VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS

VERSLO VADYBOS FAKULTETAS

VERSLO TECHNOLOGIJŲ IR VERSLININKYSTĖS KATEDRA

Gintarė Orlavičienė

INTERNATIONALIZATION STRATEGIES OF THE METALWORKING INDUSTRY

METALO APDIRBIMO PRAMONĖS INTERNACIONALIZACIJOS STRATEGIJOS

Baigiamasis magistro darbas

Verslo vadybos studijų programa, valstybinis kodas 621N10008

Tarptautinio verslo specializacija

Verslo studijų kryptis

Vilnius, 2018

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS

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TVIRTINU

Katedros vedėja

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2018-01-04

(Data)

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Konsultantas	(Moksl. laipsnis/pedag. vardas, vardas, pavardė)	(Parašas)	(Data)
Konsultantas	(Moksl. laipsnis/pedag. vardas, vardas, pavardė)	(Parašas)	(Data)
Lietuvių kalbos konsultantas	(Moksl. laipsnis/pedag. vardas, vardas, pavardė)	(Parašas)	(Data)

Vilnius, 2018

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS
VERSLO VADYBOS FAKULTETAS

VERSLO TECHNOLOGIJŲ IR VERSLININKYSTĖS KATEDRA

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prof. dr. V. Davidavičienė
(Vardas, pavardė)
2016-11-11
(Data)

Verslo studijų kryptis

Verslo vadybos studijų programa, valstybinis kodas 621N10008

Tarptautinio verslo specializacija

BAIGIAMOJO MAGISTRO DARBO
UŽDUOTIS
.....Nr. .....
Vilnius

Studentui (ei) Gintarei Orlavičienei.....
(Vardas, pavardė)

Baigiamojo darbo tema: METALO APDIRBIMO PRAMONĖS INTERNACIONALIZACIJOS STRATEGIJOS (INTERNATIONALIZATION STRATEGIES OF THE METALWORKING INDUSTRY)

patvirtinta 2016 m. lapkričio 11 d. dekano potvarkiu Nr. 306vv

Baigiamojo darbo užbaigimo terminas 2018 m. sausio 4 d.

BAIGIAMOJO DARBO UŽDUOTIS:

Remiantis mokslinės literatūros, sektoriaus realijas atspindinčių dokumentų, tyrimų bei kitų šaltinių analize, atlikti empirinius metalo apdirbimo verslo internacionalizavimo būklės tyrimus. Taikant statistinių duomenų analizės, apklausos metodus ištirti galimybes taikyti internacionalizacijos strategijas metalo abdirbimo pramonės įmonėse ir pasiūlyti šių įmonių internacionalizacijos modelį.

Baigiamojo darbo rengimo konsultantai:

—

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(Moksl. laipsnis/pedag. vardas, vardas, pavardė)

Vadovas ..... (Parašas) dr. Mantas Vilys
(Moksl. laipsnis/pedag.vardas, vardas, pavardė)

Užduotį gavau
.....
(Parašas)
Gintarė Orlavičienė
(Vardas, pavardė)
2016 11 11
(Data)

Vilniaus Gedimino technikos universitetas
Verslo vadybos fakultetas
Verslo technologijų ir verslininkystės katedra

ISBN ISSN
Egz. sk. 2
Data 2018-01-04

Antrosios pakopos studijų **Verslo vadybos** programos magistro baigiamasis darbas

Pavadinimas	**Metalo apdirbimo pramonės internacionalizacijos strategijos**
Autorius	**Gintarė Orlavičienė**
Vadovas	**Mantas Vilys**

Kalba: anglų

Anotacija

Baigiamajame magistro darbe nagrinėjamos tarptautinio verslo problemos metalo apdirbimo pramonėje. Kad būtų nustatytos pagrindinės Lietuvos metalo apdirbimo pramonės verslo tendencijos, buvo atlikta jos sektorių statistinių duomenų analizė. Empiriniu tyrimu buvo siekiama nustatyti faktorius lemiančius sėkmingą metalo apdirbimo įmonių internacionalizaciją bei pasiūlyti tinkamiausią joms internacionalizacijos modelį. Gimusių globaliomis įmonių bei tinklaveikos modelių kombinacija buvo nustatyta kaip tinkamiausia Lietuvos metalo apdirbimo įmonių internacionalizacijai.

Darbą sudaro 7 dalys: įvadas, metalo apdirbimo pramonės reikšmės ir plėtros galimybių analizė, internacionalizacijos procesų ir strategijų analizė, internacionalizacijos būklės Lietuvos metalo apdirbimo pramonėje tyrimas, pasiūlytas internacionalizacijos modelis Lietuvos metalo apdirbimo įmonėms, išvados ir siūlymai, literatūros sąrašas.

Darbo apimtis – 71 p. teksto be priedų, 12 iliustr., 10 lent., 99 bibliografiniai šaltiniai.

Atskirai pridedami darbo priedai.

Prasminiai žodžiai: internacionalizacija, internacionalizacijos modeliai, metalo apdirbimo pramonė, tinklaveika, strategija, konkurencingumas.

Vilnius Gediminas Technical University
Faculty of Business Management
Department of Business Technologies and Entrepreneurship

ISBN ISSN
Copies No. 2
Date 2018-01-04

Master Degree Studies **Business Management** study programme Master Graduation Thesis

Title	**Internationalization Strategies of the Metalworking Industry**
Author	**Gintarė Orlavičienė**
Academic supervisor	**Mantas Vilys**

Thesis language: English

Annotation

Final Master thesis analyzes international business problems in metalworking industry. In order to identify the main business trends of the metalworking industry in Lithuania, the analysis of its sectoral statistics was carried out. The empirical research was aimed at identifying the factors determining the successful internationalization of metalworking companies and proposing the most suitable model for their internationalization. The combination of Born Global and networking models were chosen as the most suitable for the internationalization of Lithuanian metal processing companies.

Structure: introduction, chapters about the role and development of metalworking industry, internationalization process and strategies, research of internationalization state of the metalworking industry in Lithuania, proposed internationalization adoption model for Lithuanian metalworking companies, conclusions and suggestions, references.

Thesis consists of: 71 p. without appendixes, 12 pictures, 10 tables, 99 bibliographical entries.

Appendixes included.

Keywords: internationalization, internationalization models, metalworking industry, networking, strategy, competitiveness.

Vilniaus Gedimino technikos universiteto
egzaminų sesijų ir baigiamųjų darbų rengimo
bei gynimo organizavimo tvarkos aprašo
2 priedas

(Baigiamojo darbo sąžiningumo deklaracijos forma)

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS

Gintarė Orlavičienė, 20160762
(Studento vardas ir pavardė, studento pažymėjimo Nr.)

Verslo vadybos fakultetas
(Fakultetas)

Verslo vadyba, TVfmu-16
(Studijų programa, akademinė grupė)

BAIGIAMOJO DARBO (PROJEKTO)
SĄŽININGUMO DEKLARACIJA

2017 m. gruodžio 28 d.

Patvirtinu, kad mano baigiamasis darbas tema „Metalo apdirbimo pramonės internacionalizacijos strategijos" patvirtintas 2016 m. lapkričio 11 d. dekano potvarkiu Nr. 306vv, yra savarankiškai parašytas. Šiame darbe pateikta medžiaga nėra plagijuota. Tiesiogiai ar netiesiogiai panaudotos kitų šaltinių citatos pažymėtos literatūros nuorodose.

Mano darbo vadovas dr. Mantas Vilys.

Kitų asmenų indėlio į parengtą baigiamąjį darbą nėra. Jokių įstatymų nenumatytų piniginių sumų už šį darbą niekam nesu mokėjęs (-usi).

(Parašas) Gintarė Orlavičienė
(Vardas ir pavardė)

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Explanation of the abbreviations

ASEAN – Association of South East Asian Nations

CETA - Comprehensive Economic and Trade Agreement

EPP – export promtion program

EU – European union

FDI – foreign direct investment

FTA - Free Trade Agreement

GDP – gross domestic product

GVC – global value chain

MNCs – multinational corporations

NRCA – normalized revealed comparative advantage

OECD - The Organisation for Economic Co-operation and Development

OEM - original equipment manufacturing

PEST - political, economic, social, technological factor analysis

PESTEL - political, economic, social, technological, ecological, legal factor analysis

R&D – research and development

RCA – revealed comparative advantage

SMEs - small and medium size enterprises

SWOT – strengths, weaknesses, opportunities, threats

TTIP – Transatlantic Trade and Investment Partnership

USA – United States of America

VAT - Value-added tax

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INTRODUCTION

Metalworking industry plays a major role in world‘s economy because it is a provider of durable goods to other sectors. Metal products are used in marine, automotive, railroad, aerospace, construction, packaging, electrical, machinery industries just to mention few. Therefore it is important to maintain metalworking industry competitive, providing high quality products as its performance influences other sectors‘ performance.

With increasing global competition and falling barriers to international trade many companies are pressed to compete on international markets. Metalworking industry is not the exclusion. However, it seems that companies within the industry, and particularly the European companies, are strugling to pursue appropriate international strategies. As the European Commission (2014) has identified, “the industry is pursuing a number of “generic strategies“ like moving to high growth markets, merging with or acquiring competitors to gain the benefits of scale, increasing the share of „high value added“ products“.

In addition, metalworking companies in Europe are phased with some challenges which become obstacles when competing worldwide. Metalworking industry is energy intensive. Since energy prices are much higher in Europe than in the rest of the world, it becomes tough to keep relatively low production costs. What is more, metal products‘ production has a direct effect on carbon dioxide (CO_2) emissions (Hasanbeigi *et al.* 2011). Target set by Intergovernmental Panel on Climate Change requires CO_2 emissions to be reduced dramatically. This will require an investment in breakthrough technologies which would result in high financial spending. Thus, European companies have to come up with strategies that would help them to stand out of the worldwide competition.

If looking at the situation in Lithuania, the trade balance of metal products for the last several years was negative, and the negative balance has been increasing since 2012 (Official Statistics Portal 2016). In terms of export value of basic and prefabricated metal products, Lithuania takes 20th place out of 28 within the EU (Eurostat 2017). This shows that Lithuanian metalworking industry is not competitive. Since “the metal sector is bedrock of industrialization” (Metalworking News 2017), it must be fostered, and the metalworking companies should be supported to become more recognized at the international level.

The object of this thesis is the internationalization strategy formation for metalworking industry companies.

The goal of the thesis is to propose the internationalization adoption model for Lithuania‘s metalworking industry companies.

To achieve the goal, the following **objectives** are set:

1. To analyze the existing internationalization process models and strategies, and investigate their applicability to metalworking industry.

2. To anaylze the major trends of metalworking industry.

3. To conduct an empirical analysis on the competitiveness of Lithuania‘s metalworking industry sectors in order to identify ones which need the adoption of internationalization strategy.

4. To provide suggestions of how to create the right internationalization strategy for the specific sector companies of metalworking industry in Lithuania.

Research methods. Scientific literature review is made to present the internationalization process models and strategies as well as methods of how to identify competitive and not competitive sectors. Statistical data from Official Statistics Portal of Lithuania, International Trade Centre‘s and United Nations‘ database is used to analyze the matelworking industry of Lithuania. Semi-structured interviews with representatives of metalworking industry of Lithuania are conducted in order to gain deeper understanding about the internationalization problems within the industry and come up with better suggestions for its international strategy improvement.

The structure of the thesis. The first part includes the analysis of existing internationalization process models and strategies as well as competitiveness measurement methods. The second part includes the macro-analysis of the metalworking industry and the global policies which aim to improve industry‘s performance. The third part presents the methodology and structure of the author‘s research, and the findings from the research. The fourth part presents the suggestions for internationalization strategy improvement of metalworking industry.

The analysis is delimited to the manufacture of basic metals and fabricated metal products, except machinery and equipment. It does not cover the manufacture of other metal products such as computers, electronic products, electrical equipment, machinery and equipment, motor vehicles, trailers and semi-trailers, other vehicles and equipment as the analysis would be too broad and results may not be relevant for the whole metalworking and machine-building industry.

1. THE ROLE AND DEVELOPMENT OF METALWORKING INDUSTRY

1.1. Strategic Objectives of Metalworking Industry and Challenges at EU Countries

Trends and Strategic Objectives

Metal is one of the most important structural materials in the world. It is used in virtually all sectors, from automotive, construction, mechanical engineering and shipbuilding to household appliances, computers and consumer electronics. Infrastructure projects such as road, bridge or rail construction would be impossible without metal. Thus it is important to foster the metalworking industry in order to keep it competitive.

If looking at the strategic objectives within metalworking industry at EU level, the biggest attention is given to steel sector as it constitutes the biggest share of all metal products produced. Four main objectives are set in terms of its development (see Table 1.) which concentrate on environmental requirements, innovation fostering, networking and human resources.

Table 1. Strategic Objectives for Steel Sector (compiled by the author from ESTEP 2017)

Objective	Description
Planet	Offer innovative technologies to fulfill environmental requirements; stimulate sustainable steel production and cultivate Life Cycle Thinking and Circular Economy.
Profit	Guarantee profit-making through innovation and new technologies within the production processes.
Partners	React to society's needs by operating with partners of the steel sector to propose innovative steel products and steel solutions in transport, construction, infrastructure and energy sectors.
People	Attract and preserve human resources and skills; be a worldwide reference for health and safety at work.

Sustainability assessment and reporting is an important part of developing a strategy for metal products being produced in the EU. Life Cycle Thinking, which aims to reduce a product's resource use and emissions to the environment, keeps being the main topic of product environmental policy making. European Commission aims to implement the policy that would encourage the recycle

and re-use of secondary materials such as metal scrap for metal products' production. Stainless steel is probably one of the best examples of a metal in the circular economy today. Thanks to its high intrinsic value almost all stainless scrap is collected and re-melted, and relatively little is lost (EUROFER 2017). Another good example – aluminium. It has reached 70% recycling rate in beverage cans in 2015 and 95% in construction and automotive sectors. In fact, recycling aluminium saves up to 95% energy compared to primary aluminium production (European Aluminium 2015).

Another area where metalworking industry concentrates is reduction of energy consumption. Energy-saving is a driver of competitiveness, thus initiatives are made to reduce industrial energy consumption which is quite challenging because metalworking industry in general is energy intensive. The EU framework on climate and energy was confirmed in 2015 at the Paris Climate Conference where 195 countries agreed upon a first legally obliging global climate agreement (European Commission 2017b). The EU's contribution to the agreement will be a target to reduce the greenhouse gass emissions in the sectors covered by EU emissions trading system (including metalworking sectors) by 43% compared to 2005 by 2030 (European Commission 2016).

Challenges at EU Metalworking Industry

Although steel demand in Europe continues to grow cautiously (the EU steel consumption grew by 3,2% in 2016), four years in a row imports were increasing more rapidly than the actual EU steel market and demand. If on average the import share was 17%, in 2016 it has reached 24% (EUROFER 2017).

The increased international competition has become more and more obvious. Therefore, the EU steel industry needs that the rules of fair trade were imposed worldwide (ESTEP 2017). However, unfair trade via Value-added tax (VAT) evasion in some Member States, and dumping practices from third countries such as Russia, China, Iran and others exists. This is happenning mainly due to overproduction of steel. The overcapacity of steel in the world in 2013 was equal to 542 milion tones. It was calculated that it could take 5-7 years from 2014 for demand to reach the capacity, if demand increased by the same rates of growth (European Comission 2014b). The European Steel Association (EUROFER) therefore continues to encourage the European Commission to implement trade defense measures against dumping into the EU (EUROFER 2017).

In addition to the global excess steel capacity and relatively low steel demand, third countries are solving import competition by imposing tariff and non-tariff barriers. For example, in December 2015, Algeria has imposed an import quota on rebar which affects southern European countries (EUROFER 2017). Another barriers used are investment limitations and public procurement preferences for domestic suppliers (European Comission 2014).

Many valuable materials are disposed as waist and thus are the loss to the economy. In addition, valuable raw materials in EU countries are lost due to illegal exports of scrap (European Commission 2014b). Finally, although recycling rates to some of the metals (steel, aluminium) has increased, there are some precious and specialty metals which are not recycled or have low recycling rates which again causes loss (OECD 2013).

The most of modern equipment in the EU steel industry is close to the limits of what it can do, and the steel industry will suffer to further reduce the CO_2 emissions without the introduction of breakthrough technologies (European Commission 2014b). The EU legislation for the steel industry, the greenhouse gas Emissions Trading Scheme (ETS), has become a challenge to be implemented. With the fourth phase of ETS (period 2021-2030), there is a danger that European steel producers will encounter a further loss of business to non-EU competitors, which are not subjected to any CO_2 emissions limitations (ESTEP 2017).

Another challenge which lowers EU metalworking companies‘ possibilities to compete are high energy costs. Energy prices in EU are higher than in other countries. Therefore competitively priced energy is the central interest for the energy-intensive industries, including steel. There must be some commitment made by the EU to decrease the gap in industrial energy prices between the EU and its main competitors (EUROFER 2017).

Furthermore, metalworking industry is not attractive to young employees. It is counted that if age structure in European steel-producing companies does not change, more than 30% of current workforce will have left the industry until 2030 (European Commission 2013). Thus, its companies have to put more efforts to capture young people‘s attetion in order to drive the process of innovation forward (World Steel Association 2016).

Finally, the metalworking industry is dependent on other industries, especially construction and automotive, because the majority of its products are used in these fields of business. Thus, if economic situation in construction or automotive goes worse, the same happens to metalworking industry.

In summary, EU has set objectives for metalworking companies to move to sustainable production, ensure profit-making through innovation, start partnering with other manufacturers to produce innovative products, and take care in attracting and securing human resources and skills. However, some of these objectives may become challenges for metalworking companies in terms of worldwide competition where cheap production prices instead of sustainability and CO_2 emissions' reduction is set as a priority. Thus, much more needs to be done in order to tackle the challenges faced by metalworking companies – fierce competition via unfair trade with third world competitors, trade barriers set by some third countries, high energy costs, and lack of young workforce.

1.2. Policies and Regulations Towards the Development of Metalworking Industry

In order to overcome the challenges metalworking industry is phasing European Commission in 2013 has prepared the action plan towards the creation of competitive and sustainable steel industry in Europe (European Commission 2014b). The summary of challenges and offered actions can be seen in Table 2.

Table 2. Actions against Challenges (compiled by the author from European Commission 2013)

No.	Challenge	Action
1	VAT evasion	Investigate possible initiatives against VAT evasion
2	Price dumping	Work with the Council and European Parliament to update the basic Anti-dumping and Anti-Subsidy Regulations
3	Tariff and non-tariff barriers	Sign Free Trade Agreements with non-EU countries
4	Illegal exports of scrap	Implement Waste Shipment Regulation and monitor scrap movements
5	Low recycling rate	Encourage companies to produce steel products from scrap instead of virgin ores
6	CO_2 emissions limitations	Support research and development (R&D) projects for new technologies for cleaner, more resource and energy-effective technologies
7	High energy prices	Encourage the usage of renewable energy sources more intensively in Member States
8	Lack of young employees	Introduce apprenticeship programs and youth-oriented recruitment processes in order to attract young people in the steel sector
9	Dependency on other sectors	Support the construction and automotive sectors in order to increase the demand for steel products

In 2014 the European Commission has prepared the Staff Working document to present the progress made in implementing the Steel Action Plan. The following actions were implemented:

— Two Directives (Directive 2013/42/EU and Directive 2013/43/EU) were adopted by European Council that enabled Member States to combat VAT fraud. This had had a positive impact for the industry in Member States where VAT fraud was present, especially in Poland and Czech Republic;

- Ten anti-dumping investigations and 37 measures in force (both, anti-dumping and anti-subsidy) related to imports of steel products into the EU were implemented;
- Some Free Trade Agreements (FTA) which could benefit the EU steelmaking industry were signed – EU/Canada Free Trade Agreement (CETA), FTA with Singapore in 2014 and Vietnam in 2015 (European Commission 2016). However, Transatlantic Trade and Investment Partnership (TTIP) with United States of America (USA), FTA with India and Association of South East Asian Nations (ASEAN) have failed to be signed, although there is still some hope that the FTA between EU and India will be signed in the future (European Commission 2014b);
- The Waste Shipment Regulation was corrected by adding Impact Assesment proposal which reinforced national inspections of waste shipments to further reduce illegal exports of waste;
- Better access through financing applications was made to debt financing for private companies or public institutions in the areas of research, technological development, and innovation investments;
- The Quality framework for traineeship was adopted in 2014 to increase the quality of traineeships in EU and thus, attract young people to work in the steel sector. As for the people made redundant in the sector, the European Globalisation Adjustment Fund was renewed for the period of 2014-2020 which helps people to find a new job or start their own business and finance up to 60% of the project costs. However, this aid is applied only if the company lays off more than 500 workers or if a large number of workers are laid off in a particular sector in one or more neighbouring regions (European Commission 2014b).
- "Sustainable Construction" initiative and automotive action plan "Cars 2020" were prepared with actions to bring back these industries to the path of growth (European Commission 2014a) and as a consequence, increase the demand for steel products.

To sum up, although metalworking industry phases quite a lot of challenges EU institutions are working in order to help the metalworking companies increase their competitiveness. However, not only institutions need to work in order to keep the industry competitive, companies need good internationalization strategies that would help them stand out of the competition.

2. INTERNATIONALIZATION PROCESS AND STRATEGIES

2.1. Models of Internationalization Process

To understand the internationalization process and identify the important aspects for metalworking industry, the models of internationalization process were overviewed.

Internationalization is defined as a "geographical expansion of economic activities over a national country's border" (Ruzzier *et al.* 2006). Other scholars define it as "a multilateral network development process" (Johanson, Vahlne 1990). Since network building is time and resource demanding it is claimed that successful internationalization may be built on existing network (Johanson, Vahlne 2003; Oviatt, McDougall 2005). However, it may not be the case of small and medium sized companies (SMEs). Kalinic and Forza (2012) after empirical analysis suggested that specific strategic focus rather than knowledge-intensity, international network or international experience may be the success factor which allows SMEs to rapidly internationalize the operations in unknown markets. These determinants are covered in different internationalization models which are reviewed by the author.

If talking about the process of firm internationalization, there are several traditional models – Upsala Internationalization Model which states that companies internationalize step-by-step, eclectic paradigm model (Andersen 1993) and few others. However, some of the authors claim that companies do not necessarily follow any of the classical models as some firms adopt an international approach right from the beginning of their business activities. Such companies are called Born Globals (Madesn, Servais 1997). What is more, companies belong to various networks which influence their strategic decisions. The author overviews the main internationalization process models to gain a better understanding about them.

The first Upsala model of internationalization was introduced in 1977. It assumed that company internationalizes through few stages from indirect export to direct export, licensing, franchising and foreign direct investment (FDI). It also stated that company first starts its international activities at markets which are closer and gradually expands to further existing markets (Daszkiewicz, Wach 2012). Because of changing business environment this model was addapted in 2009 by the original model's authors. Now they emphasize the outsidership as an obstacle to enter a new market rather than the physical distance. Markets are understood as networks of relationships and firm insidership is considered as a success factor of internationalization (Johanson, Vahlne 2009).

The early eclectic paradigm theory introduced by Dunning aimed to explain the reasons behind choosing the international production and FDI. It can be treated as a complement to Upsala model of internationalization because it looks only to one (the last) stage ot it. The theory stated that the firm will engage in international production only if it will have a particular advantage over

domestic producers. The main sources of competitive advantage are the ones which are easily transferable from one country to another – production technology, know-how, marketing and other tangible and integible assets. What is more, company should find location-specific advantages, such as good political climate and attitude towards FDI, labor costs and other factors (Daszkiewicz, Wach 2012).

The recent, adapted version of eclectic paradigm states that instead of foreign production, non-equity alliances has become more essential form of international economic involvement. They may take several forms – strategic technological or marketing alliance between two or more competitors, a sub-contracting, licensing or franchising agreements between a firm and one or more of its customers (Dunning 2001). However, some empirical findings show that the exchange relationship with competitors is successfull not in all the industries (Ritala 2012).

In 1994 McDougall and Oviatt suggested that some SMEs do not follow gradual internationalization but become international players from their inception. Such theory became known as Born Globals. Thus, in 1994 the literature started to differentiate two ways of internationalization that companies can follow – "International at founding" and "International-by-stage" (Daszkiewicz, Wach 2012). To answer the question why some companies start the international business activities from the beginning McDougall (1994) after the analysis identified that it is easier to operate by implementing international strategy from the begining rather than starting with domestic one and then trying to change it into the international after the need for international expansion arises. The author also identified that such Born Global companies ususally choose hybrid structures of internationalization such as strategic alliances and networks to preserve scarce resources.

All the above mentioned models have focused on the characteristics of the single organization. In 1992 Axelsson and Johanson have noticed that strategic decisions of a company are influenced by the relationships among customers, suppliers, competitors, even family. There are many classifications of such relationships or networks (Daszkiewicz, Wach 2012). Most common differentiation is inter-firm (external) and intra-firm (internal) networking (see Fig. 1).

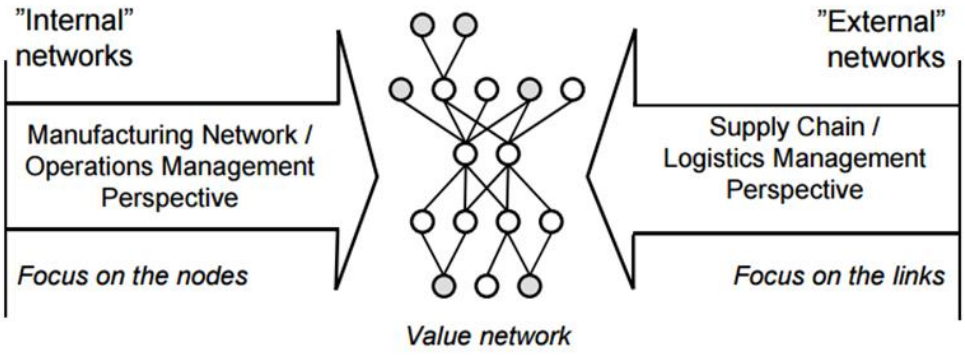

Fig. 1. "Internal" and "External" Networks (Rudberg, Olhager 2003)

Inter-firm networking is based on the networking with other companies and can be implemented through joint ventures, franchising, commercial agreements, subcontracting, even personal networks (Grandori, Soda 1995). Intra-firm networking is networking of company's individual employees or teams. It can be adopted within such functional areas as R&D, marketing or manufacturing (Colombo *et al*. 2011).

Perry (2012) identifies four types of inter-firm networks – ethnic and social, community-based, organizational, and supplier networks. Ethnic and social networks are based on overseas ethnic minority enterprises and family businesses. Community-based networks - on subcontracting relationship. Organisational networks are implemented through strategic alliances and joint-ventures, although franchising can be also an example of organisational network as it helps to overcome distance and territorial limits on interaction. Finally, supplier networks may be realized through relational subcontracting - for example, through co-engineering of new products, which involves supplier participation in new product or process design.

To sum up, there are several internationalization process models. Upsala model states that company internationalizes through few stages from indirect export to direct export, licensing, franchising and FDI. While some firms follow this stepwise progression of internationalization others start their international activities from the beginning of their inception. Overall, despite the choise of company internationalization model – whether it is step-by-step or not, all the models emphasize the importance of relationship building and networking which has become a very important factor in order to remain competitive in the global market. The author emphasizes on the networking aspect and takes a look at organisational and supplier networks as they can be mostly found in the metalworking industry.

2.1.1. Organisational and Buyer-Supplier Networks

Organisational networks can be found in the form of business groups, industry associations, strategic alliances and franchising. Accodring to Granovetter (2010) *business groups* are sets of legally separate firms bound together in permanent formal and (or) informal ways. Business groups can differ in their authority structure which can be either vertical or horizontal. Vertical authority structure results into the rivalry among the companies within the business group (Perry 2007). All the decisions are made at the top management level, while in case of horizontal authority, all the companies‘ within the business group managers can participate in decision making.

Industry associations‘ functions are to lobby and to educate its members about market trends, opportunities, technology and regulation affecting their industry. In addition, associations may be formed to develop export marketing initiatives for industries. Finally, local associations of industries work as a catalyst for the innovation process, acting through increasing the awareness of all actors and assisting firms in developing their innovation capabilities (Schwartz, Bar-El 2015). The feature that distinguishes an association from other types of network is the delegation of at least partial control over certain decisions to the authority of the association‘s management (Perry 2007).

Strategic alliances are viewed as a form of networking in that they comprise interfirm collaboration. This includes R&D or production agreements, marketing, distribution agreements, technology exchange or joint ventures (Kale *et al*. 2002). Alliances have most chance of success where partners have an equal resource dependence (Perry 2007). Thus, companies seeking strategic alliance should be similar in size.

Strategic alliances between small and large companies also happen. Small firms mainly seek access to foreign markets and the expertise of the alliance partner (Lee *et al*. 1999) while large firms are more interested in securing cost savings and gaining access to the partner‘s R&D capability. Small company may benefit because of enhanced reputation through the linkage to a more prestigious partner, improved production efficiency through the knowledge gained about the quality and inventory management systems or by combining the component orderds for volume discounts, finally, learning of specific skills such as product commercialisation or proposal writing. However, such alliance may cause negative outcomes – a small firm‘s loss of technology or market share because sometimes large companies seek alliance only to appropriate technology or market information even when the technology is protected by copyrights (Perry 2007).

In order to avoid the failure of alliance it is essential to identify and analyze appropriate fit criteria, including task, learning and partner related factors. Task related factors include the essential objectives that the alliance must help the firm achieve. Learning related factors in alliances include desired learning outcomes. Partnering related factors take into account whether the degree of

relational harmony between partners will be sufficient to overcome the persistent conflicts and opportunistic behaviors potentially inherent in alliance settings (Cummings, Holmberg 2012).

Finally, *franchising* represents a form of strategic alliance between a franchisor and entrepreneurs which is adaptable to a wide variety of industries and professions (Preble, Hoffman 1994). It is the most used activity when the relevant portion of production or service must be made locally or near the consumer (Mariz-Pérez, García-Álvarez 2009). From the perspective of entrepreneur it provides a possibility to a wide range of activities if the business‘s owner complies with the system of production and management set by the owners of franchise. Two types of franchise arrangements exist – the product or trademark franchise and the whole business model franchise. Product or trademark franchise gives more freedom of action to franchisee while business model franchise can restrict the franchisee in terms of decision-making and may not have high financial returns because of the standing charges to the franchisor (Perry 2007).

If looking at buyer-supplier network, it can be explained as any exchange of goods or services. Subcontracting refers to a buyer-supplier relation in which goods and services are provided according to specifications customised to the buyer (Balboni *et al.* 2013). Subcontracting has three primary forms based on the contractor‘s need: *specialised*, due to inadequate know-how or equipment; *concurrent*, due to inadequate capacity to meet a delivery schedule or unwillingness to invest in additional internal capacity; and *economic*, due to the preference to access lower cost inputs of other firms. At the minimum subcontracting may be limited to the processing of raw materials provided by the buyer. At the maximum, the subcontractor may have responsibility for material procurement, product design and production according to specifications given by the buyer or according to its own designs approved by the buyer (Perry 2007).

Being a subcontractor provides distinct opportunities for small companies. They may get insight into the managerial practice of the customer and access to its technology, providing valuable learning opportunities. This insight helps subcontractors offer differentiated, innovative products and services to a wider array of customers which helps becoming more autonomous in global arena (Inemek, Mathyssens 2012; Giunta *et al*. 2012). What is more, subcontracting ties impact the subcontractors‘ export orientation and intensity (Kim, Hemmert 2016).

To sum up, different types of networking bring different opportunities, and have their own advantages. Next sections focus more on metalworking industry to identify the networking practices used.

2.1.2. Supply Chain of Metalworking Industry

In order to analyse the metalworking industry trhough networking perspective, first its supply chain should be overviewed.

Hafeez *et al*. (1996) has suggested the following supply chain‘s material flow structure (see Fig. 2) which can be applied to metallurgy products. The model demonstrates the supply chain of metal products for construction companies, but in general it can be applied to other end customers as well (such as customers from automotive, domestic appliances, energy, packaging and

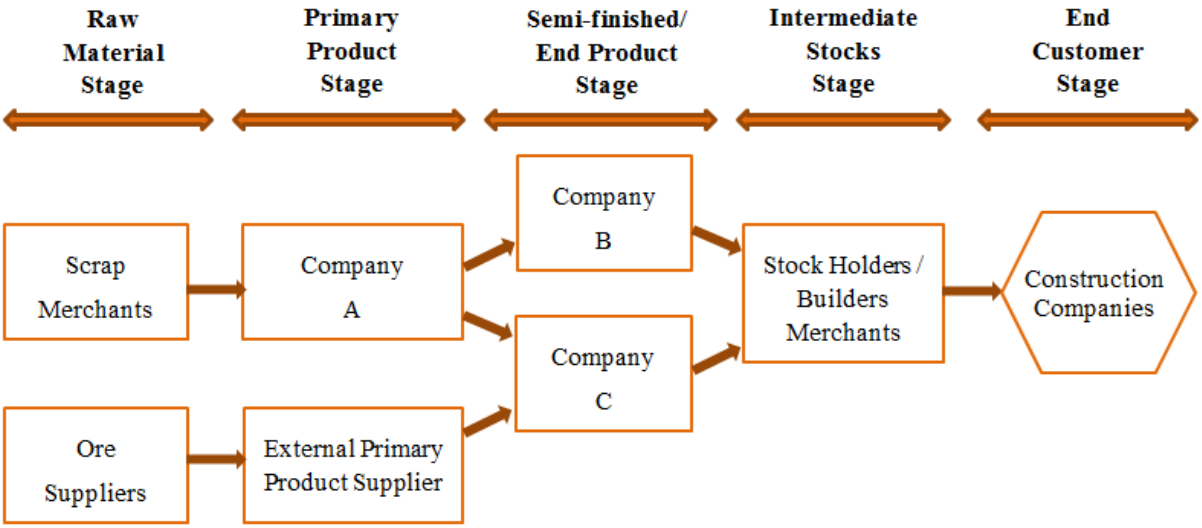

Fig. 2. Steel Industry Supply Chain (Hafeez *et al*. 1996)

other industries). Company A in the structure is shown as the foundry transforming scrap metal into billets. Companies B and C produce semi-finished or end products out of steel billets. In case of construction industry, the products are then transfered to builders who are accountable for the end clients – construction companies. However, in other cases, for example, automotive, the value chain may be shorter, as the products of companies B and C could be delivered to a vehicle manufacturer for the final assembly of vehicles.

In Lithuania companies B and C (Fig. 2) most often buy metal billets and plates from Latvian, Lithuanian and Polish foundries which themselves buy raw materials from Chinese, Polish, German and Russian scrap merchants and ore suppliers. Lithuanian processing companies are also using local external primary product suppliers in case of big orders which exceed their production capacity, or lack equipment needed to produce particular products. The produced basic metals and fabricated metal products are exported to Latvia, Turkey, Norway, Germany, Sweden and other

countries (United Nations 2017). The five main export countries account for 54% of total metal products' exports (Fig. 3).

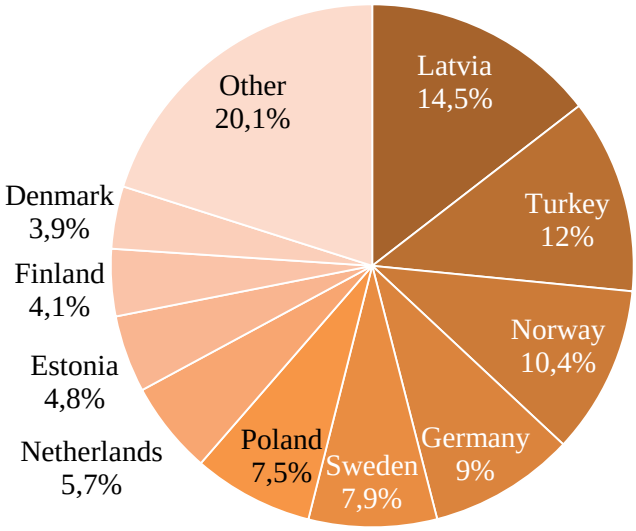

Fig. 3. Lithuania's Basic Metals' and Fabricated Metal Products' Export Share, 2015 (compiled by the author from United Nations 2017)

Interestingly, the trade of metal products between Lithuania and the mentioned export countries happens both ways. The trade with Latvia, Germany, Netherlands and Sweden is based on the trade in similar but specialized in a narrow product lines' goods. The trade with Turkey and Poland happens because Lithuania and these countries have similar GDP per capita meaning similar needs. Finally, the export exchange between Lithuania and Norway is explained by the Product Life Cycle theory as the metal products' export of Norway to Lithuania has been decreasing from 2010 till 2015 while exports from Lithuania to Norway were increasing. Thus, the export of metalworking products is moving from higly industrialized capital-intensive Norway to less capital-intensive lower labor cost Lithuania (Orlavičienė, Vilys 2017).

2.1.3. Networking with Customers and Competitors within Metalworking Industry

The most visible inter-firm networking types in Lithuania's metalworking industry are relations with customers and competitors. They are overviewed in this section.

Metallurgy companies' relations with their customers usually are subcontracting based. In case of Lithuanian metalworking companies, collaboration is implemented through concurrent or

economic subcontracting, because Lithuanian manufacturers are still seen as being able to manufacture the products at lower costs. Subcontracting is based on original equipment manufacturing (OEM) according to clients‘ drawings. This type of subcontracting helps manufacturers to save time on R&D activities. On the other hand, specialising in some R&D activities for particular industry‘s products (domestic appliances, furniture or others) would help to create more value added services and win more orders. One of such companies is JSC „Stansefabrikken“ which not only offers sub-contracting services, but also manufactures its own products from sheet metal (Stafa Industrier AS 2017).

In case of strategic alliances, they are not common among metalworking companies in Lithuania. JSC “Umega“, one of the largest metal processing companies in Lithuania (Umega 2017) in 2014 has created a joint venture with one of its clients in Ireland in order to acquire its technological know-how and increase the profitability. However, the joint venture lasted only two years as the company in Ireland went bankrupt.

As for FDI, in 2016 “Umega“ has acquired a company in Germany in order to gain knowledge about metal processing technologies in a country perceived as manufacturing high quality products. In addition, “Umega“ has its sales offices in Ukraine, Russia and Belarus in order to be closer to their customers (Umega 2017).

In terms of relationship with clients creation, it happens in various ways – sometimes customers find the manufacturers themselves, in other cases the latter ones actively engage in new clients‘ search through cold calling, business meetings with potential clients and participation at international exhibitions. Most often the first order from potential client is received after his or her audit of production plant. Satisfactory production site and equipment create trust and good image of the manufacturer. The trust is enlarged if the first order is implemented in time, and the quality of products satisfies the customer. Finally, the trust and the strength of the relationship depends on the way the manufacturer‘s manager interacts with the client - the speed of reply, the problem solving skills and the quality of communication in general matters.

The network integration with clients is quite weak – manufacturers are exchanging information only with their direct clients – they do not know the end customers. On the other hand, the information exchange is quite intense during the project implementation, especially during the new one, as a lot of details have to be discussed and adjusted – client communicates with the sales manager who himself or herself transfers client‘s information to technology and planning departments, which are responsible for placing a new products‘ information into internal system and forwarding it to production and purchasing departments. However, the information shared is mostly technical, product based. The knowledge sharing is rare – only the main clients may advice and try to find the best solutions together with manufacturers of how to make one or another product better,

or imptove the process of manufacturing. Usually if the client sees that the order which he has placed is hard to implement for the metalworking company because of the its lack of know-how, or the constant quality problems arise, it switches to another, more advanced supplier.

Networking with competitors seems to be low. Even if it is happenning, it is not announced in public. One competitors‘ networking example is the metal products‘ subcontracting cluster in Šiauliai, which was established in 2015, and includes nine metalworking companies aiming to work together in order to receive larger foreign comanies‘ orders and gain purchasing power for raw materials. The latter aspect is very important, because separate companies can rarely bargain for a better metals‘ price. However, Šiauliai subcontracting cluster is very young and small, it lacks other industries‘ players, associations and agency which could coordinate the cluster‘s activities, promote it internationally and try to get as many orders for subcontracting as possible.

A better example of metal processing cluster can be found in Poland. It was established in 2006, and today it joins 90 companies and R&D organisations from the north-eastern Poland. The cluster consists of manufacturers, companies engaged in services and trade, universities, municipalities and others. Among the manufacturers, not only basic metal and fabricated metal products‘ producers but also machinery and equipment producers are involved. Thus, cluster members not only gain advantage of buying raw materials at better prices, but also serve each others‘ needs by supplying their goods both, to external clients and each other. Furthermore, close cooperation with the Technical University of Bialystok helps to develop various new projects (Innovation and Development Promotion Centre 2017a), exchange knowledge and thus create innovations needed to increase metalworking companies‘ competitiveness.

The Centre of Innovation and Development acts as a network agency of the cluster. The role of the Centre includes seeking external sources of financing cluster‘s activities (Innovation and Development Promotion Centre 2017b) and promoting the cluster. Thus, this is a more integrated cluster compared to Lithuania‘s case, because the latter one connects only manufacturers and Siauliai Chamber of Commerce. In fact, Polish metalworking cluster could be joined by Lithuanian companies as recently a new EU project was announced, which seeks to enhance the competitiveness of the Polish-Lithuanian borderline companies through establishment of clustering services (Innovation and Development Promotion Centre 2017c).

To sum up, the supply chain of metalworking industry comprises of scrap merchants, ore suppliers, primary product manufacturers, semi-finished and end product manufacturers, distributors and end customers from automotive, construction, furniture and other industries. Mostly networking within the industry is based on supplier-buyer relations through subcontracting. However, in some cases the networking is implemented by creating joint ventures, through acquisitions and opening foreign sales offices. The network integration with clients is quite weak – the knowledge sharing

happens rarely. From horizontal networking perspective networks are also weak – only some cooperation is happenning between several market players in order to reach economies of scale in terms of buying raw materials and implementing larger orders of foreign clients.

2.2. Company Internationalization Strategies and Environmental Regulation

2.2.1. Company Level Strategies

Any foreign expansion requires to apply a strategy – "a plan of action designed to achieve a long-term or overall aim" (Oxford University Press 2017). If we would integrate the concepts of internationalization and strategy, the *internationalization strategy* would be a plan of action designed to reach a long-term geographical expansion of economic activities over a national country‘s border. There are many typologies of internationalization strategies taking different dimensions in consideration (Daszkiewicz, Wach 2012). The author focusses on the most popular typologies.

Bartlett and Ghoshal's Global Integration-Local Responsiveness Framework adapted by Porter, Jermillo and Matinez identifies four strategies that organizations use to manage international business. These strategies depend on the environmental global integration pressures and environmental local responsiveness pressures (see Fig. 4). The first ones are influenced by the presence of global customers, global competitors, and the need to achieve economies of scope and scale, and the latter ones are created by differences in consumer tastes and preferences, differences across distribution channels in countries and varying government policies across countries (Silver 2015).

High global intergration	Global Strategy	Transnational Strategy
Low global intergration	International Strategy	Multidomestic Strategy
	Low local responsiveness	High local responsiveness

Fig. 4. Integration-Local Responsiveness Framework (Silver 2015)

Companies which choose *global strategy*, concentrate their production and R&D activities at headquarters, and view the world as one marketplace. They produce standardized goods in the most cost effective locations (Bartlett, Ghoshal 2002). Subsidiaries are not supposed to react to local demands. The only possible adaptation is marketing campaigns (Harzing 2000). Companies which choose *international strategy* produce products or services which are designed taking into account domestic customers‘ needs, and international business is seen as a way of extending the product‘s or service‘s lifecycle and replicating its home market success. Multinational corporations (MNCs) that follow an international strategy strive to transfer knowledge to areas which have less technological or market development (Bartlett, Ghoshal 1989).

The bottom right quadrant of the Integration-Local Responsiveness Framework signifies a *multidomestic strategy*. This strategy is a reverse of Global strategy (Harzing 2000). The pressure for local responsiveness is high and global integration is low (Silver 2015). Companies whithin this environment sell customized products and services that are produced locally. Country managers, who usually are the nationals of the host country, operate independently from headquarters (Bartlett, Ghoshal 1989; Harzing 2000).

In theory, the ideal organization is the one which can cope with both types of pressures - high global integration and local responsivenes. *Transnational strategy* attempts to combine the major advantages of multidomestic and global strategies. It implies a flexible approach: standardize

where feasible; adapt where appropriate (Bartlett, Ghoshal 1989). However, this strategy is difficult to implement, because of its competing objectives (Bartlett, Ghoshal 2002).

According to Daszkiewicz and Wach (2012) the most important internationalization strategies‘ typologies are:

- Ansoff‘s Product-Market Matrix;
- Market diversification / concentration strategy;
- Porter‘s cost leadership / differentiation / focus strategy;
- Offensive / defensive strategy;
- Ethnocentric / polycentric / geocentric / regiocentric strategy.

In 1960s Ansoff proposed a Product-Market Matrix with four strategies. *Market penetration strategy* aims to offer existing products in the current markets. Possible actions to reach higher sales are market consolidation through mergers and acquiaitions, competitive pricing, discounting and others (Shubhabrata 2014). *Product development strategy* aims to develop or modify the product for existing markets (Daszkiewicz, Wach 2012). These strategies could be used by the companies which already operate in foreign markets and would like to strengthen their positions there.

Market development strategy aims to find a new market for existing or modified (Shubhabrata 2014) products. This strategy is similar to Bartlet and Goshal‘s International strategy. *Diversification strategy* aims to crete new products for new markets (Daszkiewicz, Wach 2012). This strategy could be employed by larger companies which have enough financial resources to create new products instead of offering the existing ones.

Market diversification and *concentration* strategies were proposed by Ayal and Zif (1979). It is stated that after the company decides to internationalize, it should choose whether to penetrate into large number of markets at the same time (choose market diversification strategy) or concentrate on few markets (market concentration strategy). Market concentration enables to reach economies of scales and is beneficial because of relatively low logistics costs (Daszkiewicz, Wach 2012).

According to Kurt and Zehir (2016) companies attain competitive advantage by two ways - either having the lowest product cost or by producing products different from those of competitors. These are two strategies of Porter - *cost leadership* and *differentiation* together with the third one, the *focus strategy*. *Cost leadership strategy* states that company should achieve low-cost position within an industry (Daszkiewicz, Wach 2012). This strategy is usually chosen by a market share leaders, who produce the standartized products, pay great attention to employee productivity and asset use (Hambrick 1983).

Differentiation is a strategy which aims to create something that is considered as unique within the industry (Daszkiewicz, Wach 2012). It can be in many forms, including brand image, service, distribution, quality, and product attributes (Hambrick 1983). Product advantage can

overcome the challenges of unfamiliarity with foreign markets and a lack of knowledge about foreign cultures and environments (Hsu, Pereira 2008). It also allows the firm to command a price premium (Rajiv *et al.* 2014). *Focus* is a strategy based on focusing on particular buyer segment, group of the product line, or geographic market (Daszkiewicz, Wach 2012). Kalinic and Forza (2012) after empirical analysis suggested that specific strategic focus may be the determinant success factor which allows small and medium size enterprises (SMEs) to rapidly internationalize the operations in unknown markets.

In addition to cost leadership, differentiation and focus strategies, Porter has proposed defensive and offensive strategies in 1985. A *defensive strategy* focuses on manufacturing and marketing existing products or services. Companies which adopt defensive strategy do not actively search for business partners. They rather deal with those who find them themselves. Some scholars state that this strategy is loosing its effectiveness as it is non-adaptive and risk-averse. Companies working under the defensive strategy stick to the same products or services even when the external environment changes (Tang., Z.; Tang, J. 2012).

An *offensive strategy* is an active strategy which focusses on both, penetration to existing and entering new markets. It attempts to enhance the competitive position of a firm by improving its performance (Daszkiewicz, Wach 2012). In addition, it is an attractive strategy for companies which have a technologically advanced products and seek to launch them before the competition (Pelser 2014).

The strategy typology in terms of the degree of globalization was proposed by Heenan and Perlmuter. This typology covers ethnocentric, polycentric, geocentric and regiocentric strategies. An *ethnocentric strategy* is found mainly in the early stages of the internationalization of enterprises (Daszkiewicz, Wach 2012). The activities of a firm are mainly to keep its position on the domestic market, but it also uses an opportunity to conclude effective foreign transactions (Gubik, Wach 2014). They try to adopt the same strategy both, to lacal market and foreign markets. However, companies which engage in ethnocentric strategy are less successful than those operating under any other three strategies (Caligiuri, Stroh 1995).

Polycentric strategy is more advanced compared to the ethnocentric strategy. Instead of using the simplest mode of internationalization, the polycentric strategy adopts the development of overseas subsidiaries, manufacturing plants and joint ventures. The degree of markets differentiation is very high – independent goals, strategies and marketing mix instruments are formulated and developed for each market separately (Daszkiewicz, Wach 2012). Similarly to Bartlett and Ghoshal's multidomestic strategy polycentric strategy applies decentralized decision making and keeps key positions in foreign subsidiaries for local employees as opposed to the ethnocentric strategy (Gubik, Wach 2014).

Geocentric strategy treats all the markets in the world as a single, identical market. To minimize the production costs and achieve economies of scale by producing standartized products which can be marketed with minimum differentiation in different countries are the main goals of this strategy. Usually geocentric strategy is adopted by large corporations (Daszkiewicz, Wach 2012). Geocentric strategy by some scholars is considered as perfect strategy because it balances both, global integration and local responsiveness (Caligiuri, Stroh 1995). Thus, it is identical to the transnational strategy of Integration-Local Responsiveness framework. Finally, *regiocentric strategy* involves combining homogenous groups of foreign markets and treating them as one market (Daszkiewicz, Wach 2012). Groups of foreign markets naturally emerge due to processes of trade liberalization (Drachal 2014). Examples of such groups are ASEAN and the EU.

To sum up, there are many internationalization strategies which can be chosen both, by multinational companies as well as SMEs. All of the presented strategies mainly concentrate on company decisions – which markets to choose, how many to enter at a time, which products to market, whether to position the company as a low cost leader or try to get into premium products line by differentiating the company‘s product or service from those of competitors. However, not only companies can affect their internationalization – a lot can be done from government‘s side. The author overviews the works of other schollars regarding the governmental regulation which aim is to increase the competitiveness of a country‘s industry.

2.2.2. The Importance of Government Regulation for Internationalization

According to some scholars, the main drivers of competitiveness are internationalization, innovation and institutions (Altomonte *et al.* 2012; Kumar *et al*. 2013). One of the institutions‘ activities that foster competitiveness is environmental regulation. According to Porter and Linde (1995) environmental regulation can trigger innovativeness of an industry. This, in turn, can lead to firms’ competitive advantage, especially in foreign markets where such regulations are not present.

Innovativeness can be triggered not only by environmental regulations but also by adopting the innovation policies directly at a country level. Singapore is considered to be the best example of an emerging economy which has managed to positively influence the competitiveness of its companies by embracing innovation as a national priority (Kumar *et al*. 2013).

In case of tax regulation, according to Costantini and Mazzanti (2012) the energy taxes have significant impact on the medium-low technology sectors’ competitiveness as they are quite high energy intensive. Higher energy taxes result in the production efficiency improvement. However, recent empirical findings are different. Contrary to Costantini and Mazzanti, Trianni and Worrell (2013) have made an analysis of primary metal manufacturers in the Northern Italy and found out

that high energy taxes have a negative impact on them. In fact, it is considered to be one of the biggest barriers in adopting technology and energy efficient practices. It is suggested that policy makers should encourage energy suppliers to share the information about the possibilities to decrease the energy expenditures through the adoption of the appropriate energy contract.

Government-designed export promotion programs (EPPs) may also play an important role in increasing companies' competitiveness. After empirical analysis of Turkey's SMEs Durmuşoğlu *et al.* (2012) have identified positive relationship between EPPs and companies' export performance. It was also identified that the use of EPPs encourages better stakeholder relationship and strategic goals' achievement. In addition, Wang *et al*. (2017) have made the analysis of China's SMEs and concluded that adoption of different types of EPPs (financial and informational) help to increase the export performance of the companies. However, marketing strategy should be employed at companies in order to successfully implement EPPs.

Although SMEs significantly contribute to all the home economies, in many countries they are still a minority group in terms of exports compared to the large organizations (Ayob *et al*. 2015), thus the export promotion programs should be aimed to help SMEs not only increase exports through subsidies but also grow in size (Altomonte *et al.* 2012).

Freixanet (2012) has analyzed companies in Spain which were at different stages of internationalization. Author has found that EPPs help companies which are in their initial stage of internationalization to become more competitive, therefore, managers from such companies should gather information about the programs and actively participate in them.

On the other hand, some authors state that environmental regulation affects the competitiveness only marginally – other factors such as market conditions (Garcia Pires 2010), the quality of the local work force (Dechezleprêtre, Sato 2014), international products' and services' certificates (Gereffi, Fernandez-Stark 2016), entrepreneurial orientation, networking, availability of natural resources, firm size (Jormanainen, Koveshnikov 2012) and participation in global value chains (GVCs) are more important.

In terms of developed countries, Garcia Pires (2010) states that firms in the larger home markets have higher competitiveness as they invest more in research and development (R&D). This helps them to grow in size and achieve cost competitiveness compared to the companies from smaller countries which in turn increases their market share in international markets.

According to Gereffi and Lee (2012) knowing the GVC framework of the industry helps companies to identify opportunities and the barriers to enter it which is of considerable importance for creating a competitive strategy of a company. However, empirical evidence shows that Porter hypothesis which states that government regulation maters, holds for some of the manufacturing

sectors, especially the ones of high and medium-low technology, the latter representing the metalworking industry.

To sum up, both aspects, companies' strategies and environmental regulation are important in terms of internationalization. Companies should engage in networking with national institutions in order to maximize their internationalization efforts and reach success.

2.3. Forming the Internationalization Strategy

Globalization tendency has triggered higher competition and has forced many companies to internationalize in order to remain successful (Sreenivasan, Sahal 2010). In fact, internationalization brings several benefits for the companies – increased sales and the use of company‘s production capacities, reduced financial risk because of diversified markets and possibility to strenghten the company‘s brand at international level.

The success depends on the choice of correct strategy for internationalization, which includes market research, choice of entry mode and other determinants. While international market research seldom guarantees correct decisions, it usually improves the firm's chances for success by a substantial degree. Market research allows the firm to plan for a successful venture, or reveal disqualifying problems before any investment is done (Knight 2001).

Knowledge is one of the main factors of a company‘s international behaviour and plays central role in deciding internationalization strategy. The environmental factors also matter – those companies which operate in saturated markets more frequently choose to internationalize compared to those who operate in growing markets (Carpenter, Dunung 2011). Another factor influencing decision to internationalize is company‘s accepted level of risk – those companies which are risk averse may choose closer markets as they will have more knowledge about them, and vice versa – companies which tend to accept more risk may choose further markets. Finally, company‘s resources impact the internationalization strategy‘s decisions. Firms, which do not have enough resources ususally choose a mimicry strategy by copying others in order to minimize their costs of experimentation or discovery.

The internationalization or the market expansion strategy requires two main steps to be prepared, that is the diagnosis of goals and resources as well as the product and market analysis. Forming the strategy comprises of three main stages – research and analysis of foreign market; formulation of detailed expansion strategy; implementation of the strategy and its control (Daszkiewicz, Wach 2012). Figure 5 shows the stages of forming the internationalization strategy.

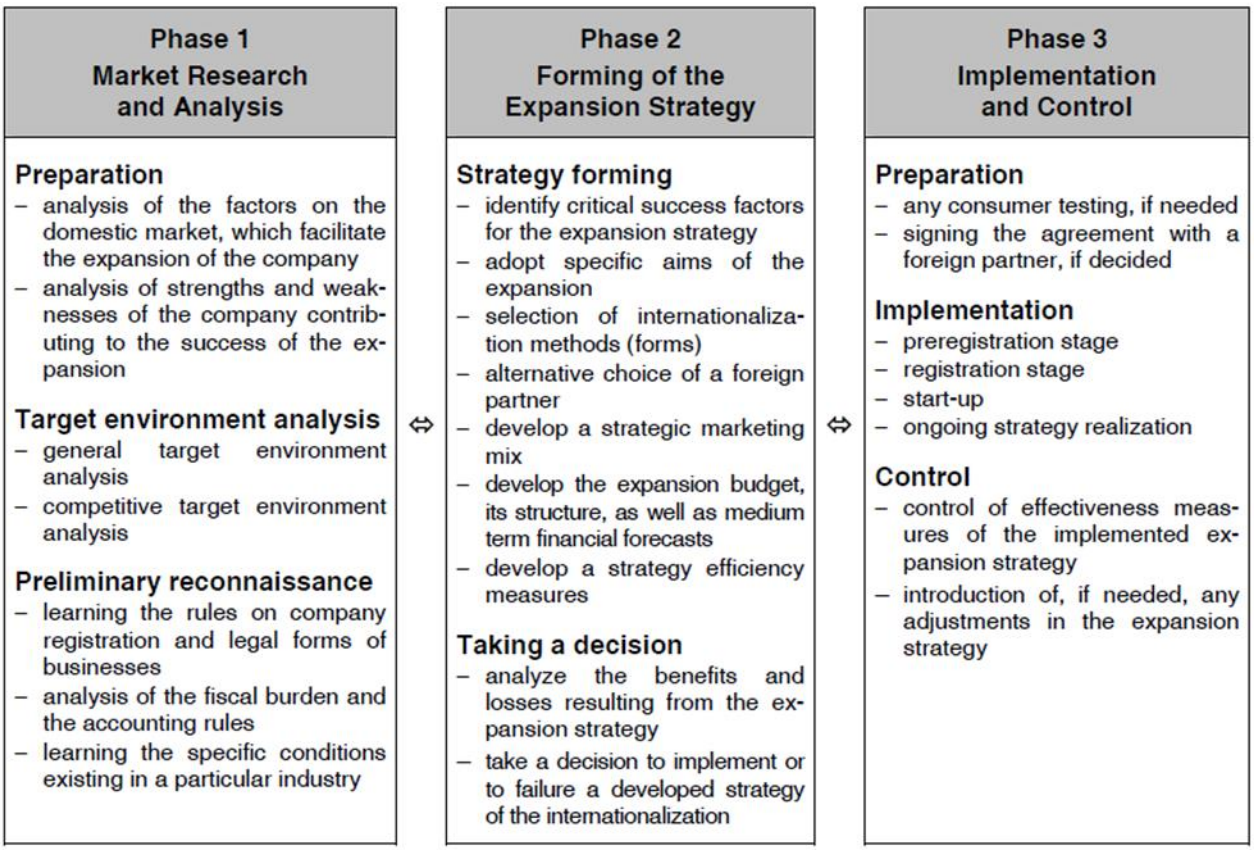

Fig. 5. Phases of Market Expansion Strategy (Daszkiewicz, Wach 2012)

The phase 1 includes the preparation, target environment analysis and preliminary exploration. Preparation is related to the external environment and company strengths and weaknesses analysis. In addition, Seifert and Machado-da-Silva (2007) suggest to analyse the resources the company has. Four types of resources are identified - financial (monetary resources), physical (technology used in the companies), human capital (experience, intelligence, relationships), and organizational capital (the organizational structure, control and coordination systems).

General target environment analysis could be based on PEST (political, economic, social, technological) or PESTEL (political, economic, social, technological, ecological and legal factors) analysis, which is used to determine to what extent macro environmental conditions are appropriate to launch the company‘s products or services in the target market (Yuksel 2012). For the competitive target market environment analysis at the industry level the Porter‘s Diamond of five forces could be used. All these analysis should later help to choose the entry mode into the market (Daszkiewicz, Wach 2012).

After the target environment analysis it is advisable to choose a number of competitors and conduct a comparative analysis of them (benchmarking) to determine the company‘s competitive

position in the foreign market (Daszkiewicz, Wach 2012). However, in some cases it is better to use the competitor analysis to turn them into partners rather than outperform them (Chetty *et al.* 2015).

For companies which are thinking to open up subsidiary, create a joint venture or acquire a company in a foreign market the legal forms, accounting rules, taxation system, employment conditions have to be taken into account (Daszkiewicz, Wach 2012). In addition, the level of political risk matters. According to Lopez-Duarte and Vidal-Suarez (2013) foreign investors should choose to create joint venture instead of opening wholly owned subsidiary in the countries where the political risk is high.

After the initial analysis of company strengths and weaknesses as well as potential target markets, in the second phase of the market expansion strategy company should choose the best target markets and decide upon their scope (choose between concentration and diversification strategies). Before choosing a particular internationalization strategy it is advised to choose a generic strategy. After adopting the particular internationalization strategy the company should adopt an entry mode, potential partners, if any, prepare financial plan and marketing plan for the selected market or markets, and the measures of the effectiveness of the implementation of the intended strategy (Daszkiewicz, Wach 2012).

In terms of phase three, the most interesting is control part. Metalworking companies in Lithuania are more or less internationalized, thus, have created some internationalization strategies. However, question is whether they measure the effectiveness of their strategies to know what factors cause the success of their strategies. The author will concentrate on this part of market expansion strategy in order to find the success factors for metalworking companies‘ internationalization and propose the internationalization adoption model for metalworking companies.

To sum up, the classical internationalization models, the main internationalization strategies and the techniques for the strategy creation were overviewed. The author in further analysis will concentrate mainly on identifying which internationalization model (gradual, Born Global or through networking) is more suitable for metalworking companies, and which internationalization strategy is the best for them (Ayal‘s and Zif‘s market concentration-diversification and Porter‘s cost leadership-differentiation-focus strategies will be taken into account). But before that general overview should be done in order to find out the existing competitiveness level of Lithuania‘s metalworking sectors. Thus, the author overviews the competitiveness measurement techniques in order to identify the competitive and not competitive metalworking sectors in Lithuania.

2.4. Identifying the Industry Sectors in Need of Internationalization Strategy

There might be the case that not all the sectors in metalworking industry need a new internationalization strategy as they may be doing international business well already. Thus there is a need to identify the sectors which are actually in need of proper internationalization strategy which would help them stand out of competition and become competitive worldwide. The measurement techniques for identifying the sectors' competitiveness level are overviewed for this purpose.

According to Dechezleprêtre and Sato (2014), sector competitiveness is identified in terms of how attractive the country is for a particular industry and is often measured in terms of its performance in interntional trade. The main drivers of sector's competitiveness include availability of production factors such as raw materials, labour and skills; industrial policy, supply chain linkages.

There are many ways to measure competitiveness, but the most widely used method to measure it in the indirect way is by the use of Revealed Comparative Advantage (RCA) index. Theoretically, if the RCA > 1, the country has comparative advantage of the particular product or industry, and if RCA < 1, the contry is said to have a disadvantage in the product or industry (Kumar, Shahid 2015; Tripa, Cuc 2016).

RCA can be used to measure comparative advantage within some narrowly defined sectors (French 2017). However, some evidence shows that comparative advantages for most countries are very unstable: according to Hanson *et al.* (2015) during 1987-2007, about 76% of exporters analyzed had changes in their top comparative advantage industries. What is more, most of top products in 2007 were not top products in 1987 but rather from lower rank. Another problem is that RCA is not symetric. Its values ranges from 0 to 1 and from 1 to infinity, meaning that non-adjusted RCA index gives much more possible values above 1 than below to 1 (Laursen 2015). So if one wants to compare different sectors within a country or different countries within a sector, the Normalized Revealed Comparative Advantage (NRCA) index should be used (Deb, Hauk 2017; Deb, Sengupta 2017):

$$NRCA_j^i = \frac{E_j^i}{E} - \frac{E_j E^i}{EE}$$

where E_j^i – country *i*'s export of product *j*; E – world export market; E_j - export of product *j* by all countries; E^i – country *i*'s export market. $NRCA_j^i > 0$ (or $NRCA_j^i < 0$) identifies that the country *i* has a comparative advantage (or disadvantage) in product *j*. The higher (or lower) the $NRCA_j^i$ score is, the bigger the comparative advantage (or disadvantage) will be (Yu *et al.* 2009).

According to Altomonte *et al.* (2012) the best way to measure the sector's competitiveness is by analyzing companies within the sector as using the agregated industry data may cause wrong conclusions which will lead to the wrong governmental policies for industry competitiveness's

fostering. It is suggested to use firm-level total factor productivity (TFP) index for competitiveness measurement. The higher the index value, the more competitive the company is as it can generate more output with the same amount of input. However, since to get the companies‘ financial data is costly and time consuming, the author uses the sectors‘ of metalworking industry data for competitiveness analysis.

3. RESEARCH OF INTERNATIONALIZATION STATE OF THE METALWORKING INDUSTRY IN LITHUANIA

3.1. Research Methodology and Data Collection Methods

From what was already overviewed in this thesis it seems that first competitiveness of metalworking sectors needs to be measured to identify the ones in need of proper internationalization strategy. Thus the aim of the empirical research is to compare the internationalization strategies adopted by different types of companies from competitive and not competitive sectors, and determine whether there is significant difference between the strategies of those companies or not. Another purpose is to identify factors which cause successful internationalization of metalworking companies.

The analysis is divided into two phases:

— 1st phase:

a) The analysis of trends and the main indicators of metalworking industry in Lithuania;

b) Analysis to identify four types of metalworking sectors: competitive and having high export share; competitive but having low export share; not competitive but having high export share; not competitive and having low export share;

— 2nd phase:

a) Analysis of the metalworking companies representing the sectors analysed in phase one part c) in order to understand which internationalization strategies are used by metalworking companies from different groups, and check if there is any signifficant difference between them. In addition, identify factors causing successful internationalization of the companies.

For the phase 1 analysis, the statistical data from Oficial statistics portal is used in order to overview the main metalworking industry‘s indicators. The calculation of NRCA indexes of the top metalworking sectors by export share (>0,05% from all Lithuania’s exports in 2016) as well as second best sectors (with export sahre of >0,02% from all Lithuania’s exports in 2016) at 4-digit HS codes level was made. The sectors are divided into four groups: 1) Having high export share and being competitive; 2) Having high export share but being not competitive; 3) Having low export share but being competitive and 4) Having low export share and being not competitive.

For the phase 2, semi-structured interviews are made with the representatives of metalworking companies from different sectors. Open and closed questions as well as questions based on Likert’s 10 point scale were used to get information about the entrance’s to the international markets pattern, internationalization strategy employed, entry modes chosen, level of networking intensity, financial aid’s from external sources usage intensity to find which factors positively

influence the internationalization as well as if there are any significant differences between the practices of competitive and not competitive sectors' companies in Lithuania.

The following hypothesis for the empirical research have been formulated:

I. There are metalworking sectors which are significant at country level and competitive worldwide;
II. The usage of financial aid from government and EU funds is one of the success factors of internationalization;
III. Networking with other stakeholders helps companies successfully internationalize;
IV. Competitive sectors' companies employ different internationalization strategies from those of not competitive sectors.

To sum up, both secondary data at sector level and primary data analysis at company level is taken into consideration in order to check the competitiveness level of the metalworking sectors as well as find out the factors causing successful internationalization of metalworking companies of Lithuania.

3.2. The Overview of Metalworking Industry

3.2.1. The Structure of Metalworking Industry, and Worldwide Statistics

Before the analysis of the metalworking industry sectors' competitiveness in Lithuania first the general overview of the industry should be done. This section overviews the structure of metalworking industry. In addition, some of the worldwide statistcs to understand the scope of the industry is presented.

There are different classifications of metalworking industry. According to Statistical Classification of Economic Activities (NACE Rev. 2), metalworking industry comprises from two groups - manufacturing of basic metals (C24) and manufacturing of fabricated metal products, except machinery and equipment (C25) (Eurostat 2008). According to Harmonized System Codes (Foreign Trade Online 2016) these products fall into categories of 72-83 and 93:

- 72 iron and steel;
- 73 articles of iron and steel;
- 74 copper and its articles;
- 75 nickel and its articles;
- 76 aluminum and its articles;
- 78 lead and its articles;
- 79 zinc and its articles;
- 80 tin and its articles;

— 81 metals; N.E.C., cermets and articles thereof;
— 82 tools, cutlery, spoons and forks, of base metal;
— 83 miscellaneous products of base metal;
— 93 arms and ammunition; parts and accessories.

Although Harmonized System does not cover some of the products covered in Nace Rev. 2, for example, precious metals such as gold or silver which fall in the category 71 (natural, cultured pearls; precious, semi-precious stones; precious metals, metal clad with precious metal, and articles thereof; imitation jewellery) and steam generators which fall in the category 84 (nuclear reactors, boilers, machinery and mechanical appliances; parts thereof), the core scope of this work is internationalization strategy, thus author assumes that the absence of some of the products in Harmonized System Codes will not have an impact on general metal industry‘s trends.

If looking at worldwide statictics, the value added at factor cost of manufacturing of basic metals and fabricated metal products (C24 and C25 according to NACE Rev. 2) in 2014 was equal to € 229 billion and accounted for 13,4% of total value added at factor cost of 28 European Union (EU) countries within the whole manufacturing industry (European Commission 2017). In addition, the metalworking industry generated 11,4% of total manufacturing industry‘s turnover in 28 EU countries.

The exports of metalworking products accounted for € 1,21 trillion in 2016 (International Trade Centre 2017). Figure 6 shows the world‘s metalworking products‘ export structure changes in 2016 compared to 2011. It can be seen that during this period basic iron and steel materials had the highest export share and even increased it by 4 percent. The second most important sector was

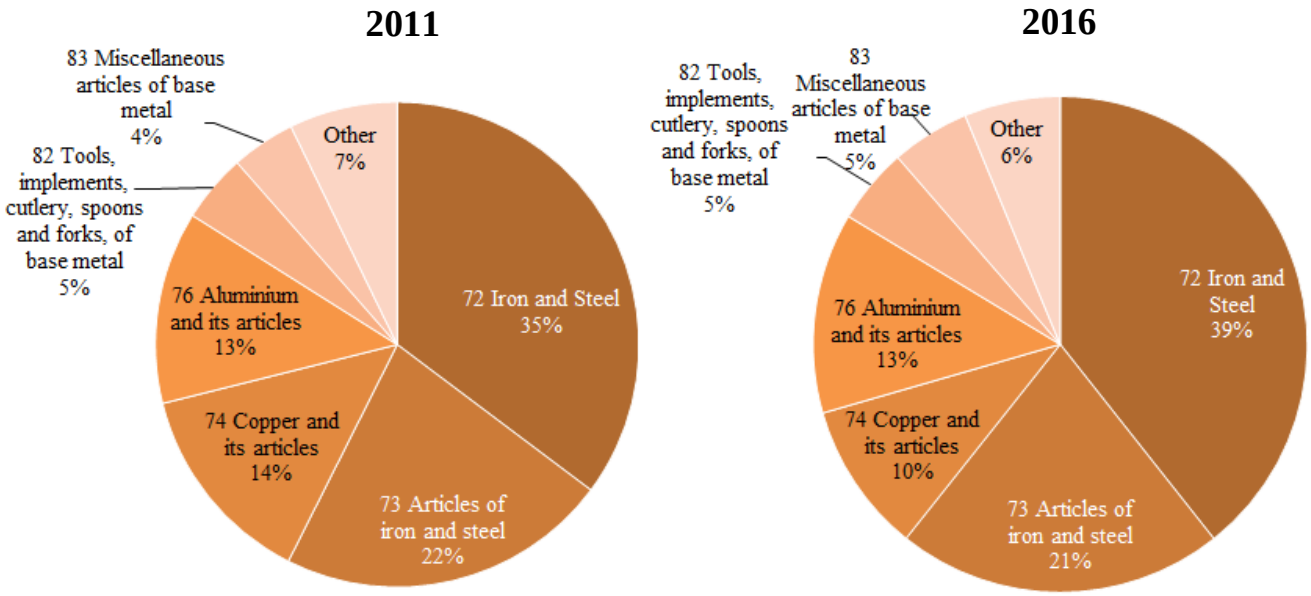

Fig. 6. Structure of World Metalworking Products‘ Export (compiled by the author from International Trade Centre 2017)

articles of iron and steel which during the period maintained almost the same export share (22 and 21 percent respectively). There was a negtive change in copper and its articles – its export share has decreased by 4 percent. Finally, miscellaneous articles of base metal have slightly increased its export share from 4 to 5 percent.

The main exporters of iron and steel in 2016 were China, Japan and Germany. The main exporters of articles from iron and steel – again China, Germany and USA. The main importers of group 72 products were Germany, USA and China; group 73 products – USA, Germany and France (International Trade Centre 2017).

Metalworking companies‘ business and its wealth is dependent on raw material prices. If looking at historical data of metal prices, most of them are quite low at the moment. For example, the price of iron ores fines has dropded more than three times since 2011 from € 169 per tone to € 50 per tone in 2016 (InfoMine 2016). This allows to reduce the final products‘ prices and thus attract more customers.

3.2.2. Lithuanian Metalworking Industry’s Overview

In order to better understand Lithuania‘s metalworking industry and its dynamics, first the statistical data is overviewed.

In 2016 the number of operating companies at metalworking industry accounted for 756 and was the highest within the period of 2010-2016 (see Table 3.). According to statistics, around 65% of companies operating in basic metals sector and 63% operating in fabricated metal products serctor were profitable which is a good result comparing to the average of 59% profitable companies out of total operating companies in Lithuania. This may be the reason why the number

Table 3. Number of Operating Companies at the Beginning of the Year (compiled by the author from Official Statistics Portal 2016)

Economic Activity	2010	2011	2012	2013	2014	2015	2016
C24 - Manufacture of basic metals	40	37	32	29	28	28	33
C25 - Manufacture of fabricated metal products, except machinery and equipment	665	626	602	644	644	715	723

of metalworking companies has been constantly increasing in Lithuania for the last few years. On the other hand, the number or operating companies was decreasing from 2010 to 2012 in fabricated metal products‘ sector and from 2010 to 2014 in basic metals‘ sector. This may imply that the economic crisis in 2008-2009 had affected the metalworking industry forcing some companies to close down the business.

If looking at the size of the enterprises working within metal industry, 32 out of 33 basic metals‘ manufacturers in 2016 were SME‘s with less than 100 employees. 70% of all companies in this sector had only up to 9 employees. Only 1 company had more than 250 employees. Similarly, 720 companies out of 723 working within fabricated metal products‘ field were SME‘s with 61% of companies having up to 9 employees. Only three large companies were having more than 250 employees (Official Statistics Portal 2016). The four largest metalworking companies are steel structures producer JSC “Litana ir Ko” (more than 500 employees), heating boilers’, valves and pistons rings’ producer and metal processing services’ provider SC “Umega”, industrial steel chimneys’ and boiler elements’ producer JSC “Energetikos paslaugų ir rangos organizacija”, steam boilers’ and containers’ producer SC “Axis Industries” (each of them having more than 600 employees).

If looking at GDP generated by metalworking sectors in last five years, it has been constantly growing for fabricated metal products since 2012 (€ 171 million) to 2016 (€ 251 million). However, for basic metals‘ sector it was the highest in 2013 (€ 15 million) and has dropped by 46% in 2014 showing that the productivity per company in this sector has decreased about two times (Official Statistics Portal 2017). This may show possible sector‘s competitiveness problem as stated by

Altomonte *et al.* (2012). Overall, both sectors constituted 6,6% of total GDP within manufacturing industry of Lithuania in 2016 (6,4% of fabricated metal products and only 0,2% of basic metals).

Another factor indicating the competitiveness of the industry is the GDP generated per working hour. If compared with the whole manufacturing industry, basic metals' and fabricated metal products sector's labor productivity was lower during 2012-2016 (see Fig. 7). However, similarly to whole manufacturing industry, basic metals' and fabricated metal products' GDP

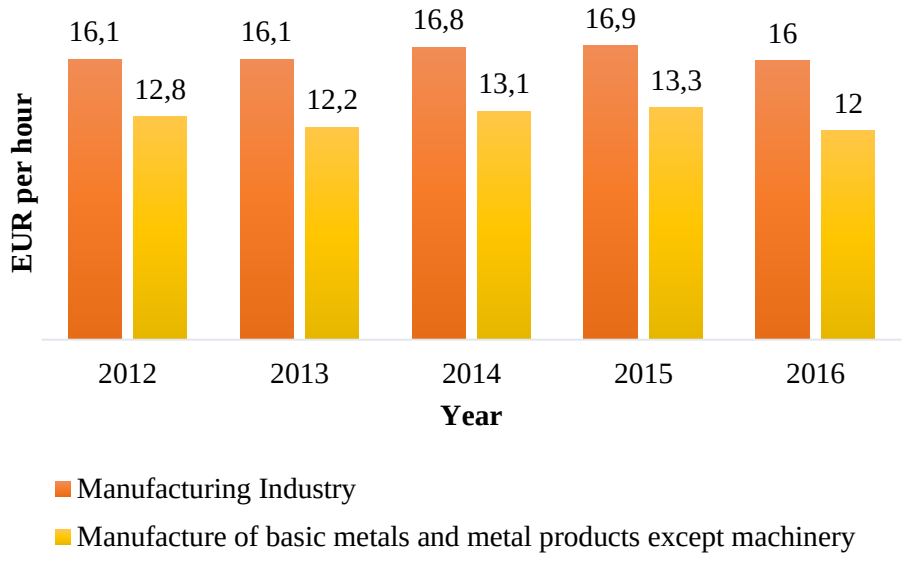

Fig. 7. GDP per Working Hour in EUR (compiled by the author from Official Statistics Portal 2017)

generated per working hour remained pretty stable and was equal to 75-80% of total manufacturing industry's GDP per working hour generated. Although the results are relatively good, the negative tendency can be seen from the last year's result – the GDP per working hour was the smallest within 5 years period.

Another indicator showing the competitiveness of the sector is the trade balance. If the exports outweigh the imports, this shows that the industry is competitive in international trade. Harmonized Codes System was chosen to show Lithuania's basic metals' and fabricated metal products' trade balance (Fig. 8). Codes 72-83 and 93 of Harmonized Codes System are included in the average industry's trade balance.

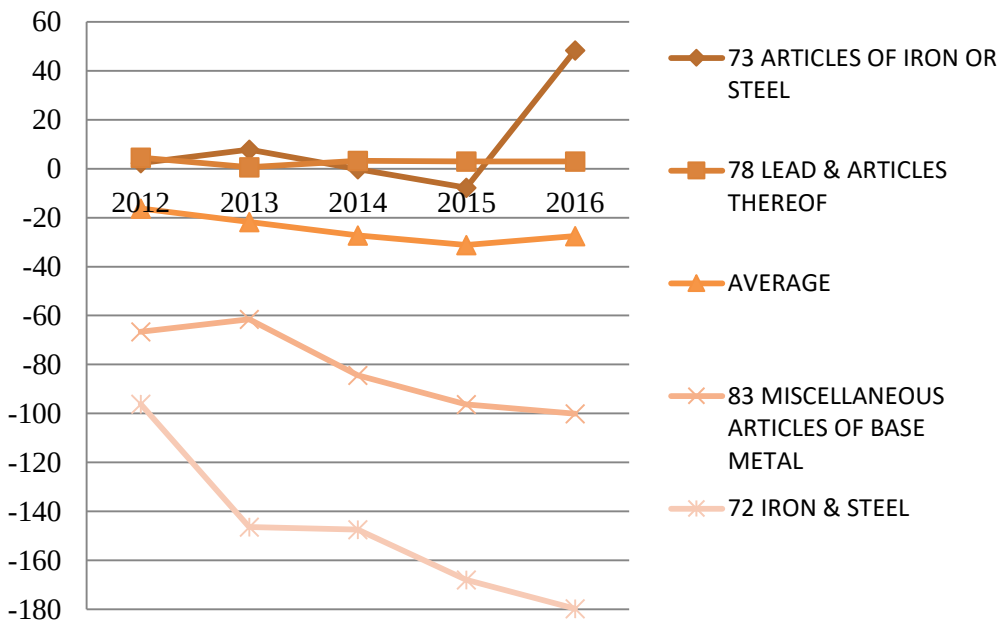

Fig. 8. Basic Metals‘ and Fabricated Metal Products‘ Trade Balance in 2012-2016, € Million (Compiled by the author from Official Statistics Portal 2017)

The graph shows that in general, metalworking industry is not competitive as during the period 2012-2016 the trade balance was negative. However, separate sectors such as 73 – articles of iron and steel, 78 – lead and its articles seem to be competitive. During 2012-2016 lead and its articles had always positive trade balance. Interestingly, the group 73 products from negative trade balance of € 8 million in 2015 have jumped to positive trade balance of € 48 million in 2016. This was due to the decreased import and increased export of this group’s products. The worst off were the sectors 83 - miscellaneous articles and 72 - iron and steel. In 2016 the miscellaneous base metal goods had a deficit of € 100 million, and iron and steel products – deficit of € 180 million in trade balance. This clearly shows that Lithuania during 2012-2016 was mainly an importer of some of the basic metals and fabricated metal products.

However, this does not mean that Lithuania only imports metal products. In 2016 Lithuania’s metalworking industry amounted for 5,3% of total Lithuanian origin products’ exports (United Nations 2017) and was higher compared to that of 2015 (4,7%). The biggest export share (Fig. 9) of metalworking industry had articles of iron and steel (46%), iron and steel (25%),

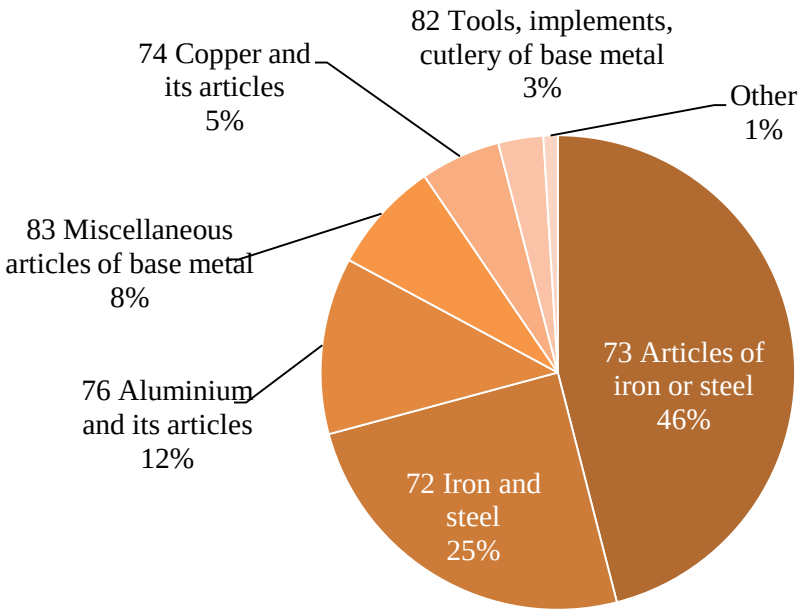

Fig. 9. The Lithuanian Origin Exports Structure of Basic Metals and Fabricated Metal Products in 2016 (compiled by the author from United Nations 2017)

aluminium and its articles (12%) and miscellaneous articles of base metal (8%). Although the trade balance of lead products is positive, the export of these products amounted only 0,4% of total metal products' except machinery exports. In addition, the export share of iron and steel was high although it had a negative trade balance. This is explained by the fact that the export structure represents only the exports of Lithuanian origin, when the trade balance represents both, Lithuanian origin exports and re-exports. However, even if taken re-export into account, the metalworking industry's structure would remain very similar.

To sum up, metalworking industry in Lithuania plays significant role as it generates 5,3% export share of total Lithuania's exports. However, it is vulnerable to economic instability. What is more, some signs (GDP generated, trade balance) shows some of the sectors are not competitive although have significant export share. Thus, the deeper competitiveness analysis has to be done in order to find out the metal products' sectors in need for proper internationalization strategy in order to increase their competitiveness.

3.3. Competitiveness Analysis of Metalworking Sectors of Lithuania

This chapter represents the analysis made to identify four types of sectors within basic metals and fabricated metal products business. Analysis was made using metalworking sectors' data at two and four digit HS codes levels.

The competitiveness analysis at two-digit level of HS codes has showed that the main sector of basic metals and fabricated metal products' industry (73 - articles of iron and steel) is not only significant at Lithuania's level but also is competitive worldwide (see Fig. 10). Other less but still competitive sectors are 83 (miscellaneous articles of base metal) and 81 (other base metals). However, other sectors having high export share (72 - primary iron and steel, 76 - aluminum and articles thereof, 74 - copper and its articles) were found to be not competitive.

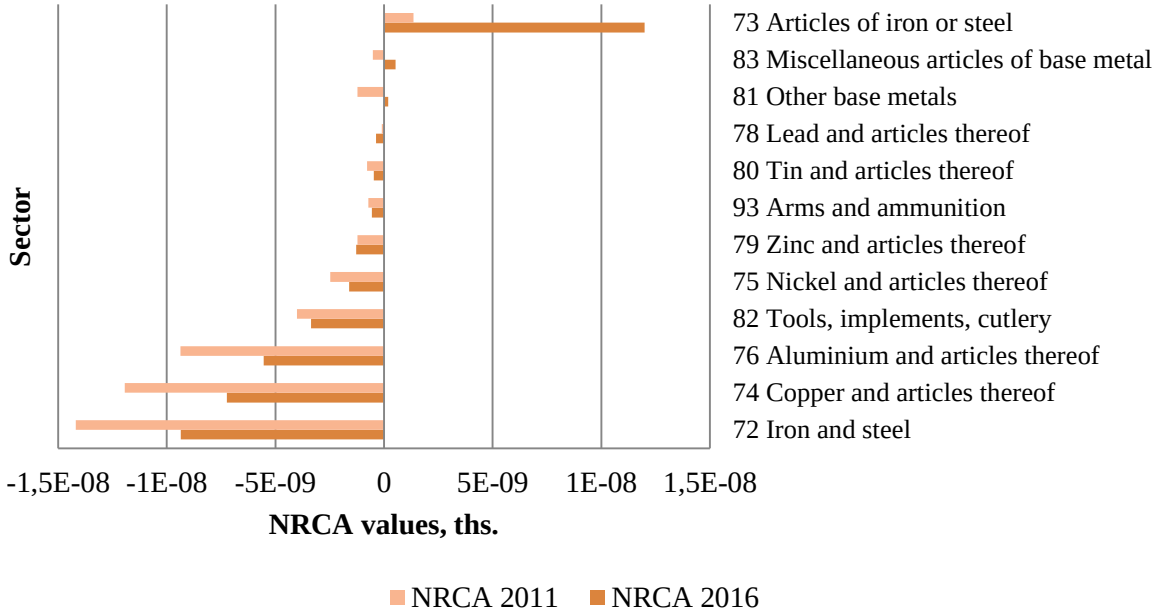

Fig. 10. The NRCA Index of Basic Metals and Fabricated Metal Products at 2-digit Level in 2011 and 2016 (compiled by the author)

The analysis shows that sector 73 could be taken as a good example for other sectors in order to increase their competitiveness. The result also implies that companies within the groups of 72, 76 and 74 are already exporting much but their internationalization strategies may not be proper in order to become successful.

However, if taking a look at 4-digit level sector analysis, different results can be found. Since there are 149 sectors at 4 digit HS codes level, the author has analyzed only those sectors having the

highest export share in Lithuania's according to adjusted methodology of KTU Verslo strategijos institutas and VšĮ Žinių visuomenės institutas (2009). 52 sectors in total were analyzed – 10 from group 72 (iron and steel), 21 from group 73 (articles of iron and steel), 2 from group 74 (copper and its articles), 7 from group 76 (aluminium and its articles), 1 from 78 (lead and its articles), 4 from 82 (tools), 5 from group 83 (miscellaneous articles of base metal), and 2 from 93 (arms). The NRCA index values of the 23 sectors with highest export share are shown in Table 4.

Table 4. NRCA indexes of Top Metalworking Sectors at 4-digit HS Codes Level in 2016 (compiled by the author)

Code	High export share, NRCA<0	Code	High export share, NRCA>0
7210	Iron or non-alloy steel; flat-rolled products, width 600mm or more	7204	Ferrous waste and scrap; remelting scrap ingots of iron or steel
7216	Iron or non-alloy steel, angles, shapes and sections	7214	Iron or non-alloy steel; bars and rods, not further worked than forged, hot-rolled
7219	Stainless steel; flat-rolled products of width of 600mm or more	7217	Wire of iron or non-alloy steel
7307	Tube or pipe fittings (couplings, elbows, sleeves), of iron or steel	7306	Iron or steel (excluding cast iron); tubes, pipes and hollow profiles (not seamless)
7318	Screws, bolts, nuts, coach screws, screw hooks, rivets of iron or steel	7308	Structures of iron or steel and parts thereof; plates, rods, angles, shapes
8207	Tools, interchangeable; for hand tools, whether or not power-operated	7309	Reservoirs, tanks, vats and similar containers; capacity exceeding 300l
		7310	Tanks, casks, drums, cans, boxes, capacity not exceeding 300l
		7314	Cloth, grill, netting and fencing, of iron or steel wire
		7315	Chain and parts thereof, of iron or steel
		7317	Nails, tacks, drawing pins, corrugated nails, staples and the like, of iron or steel
		7326	Iron or steel; articles, n.e.c. in chapter 73
		7404	Copper; waste and scrap
		7602	Aluminium; waste and scrap
		7610	Aluminium; structures and parts (e.g. bridges and sections, towers) plates, rods
		7616	Aluminium; articles n.e.c. in chapter 76
		8302	Base metal mountings, fittings for furniture, doors, staircases, windows
		8309	Stoppers, caps, lids (including screw caps); other packaging accessories

Four-digit level analysis shows that sectors representing the same product group can be both, competitive and not competitive. For example, sectors within group 72 – three of them have positive NRCA (right side of the Table 4) and other three – negative (left side of the Table 4). This implies that it is important to evaluate sectors as narrowly as possible because generalizing them may lead to wrong export promotion policies of a country. All in all, this analysis supports Hypothesis I which states that there are some metalworking sectors in Lithuania which have significant export share and are competitive worldwide.

In addition, author has analysed the sectors which fell behind the top 23 exporters to check if there are other sectors exporting less but having positive NRCA index. According to the same methodology as of KTU Verslo strategijos institutas and VšĮ Žinių visuomenės institutas (2009) the author took into account another 29 sectors with the export share not less than 0,02% and less than 0,05% compared to total Lithuania's export value in 2016, and ran the calculation of NRCA indexes. The results are shown in Tables 5 and 6. Table 5 shows the sectors which are not

Table 5. Metalworking Sectors Having Low Export Share and Positive NRCA in 2016 (compiled by the author)

Code	Low Export Share, NRCA > 0
7215	Iron or non-alloy steel; bars and rods, n.e.c. in chapter 72
7301	Iron or steel sheet piling, welded angles, shapes and sections, of iron or steel
7312	Stranded wire, ropes, cables, plaited bands, slings and the like, of iron or steel, not electrically insulated
7322	Radiators for central heating, not electrically heated and parts thereof, of iron or steel; air heaters
7324	Sanitary ware and parts thereof, of iron or steel
7802	Lead; waste and scrap
8208	Knives and cutting blades, for machines or for mechanical appliances
8303	Safes; armoured or reinforced, strong-boxes, doors and safe deposit lockers for strong-rooms, cash boxes
8311	Wires, rods, tubes, plates, electrodes of base metal or metal carbides
9305	Firearms; parts and accessories of articles of heading no. 9301 to 9304

significant in export share, however, are competitive worldwide. Thus, these sectors should be taken into account when preparing the internationalization strategy in order to boost their export. Deeper analysis at company level should be made in order to find out what exactly could help increasing the export of the companies within these sectors.

However, there are many more sectors identified which are neither significant at country level nor they are competitive worldwide (see Table 6.) In order to increase their competitiveness a lot of effort should be made from both, companies' and governent's side as the former ones may need radical innovations in their business in order to catch up the competitors. As radical

Table 6. Metalworking Sectors Having Low Export Share and Negative NRCA in 2016 (compiled by the author)

Code	Low Export Share, NRCA< 0
7208	Flat-rolled products >600mm, hot-rolled, not clad, plated or coated
7213	Iron or non-alloy steel; bars and rods, hot-rolled, in irregularly wound coils
7228	Alloy steel bars, rods, shapes and sections; hollow drill bars and rods, of alloy or non-alloy steel
7302	Railway or tramway track constructions
7304	Tubes, pipes and hollow profiles, seamless, of iron (other than cast iron) or steel
7311	Containers for pressed, liquefied gas from iron or steel
7320/7321	Springs / Stoves, ranges, grates, cookers
7323	Kitchen articles of iron or steel
7325	Cast articles of iron or steel
7412	Copper tube or pipe fittings
7601	Aluminium; unwrought
7604/7606	Aluminum; bars, rods and profiles / plates, sheets and strip, thickness exceeding 0.2mm
7615	Aluminum; table, kitchen or other household articles and parts thereof
8202/8205	Tools, saws and blades for saws / Tools including glaziers' diamonds
8301	Padlocks and locks (key, combination, electrically operated) of base metal
9306	Bombs, grenades, torpedoes, mines

innovations may require high spending on R&D, the financial aid from the government side would be plausible. However, even after investing a lot in these sectors the investment may not pay off, thus the companies working in these sectors should either switch to similar business activities (for example, from production of bombs and grenades to production of parts for firearms) or concentrate more on local market instead of international as is the case of stoves, ranges and cookers‘ producers in Lithuania – most of their production is sold in Lithuania and other Baltic countries.

To sum up, the author has analysed the sectors of metalworking industry in terms of their export share and competitiveness, and identified four groups of companies – having high export share and positive NRCA (17 sectors), having high export share and negative NRCA (6 sectors), having low export share and positive NRCA (10 sectors); having low export share and negative NRCA (19 sectors). The analysis has helped the author to identify the potential companies to be analysed. The aim was to interview companies‘ representatives from first three groups of sectors in order to understand the determinants of successful internationalization.

3.4. Internationalization Strategy‘s Analysis of Metalworking Companies of Lithuania

In order to analyse the internationalization strategies adopted by metalworking companies, twenty potential companies were identified and approached in order to collect the data for analysis

needed. Seven companies agreed to share the information, and their representatives were interviewed during semi-structured interviews.

The summarry about the companies can be seen in Table 7. Companies' representatives did not want the author to use the names of the companies, thus, the author named them company A to G. Four of the interviewed companies are medium sized, two – small and one – very small. Five companies represent the successful and competitive sectors (companies A-E) and two companies

Table 7. Profile of Metalworking Companies analyzed (compiled by the author)

Compay	Sector	No. of employees	Year of inception	Year of first international sales	International sales, %
A	8309 – stoppers, caps, lids	224	1996	1998	90%
B	7610 – aluminum structures	52	2011	2011	76%
C	7309 – reservoirs over 300l	241	1929	1929	85%
D	8302 – base metal fittings for furniture	199	2001	2001	92%
E	7308 – structures from iron and steel	70	1995	1998	25%
F	7318 – screws and nuts	159	1991	1991	90%
G	7216 – angles, shapes and sections	6	2005	2013	25%

(F and G) - sectors having high export share but negative NRCA index. The author has also approached companies from competitive sectors with low export share, but none of them agreed to be interviewed. Thus the company level analysis will be concentrated on the top exporters (in terms of export value) within metalworking industry.

As it is seen from the data in Table 7, most of the interviewed companies started their internationalization quite fast – either at the same year of inception or within two years period. Only

company E started its export activities after three years, and company G – after eight years. Those companies which started internationalization at same year of inception mostly had specific reasons for that:

- company B was founded as an FDI of the Danish company, which had business operations in Denmark long time ago, thus almost all of the produced products in Lithuania were exported to Denmark;
- company C was founded in Soviet Union time and its main product was laundry equipment which was exported in all Soviet Union countries. If talking about stainless steel reservoirs which is the main business area today, they were started to be prodced only after collision of Soviet Union, and export activities were started few more years after, because company needed to get all the necessary certificates to start exporting the production;
- company D was founded to work with its biggest foreign client. In other words, the company was opened, and business has started as a result of the partnership agreement with the foreign client;
- Company F was successful in foreign markets straight from the beginning due to the fact that it was a supplier of its goods to laser producers and buyers. In this business field it is a must to be international straight from the beginning, because it would be hard to survive working only with Lithuanian laser producers.

Company representatives were asked to identify first three foreign markets entered. From the Figure 11 it is seen that the most popular markets were Russia (entered by four companies), Poland entered by three companies), Belarus (entered by two companies) and USA (entered by two companies). This shows that mostly companies have chosen markets which were close

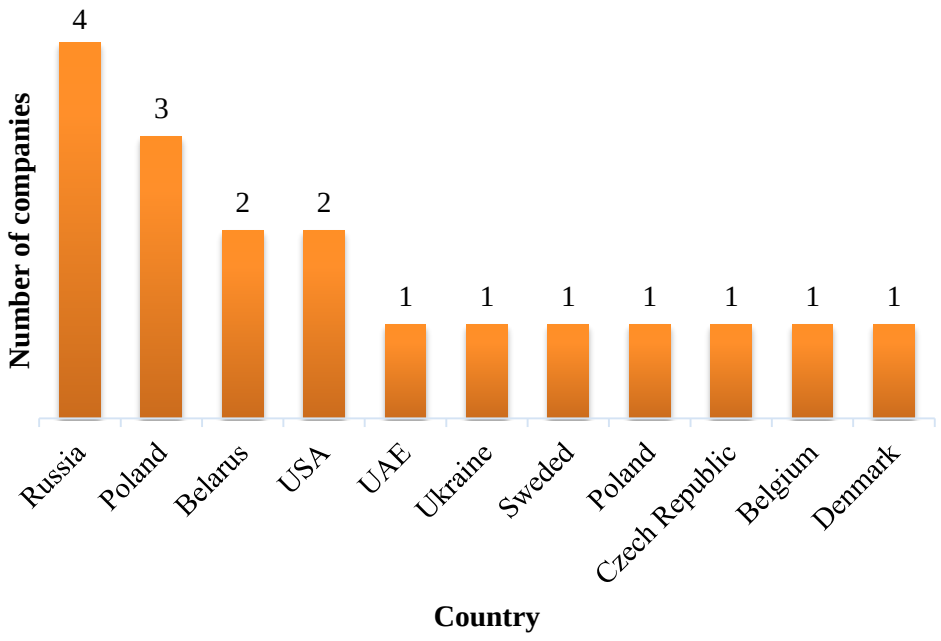

Fig. 11. Distribution of First Export Markets Entered by Metalworking Companies (compiled by the author)

geographically. Far away countries were less popular. However, most of the companies stated that the first markets chosen today are not their main ones. For example, first export markets chosen by company C were Russia, Ukraine and Belarus. Today the exports to these markets comprise only 3-5% of total company's exports. The main markets today are Germany, France, United Kingdom and Scandinavian countries. From time to time company gets orders from far away countries such as Saudi Arabia. Thus, although most of the companies analyzed had chosen gradual internationalization pattern by entering close foreign countries, it seems that it did not work well for them, thus Born Global approach for new metalworking companies entering foreign markets would be better.

Semi-structured interviews contained questions to gather quantitative data which would help to identify factors causing international competitiveness of metalworking companies. Company representatives were asked to evaluate their company competitiveness in terms of internationalization on a scale from 1 to 10, where 1 means that the company is not competitive at all and 10 – company is very competitive. The evaluation was used as a dependent variable for correlation analysis. Although the evaluation is subjective, as it is based on personal opinion, the author has used its data, because it has either positive or negative relation with the highest number of other quantitative variables.

The correlation analysis (see Table 8) of the quantitative variables has showed that competitiveness positively correlates with number of employees, export share, number of first export

markets entered, and the importance of innovative products for the clients. In addition, competitiveness negatively correlates with the length of time which took to start export activities

Table 8. Correlation Matrix (compiled by the author)

	Competitiveness
Competitiveness	1
No. of employees	0,4709
Income	0,2186
Export, %	0,8089
Subcontracting, %	0,0654
Started exporting after No. of years of inception	-0,8333
No. of first export markets entered	0,5205
How actively company searches clients	0,2404
How often clients find company themselves	0,1219
How important are innovative products	0,4932

after the inception of the company. Finally, the level of subcontracting services, and the way, how new partnerships were started (through active or passive client search) does not affect competitiveness.

However, after running regression analysis including both, significant quantitative variables and all the qualitative variables, results are a bit different. It seems that althoug there is some relation between the number of employees, export share, number of first export markets entered and company‘s competitiveness, these variables are not significant enough to be the real cause of metalworking companies‘ competitiveness in terms of internationalization. In addition, the size of export share might be more of an outcome rather than the cause of internationalization. The real significant quantitative variables determining the competitiveness of metalworking companies are the speed of internationalization and the business field‘s sophistication in terms of innovativeness. In other words, those companies which start international sales at their inception and concentrate in business where innovative products are created will be the most successful.

Regression analysis has also showed that successful internationalization can be made if the metalworking company finds the well known company worldwide which becomes its business partner (Table 9). An example could be company D which produces metal parts of furniture to “IKEA”. The company‘s representative stated that having such client‘s reference helps to attrack other potential clients, because being a supplier of “IKEA” means being a reliable supplier. Other

well known organizations which are the clients of interviewed metalworking companies are Mitsubishi Construction Co. (company's B client), ABB (company's C client), Nasa, Google, Apple, CERN (company's F clients). Company A has also stated that it supplies its goods to well-known companies, but did not disclose their names.

Table 9. Regression Analysis (compiled by the author)

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	1
Standard Error	2,78E-17
Observations	7

ANOVA		
	F	*Significance F*
Regression	1,39E+34	6,45E-18

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1	2,34E-16	4,28E+15	1,49E-16
Do you get orders from well known companies (1=yes)	2,5	1,79E-16	1,4E+16	4,55E-17
How important are innovative products to the clients	0,5	1,7E-17	2,94E+16	2,16E-17
Started exporting after No. of years of inception	-0,5	4,38E-17	-1,1E+16	5,57E-17
Do you invest in experimental activities (1=yes)	0,5	4,28E-17	1,17E+16	5,45E-17
Do you partner with direct/indirect competitors (1=yes)	4,88E-15	1,63E-16	29,91512	0,021273

Another important variable is investment in experimental activities. This variable is connected to the importance of innovative products in the business field. Finally, althoug having least signifficance, the networking with direct and indirect competitors is important in order to internationalize successfully.

Other variables which were used in regression analysis but were found to be not significant for successful internationalization were the use of financial funds of government or EU, and networking with science institutions and research centers. Thus Hypothesis II can be rejected as getting financial support is rather nice to have than a must in order to become successful internationally. On the other hand, the analysis has covered only the companies representing the sectors having high export share as none of the companies from sectors having low export share and high NRCA agreed to be interviewed. Thus, it might be the case that export promotion programs might work well for these companies to boost the exports.

In addition, networking with science institutions appeared to be not significant variable, however, Hypothesis III cannot be rejected, because partnering with competitors which is also a form of networking is one of the success factors of internationalization.

If taking all the five variables important for company‘s competitiveness and internationalization into account, the most successful companies analyzed having all five variables would be companies B, C and F. Company D has four factors adopted out of five (it does not invest in experimental activities), however, it still can be considered as a good example of internationalization. In order to understand the internationalization process of these companies, the detailed information is presented about each of them.

Company Case Studies

Company B – manufacturer of fire-rated aluminum constructions (HC code – 7610). In 2016 company has generated 77 000 EUR yearly income per employee. Its export activities account for more than 75% of total sales revenue. Company is concentrating on producing its own designed products only.

Company B has started its export activities straight after it was founded (year 2011) because it is a subsidiary of Danish Aluflam A / S company, and a lot of the orders are released in Denmark. It has started its export activities in many countries at once. Differently from most of other analyzed companies, company B has started exporting to Denmark, United Arab Emirates and United States of America (USA) instead of choosing close existing markets. But again, this was due to the fact that it is a part of Danish company which already was doing international business long time ago and had some foreign markets developed.

Company’s B representative has stressed the importance of networking when doing international business. Networking with competitors helps to get new contacts of potential clients. In addition, partnering with several foreign laboratories helps to develop and test new products, which increases the possibility to enter new markets because clients are demanding, and innovative products are important in this business area.

Company uses few export modes – it sells products to direct foreign buyers, also through the fully owned company and branches in foreign markets, as well has production plant in Poland.
Company identifies itself as competitive worldwide, naming that the main factors which help to stay competitive are high product quality, differentiated products from those of competitors, fast production time and orientation into particular clients’ segment. However, there are some things which could help company to increase competitiveness – lower taxes for employee salaries, more qualified workforce and simplified system to get the subsidies for company export development.

Company C – manufacturer of stainless steel reservoirs exceeding 300 liters volume (HS code – 7309). In 2016 company has generated 62 000 EUR yearly income per employee. Its export activities account for 85% of total sales revenue. Company is concentrating on producing customised products – subcontracting comprises more than 75% of company's products.

Company C is very old, established in 1929. Its first business activity was production of laundry equipment which was exported to Soviet Union countries. By that time the company was exporting straight from the beginning. However, if talking about its present business field, it started exporting reservoirs few years after the beginning of their production, because they required special certificates, and it took time to get them. After the certificates were received company has started exporting the production in few countries at the same time.

First export markets were Russia, Ukraine and Belarus. However, today these markets generate only 3-5% of total company's export revenue. The main markets today are Germany, France, United Kingdom and Scandinavian countries which shows that choosing the closest markets geographically was not the best decision.

Company has chosen few export modes - it sells products to direct buyers, as well through agents and distributors in Lithuania, and through two local representatives in Finland and Sweden who bring new clients.

In terms of networking, company partners with Lithuanian technical universities in order to attract young engineering specialists to work for the company. It also partners with Lithuania's Energy Institute when it requires some calculations and measurements of its products. In addition, company partners with direct and indirect competitors to share knowledge and know-how in the use of technology, as well as to create new products together. Finally, company C belongs to Baltic Automotive Components Cluster which brings the possibility to the company to enlarge its customer base by co-creates metal products together with other indirect competitors for automotive industry clients.

Company C claims that it invests in scientific research. It is important for the company because innovative products are needed in this business area. Company serves clients which have specific demands. For example, one client has required a liquified natural gas reservoir which would be lighter in weight compared to other reservoirs existing in the market. Another client required special reservoir which would be used to grow and later kill the Human Immunodeficiency Virus.

Company states that it is competitive in the worldwide market. First of all, because there are only few such manufacturers concentrating in specific stainless steel reservoirs' production and having all the needed certificates to produce them not only for European but also USA market. In addition, company can offer its clients competitive price and fast production time. Finally, the fact that among its clients there are worldwide companies such as ABB (Swedish-Swiss multinational

corporation operating in robotics, power, heavy electrical equipment, and automation technology areas) and Areva (multinational company with headquarters in France specializing in nuclear power and renewable energy) proves that the company is able to compete successfully with competitors. However, there are some areas which could be improved in order to be more competitive – higher production efficiency, and investment in new machinery.

Company D – producer of base metal fittings for furniture (HS code – 8302) and boxes not exceeding the volume of 300 liters (HS code 7310). In 2016 company has generated 101 000 EUR yearly income per employee. Its export activities account for 92% of total sales revenue. Company is concentrating on producing customised products only according clients‘ needs.

Company D has started its export activities straight after it was founded (year 2001), because it was aimed to produce products for foreign client from the very beginning. Thus, the export has started in one country which was Sweden. Other export markets entered later were also in Scandinavia. So, similarly to company B, company C has started its export activities straight from the inception already knowing where it will export, and the export markets where not the closest ones.

As for the export modes, mostly company’s products are sold to direct foreign buyers. Company also works with two local agents in Lithuania. However, this partnership does not bring much value.

In terms of networking, company partners with indirect competitors for subcontracting purpose – both, orders some services from them and also provides services to other metalworking companies. Such partnership is useful for the company because it saves money - it can deliver specific orders which require using machinery it does not have and is not planning to invest in.

Company D states that it is competitive to some extent in European rather than worldwide market. The main reason which helps to stay competitive is having a well-known client Ikea. This fact helps company to find new clients. Another point which helps to stay competitive is ability to provide value for money products to the clients. On the other hand, company sees that bigger production quantities would help to better compete in the market – today company’s income is € 20 million per year and it has to compete with companies which generate hundreds of million euros per year.

Company F – producer of fine adjustment and micrometer screws (HS code – 7318). It is also one of the largest European companies designing and manufacturing optomechanical components for laser industry. In 2016 company has generated 47 000 EUR yearly income per employee. Its export activities account for more than 90% of total sales revenue. Company produces both, its own desined products and also products under subcontracting services.

Company F has started its export activities in many countries straight after it was founded (year 1991). The first export markets were Russia, USA and European countries. Today its products are distributed to more than 90 countries and represented by more than 25 companies worldwide. Thus this company can be called an example of Born Global.

The export modes chosen by the company are sale of products through local agents and distributors, sales to direct foreign buyers, and through the joint venture in foreign country. In fact, some of the company's products are sold to Lithuanian laser producer companies, which later export them to their clients.

Company F emphasizes networking to be important in its business activities. Networking and social media channels help to attract new clients. Company has its own YouTube channel with 597 subscribers and some videos which were watched for more than 99 000 times. In general, company is networking with many different stakeholders – starting from business associations and groups, ending at clusters. One of the associations it belongs to is Lithuanian Laser and Light Science and Technology Association which joins both, business and research institutions. Company also partners with Vilnius University Laser Research Center. This partnership brings new knowledge and allows company to use the scientific and technical potential to produce new products. Finally, company partners with other indirect competitors from laser, sub micro and nanomechanics business to implement complex projects.

Company F calls itself very competitive worldwide. It gets orders from such organizations as Google, NASA, Apple and CERN. However, these clients come because of the need for company's complex optomechanical components rather than screws and nuts. Company's competitive advantage is gained through production of high quality differentiated products, short production time; focus on niche clients' segment and production of specific products (again, optomechanical components, not only screws and nuts). According to the company, still some things should be improved to reach higher competitiveness – ability to work under consignation terms, shorter research time, and education system which would be more oriented towards high-tech business fields.

Interestingly, company F is an example of successful internationalization although it represents the Lithuanian metalworking sector which is considered as not competitive worldwide. On the other hand, companies A and E cannot be considered as successful internationally although they represent competitive Lithuanian metalworking sectors. Thus, Hypothesis IV should be rejected as it seems that belonging to one or another sector does not cause international success or failure by default – exceptions can always be found.

In order to compare the four companies presented above with three other which are considered as not competitive, the summary about the main success factors of internationalization is

presented in Table 10. As it can be seen, companies A, E and G have adopted only one or two factors in their business activities important for successful internationalization.

Table 10. Company Competitiveness Results (compiled by the author)

Factor	A	B	C	D	E	F	G
Well-known client	+	+	+	+	-	+	-
Importance of innovative products	-	+	+	+	-	+	+
Fast internationalization	+	+	+	+	-	+	-
Investment in experimental activities	-	+	+	-	-	+	+
Partnership with competitors	-	+	+	+	+	+	-
Total	**2**	**5**	**5**	**4**	**1**	**5**	**2**

Company A in general seems quite successful, generating 112 000 EUR per employee per year which is really good result for Lithuanian metalworking company. The main markets where company has the biggest share against competitors are Baltic countries (90% share), Azerbaijan (70%) and Poland (7-8%). However, if compared to its international competitors, for example, company Silgan, which is the largest caps manufacturer in the world, having 60% share of the world's market it becomes clear why company A does not consider itself as competitive worldwide.

One of the main differences between these two companies, is that Silgan has more products to offer to its clients – not only metal but also plastic caps which makes it more attractive to the potential buyers as they can get more products from one supplier. Thus the partnership with indirect competitor, plastic caps maker, may help to increase the assortment of company A, and become more competitive in international markets.

Similarly to company A, company G may need to start partnering with its competitors in order to become more successful in international markets. It operates in the business area where innovative products seem to be important to the clients. It also invests in experimental activities to create innovations, but something is still missing. It might be the case that with the help of right competitors it could boost its competitiveness by co-creating new products.

The problem with company E is that it has too many different business activities as a small company. Although it partners with competitors, it is not competitive worldwide. In addition, innovations do not matter for potential clients which means that company concentrates in traditional business field. To become more successful internationally company E may need to switch its business activities to more value creating business area and concentrate in one business rather than many. In addition, attracting a well-known company as a client would also help.

To sum up, the company analysis has showed that in order to make successful internationalization, companies need to invest in experimental activities, partner with indirect and (or) indirect competitors, produce innovative products, start exporting as early as possible, and attract well-known companies to become their clients. The analysis of successful metalworking companies has also showed that mostly these companies choose *focus strategy* by concentrating in niche business and producing niche products in order to be competitive. One more common competitive advantage they have is flexibility and fast production time. As for export modes, most of the companies choose direct export to foreign buyers, although there are many other export modes which work well for them.

4. PROPOSED INTERNATIONALIZATION ADOPTION MODEL FOR METALWORKING COMPANIES

After the analysis of Lithuanian metalworking industry and its companies the internationalization adoption model is presented in Figure 12. The research has showed that to internationalize early and use networking are two important determinants in terms of internationalization models. Therefore, author suggests the model of two – *Born Global through organizational networking*.

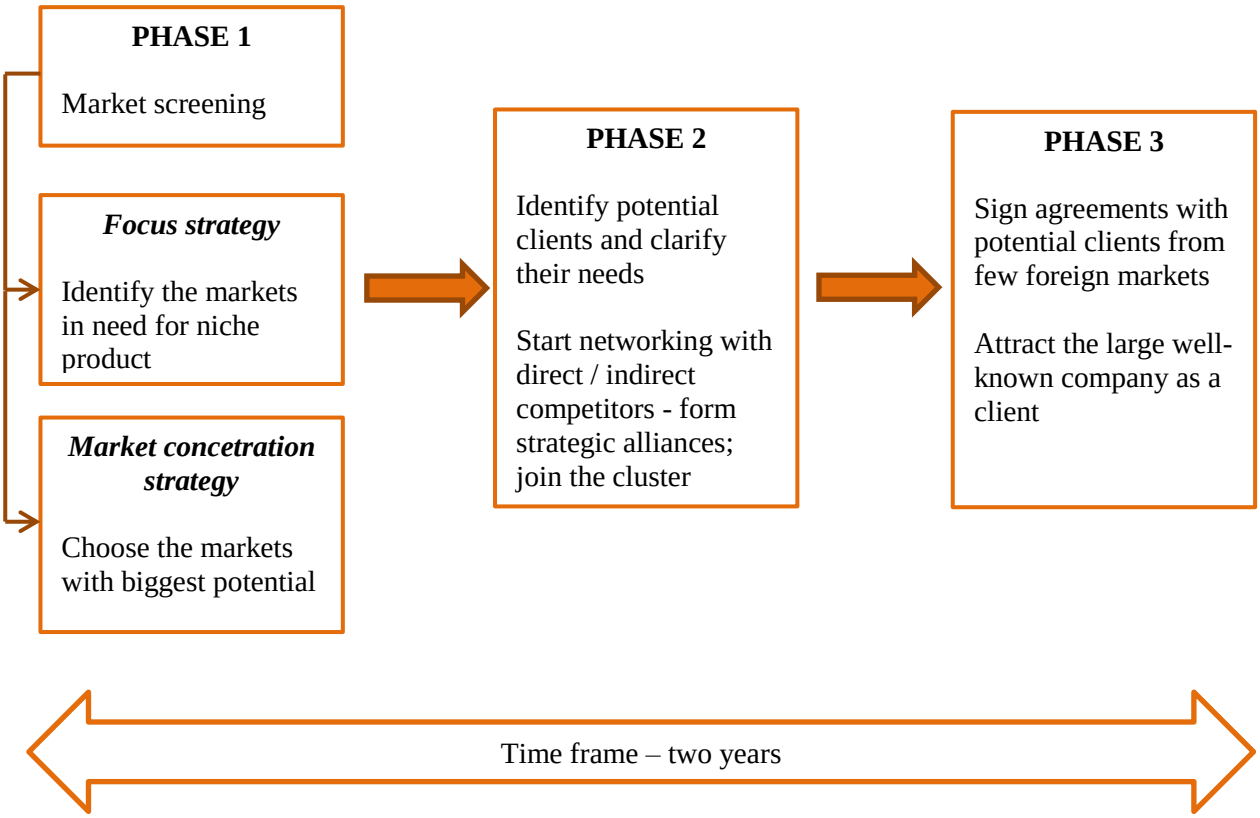

Fig. 12. Internationalization Adoption Model for Metalworking Companies (compiled by the author)

The proposed model consists of three phases which should be implemented in not longer than two-year period in order to internationalize fast. Although this model suits companies which only start internationalization activities more, it can also be used for already internationalized companies to improve their international business activities.

Phase 1 consists of market screening, identification of product niche and choice of few foreign markets with biggest potential. Although the author suggests fast internationalization which is a pattern of Born Global internationalization model, the company research has showed that *market concentration strategy* rather than diversification should be used by new entrants as the bigger number of export markets entered at the first time does not affect the success of internationalization.

What is more, metalworking companies should not aim to start from geographically close markets due to the cultural similarity of home market – the research has showed that the most successful companies concentrate on West Europe, Scandinavian countries, and even farther existing markets such as USA. However, the exception could be Latvia which today is one of the main export markets of Lithuanian metalworking companies, because goods from narrow product lines are being exported there (see Chapter 2.1.2.).

The company research has showed that the success is reached if the company specializes in the production of niche product lines, so the *focus strategy* should be adopted by the companies. This is valid not only for new entrants but also for those companies which do not consider themselves as being competitive in international markets. By switching their business to production of niche goods they could increase their international competitiveness. In addition, companies should position themselves as flexible and being able to produce the products in a short time, which is true, because most of Lithuanian companies are smaller compared to foreign competitors which usually have big bureaucratic structures and therefore lack the speed of production.

Phase 2 emphasizes the search of potential clients and networking with direct and (or) indirect competitors. The metalworking companies' analysis has showed that the biggest contribution to successful internationalization is the ability to attract well-known companies worldwide to become the clients. Therefore, exporters should aim high and start attracting such companies at the very beginning. However, usually at the beginning of internationalization it is hard to attract such clients. Thus targeting smaller potential clients known at the foreign country's level may work well at the beginning to get some references and later attract multinational companies as well.

Another success factor is networking with competitors. This is especially important when companies are concentrating in the niche products' production which requires innovative design or production technologies as well as specific know-how. So companies should not be afraid to partner if not with direct, at least with indirect competitors by sharing production technologies at minimum and co-creating innovative products which could be a combination of different experience and know-how at maximum. In addition, joining the cluster (local or foreign) might also help to find the partners needed for product creation. Since there is only one metalworking cluster in Lithuania, joining other clusters (automotive parts' producers, laser producers and other) might also help to become part of complex projects' implementation team and specialize in narrow products' line production.

Finally, phase 3 emphasizes the signing of agreements with potential clients in few export markets and attracting the well-known company as a client. This should be the outcome of phases 1 and 2 which are more as preparation for internationalization. If the company manages to reach and implement phase 3 within two-year period, it may be considered as successful internationalization.

CONCLUSIONS

- Metal is one of the most important structural materials in the world. The biggest attention at EU is given to steel sector as it constitutes the biggest share of all metal products produced. In order to keep the industry competitive, EU has set objectives for metalworking companies to move to sustainable production, ensure profit-making through innovation, start partnering with other manufacturers to produce innovative products, and take care in attracting and securing human resources and skills.
- In terms of trade, metalworking companies at EU are phasing increasing worldwide competition - unfair trade imposed by third world‘s competitors via price dumping, and import barriers set by third countries. Thus, much more needs to be done in order to tackle the challenges faced. Companies should not only follow the regulations set by the EU, but also take initiative to improve their business activities and become more competitive. However, not so much is known (especially in Lithuania) by metalworking companies what causes international success.
- Theoretical analysis of internationalization models has showed that despite the choise of company internationalization model – whether it is step-by-step or Born Global, all the models emphasize the importance of relationship building and networking which has become a very important factor in order to remain competitive in the global market.
- In terms of inter-firm networking, metallurgy companies‘ relations with their clients are usually subcontracting based. In addition, the network integration with clients is quite weak – manufacturers are exchanging information only with their direct clients – they do not know the end customers. In addition, networking with competitors seems to be low, or if it is hapenning it is not announced in public. There is one metalworking cluster joining several manufacturers in Lithuania, however, it does not seem to be strong, especially when comparing to metalworking clusters abroad.
- Empirical reasearch has showed that networking with direct and (or) indirect competitors is important in order to successfully internationalize. Other important factors are investment in experimental activities, creation of innovative products, fast internationalization and having well-known company as a client.
- Results of company survey show that in fact successful companies are partnering with their competitors (mostly indirect) in various ways – starting from providing subcontracting services ending at co-creation of innovative products. Another factor making metalworking companies successful is the use of *focus strategy* – they concentrate in producing products which are very specific, or concentrate in such business area which allows them to create products with more added value.

— The research has also showed that belonging to competitive or not metalworking sector does not make the company successful or not in internationalization process by default. In other words, companies from not competitive sectors can internationalize successfully, if they will find the need for some niche products in foreign markets and will concentrate on their production.

— All the important factors for successful metalworking companies' internationalization impose the model of *Born Global through organizational networking and focus strategy.* By Born Global fast internationalization is emphasized only – empirical research has showed that the number of first export markets entered does not influence the success of internationalization. Therefore market concentration strategy could be used instead of market diversification which is more costly to implement at the beginning of internationalization.

— The proposed internationalization model does not include the governmental suport. Differently from theory which states that export promotion programs are important to foster the internationalization of the companies, the empirical research has showed that it is not significant factor of metalworking companies' internationalization. On the other hand, companies from competitive but having low export share sectors were not interviewed, and it might be the case that EPPs would help the companies from these sectors to boost their exports. Thus further research could be done in this field.

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ANNEXES