is very distrustful with respect to public authorities, business partners, superiors and co-workers[21].
- Still insufficient is the society's awareness of the fundamental importance of innovations for the further development of Poland, which results, among others, from the short-term consideration of economic matters.
- Most of the Polish intelligentsia is of the rural provenance associated with its rather traditionalist attitude, which is not a conducive attitude to the issue of technological development and constant changes in technology and production processes.

The above negative cultural factors of innovation stated by experts can probably also include a significant drop of readership and the shortage of cultural pluralism in recent years in Poland.

The authors of the conducted study do not share the pessimistic views often expressed in discussions and in Polish publications, which present the generalising critical assessment of the Polish society's attitude to entrepreneurship and innovativeness. Of course, there are indications of such attitude, but they stem largely from the traumatic experiences of Poles in the past. These attitudes are changing, though it is clear that they require a long time.

FINAL REMARKS

The article was prepared on the basis of part of the results of empirical study conducted in the years 2014-2015. After the change of political situation in Poland, changes in the economy and the conducted social and economic policy took place. Some of the legal regulations have already changed. All this could not affect the issue of technological innovativeness in enterprises. Therefore, in the new situation, some of the conclusions formulated in the article should be, to some extent, corrected or supplemented.

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[21] It should be noted that "trust is one of the basic features of company management in a globalised economy" (Peszko, 2015 p. 168).

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