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**THE GROWTH BOTTLENECKS IN THE HIGH-TECH MECHANICS
INDUSTRY IN OULU AREA**

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The purpose of the study was to find out the growth potential and the view of internationalisation in the local high-tech mechanics companies in Oulu area. In this study, the resource-based view is emphasised in the evaluation of growth potential. The case study method is used. The issues that should be taken into account, while studying the growth potential of high technology mechanics industry, are presented in the theoretical part of the study. In the empirical part the growth potential of high technology mechanics companies in Oulu area is evaluated. In the end of this paper the way to take advantage of the existing growth potential in the high technology mechanics network is presented.

Keywords: Growth, Growth potential, Internationalisation, Networks, High Technology Mechanics

JEL - code(s): O40, O41, O32

1. Context

The study was accomplished in co-operation with the University of Oulu, the CIM2005 -project and the companies involved in CIM2005 -project. CIM2005 -project, that is in the focus of this study, is a regional education and research project focused on constructing the functional centre of research, product design, production and education in the business area of high technology mechanics.

Through the 1990`s the electronics industry was growing rapidly in the city of Oulu in northern Finland. A remarkable leap taken by electronics industry led to structural change in the high technology mechanics field. Traditional mechanics industry responded and started to focus on high technology mechanics. In the beginning of the millennium the industry of electronics faced the global changes that forced to rationalisation efforts. Rationalisation inside electronics industry led to rationalisation actions in the business relationships between electronics industry and high technology mechanics industry. The starting point for this study was the interest of different parties to define the current growth potential of local high technology mechanics companies and the view of internationalisation after the faced changes.

The research problem and research questions of the study were built up after the need and the meaning of the study were clarified. The research problem is: What points of view come out from the research dealing with the growth potential and is it possible to clarify the growth potential of the real network from these points of views? The three research questions are defined to go deeper into the problematic of the local network. First has to be found out which points of view are the most appropriate when the growth potential of the companies focusing in high technology mechanics is being clarified. The second research question is: What is the growth potential of the CIM2005 -network from these points of view? The third research question is: What actions should be taken into account while utilising the growth potential of the network the most successful way?

The base for selecting case study to be a research method for the study is built on Yin (1989) and Järvinen (1999). Yin (1999) shows that in case study can be shown both qualitative and quantitative evidence. Järvinen (1999) highlights the possibilities of the power of case study to clarify the complicated processes and to obtain new knowledge.

The body of the study (Figure 1) is built on theoretical and empirical parts. In theoretical part is defined how the study is connected to the literature, how the theoretical base for the study was constructed, and how the case study was built up on that base. The first move in theoretical part was to find the most important definitions and the basic growth methods in the literature. Examining the connections of the growth models to the growth of high technology mechanics industry was the second move. The next step was to examine the growth factors as potential growth bottlenecks. The possibilities of marketing and technology points of view and the views that co-operation and internationalisation offer, were examined at the end. Empirical part of the study is deeply rooted in theoretical part of the study. Case study was tested first by the case study trial to make sure that the study works as it was planned to. The period of empirical data collection and analysis was started after the case study trial. The result – answering to the research questions former presented – was built on theoretical and empirical part of the study.

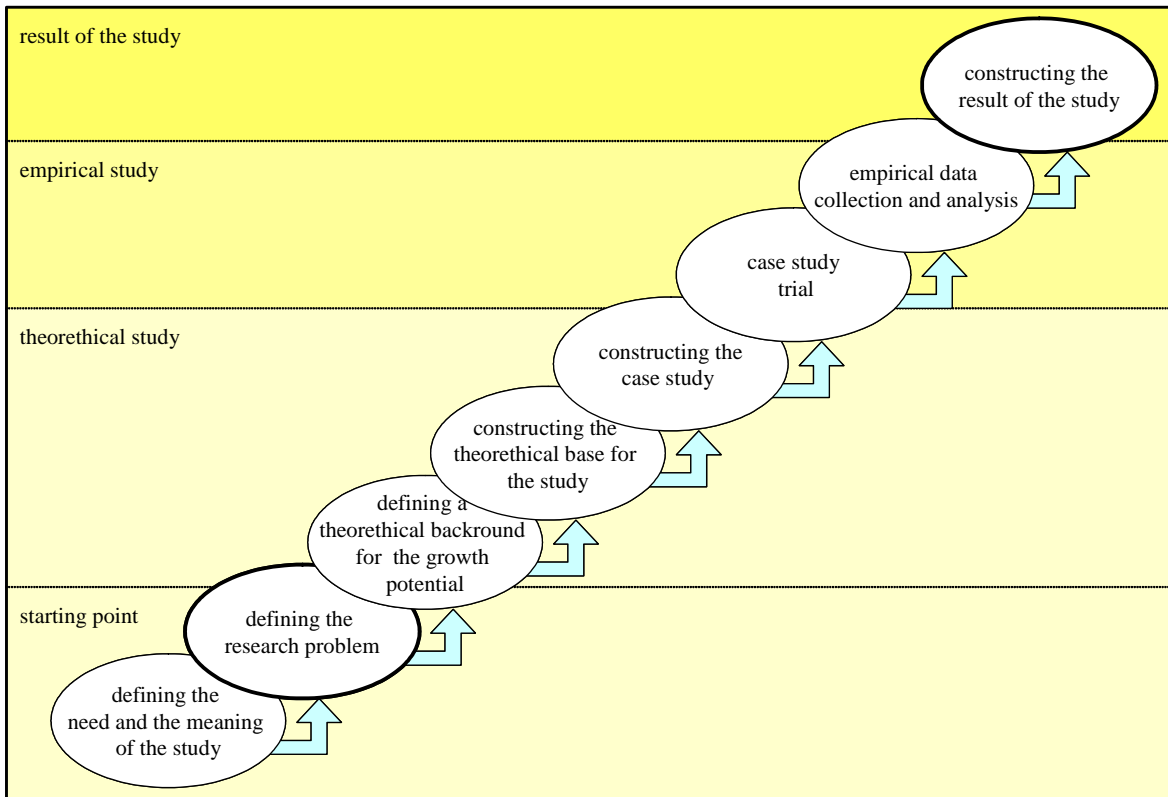


Figure 1. The outline of the research

2. Theoretical background

There is no existing definition for a high technology mechanics company. So the definition of high technology mechanics was derived from the former definitions of high technology (Tesfaye 1997) and technology intensive company (Salonen 1995; Autio 1994). A high technology mechanics company is research- and product development intensive company whose continuous aspiration to valuable, rare and inimitable knowledge in high technology mechanics leads to new or enhanced products and services (Tesfaye 1997; Salonen 1995; Autio 1994).

The theoretical background of the study is built on the foundational theories of the growth (Figure 2).

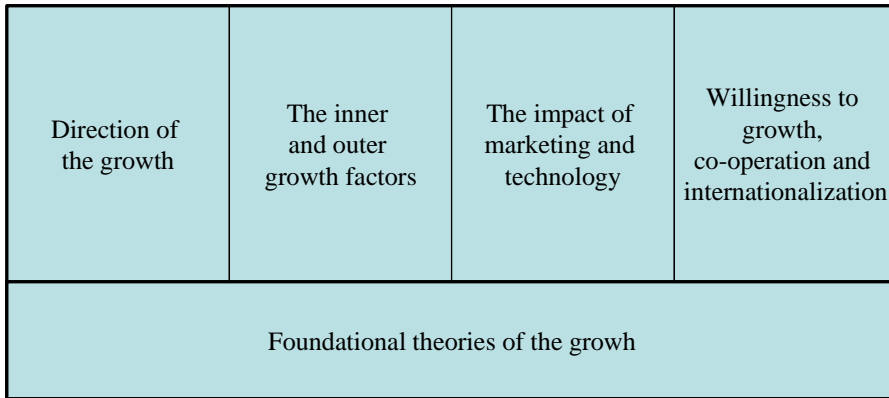


Figure 2. Theoretical background of the study

The foundation includes the clear definitions of the important growth related terms as growth (Virtanen 1999; Laukkanen 2000), growth potential (Lumme 1994) and growth speed (Neilimo & Pekkanen 1996), and the selection of the growth models that successfully describe the growth characteristics of the high technology mechanics industry (Lahti 2002, Moore 1998, Autio 1996). The life cycle model of innovative growth company (Lahti 2002) describes successfully the growth characteristics of new technology venture starting from the innovation. Autio (1996) shows that a life cycle is not fixed entity, but a company can change its position rapidly through different phases and also lock into one phase for a long time. The marketing based growth model (Moore 1998) opens the view how a high technology company can be thought to have unlimited potential for growth.

According to Laukkanen (2000), the growth of the company can be both quantitative and qualitative growth. Virtanen (1999) mentions these two directions of the growth too but points out the third one, the growth of the company's market value. From these points of view is constructed a three-dimensional growth portfolio that illustrates how a company can grow bigger (quantitative growth), wiser (qualitative growth) and more valuable (growth of the market value). The idea is introduced in Figure 3.

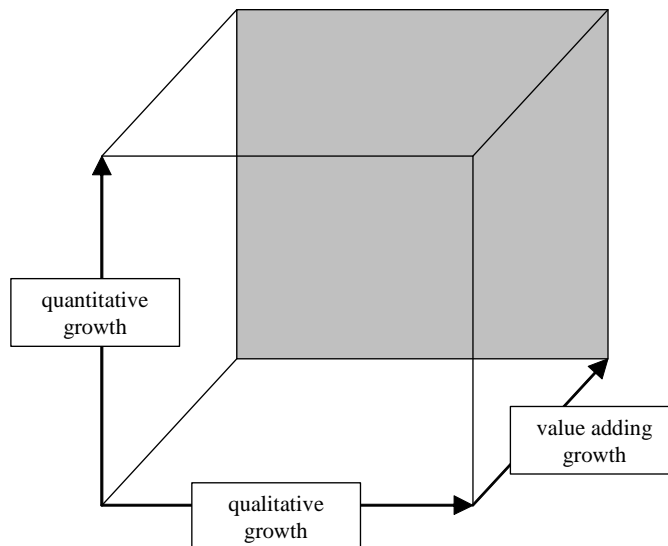


Figure 3. The three-dimensional growth portfolio

The growth factors can be divided into inner and outer growth factors (Birley & Westhead 1990; Kuisma et al. 1993) Further the inner growth factors are dividable into entrepreneur related growth factors and company related growth factors. Outer growth factors are dividable into business environmental and institutional growth factors (Laureen 1996). By analysing the importance for future growth, and the present condition of the specific growth factors selected from the list and estimated by the interviewees, it is possible to define the bottlenecks of growth in the industry of high technology mechanics in Oulu.

Both marketing and technology has influence on the growth of the company as well as financing and personnel (Yli-Renko 1996). In this case study we focused on the influence of the first mentioned marketing and technology. Marketing and technology are seen in high technology mechanics companies seen as contradictory issues. Success of the company is not built on the technology or marketing know-how alone but on the right combination of these two (Brochhoff & Pearson 1992; Salonen 1995; Smallbone et al. 1995).

Creating credibility is one of a challenge for the marketing of high-technology companies. In highly specified and narrow product sector the home markets will soon be filled up and the natural direction to continue to grow is the international markets (Pesonen & Muurinen 1994). In the network it is possible, from the marketing point of view, to exploit more effectively the existing distribution channels, gain strong references, grow critical mass, and built joint international brand (Håkansson & Snehota 1989; Yli-Renko 1996; Yli-Renko & Autio 1997).

In developing new technologies there are three groups of actors; universities, other research institutions, and companies supporting each other locally. To co-operate with the three groups of actors it is important for the individual high technology company to employ all possible technological support available as well as it is important for the local actors to be in contact with the best international centres of knowledge (Malinen 2001; Tuominen et al. 2002).

Will to grow, to co-operate with other companies and to reach internationally significant position is important indicator of the growth potential of the company and the industry. Co-operation decreases the problems of being a small company (Kuisma & Eränheimo 1993). The success of the network depends on the success that the whole business of the network is capable to bring out (Ahlstedt 1992). For new technology ventures the wall between the home markets and the international markets is high. The international markets stage requires more knowledge, power and resources than home markets (Myllyniemi et al. 1990). One reason why internationalisation is seen as the way to growth is that internationalised companies have reached better profitability level compared to the similar companies that has concentrated on the home markets (Lindell & Karagozoglou 1997; Kuisma & Eränheimo 1993).

3. Empirical study

The empirical part of the study was carried out in the beginning of the year 2004. The interviews are divided in two categories; the base sample of the study includes 24 high technology mechanics companies and the comparative sample includes five successful examples of fast-growth companies in the electronics industry. All these companies are located in the Oulu area. Interviewee was in most cases the person who is responsible for the growth of the company such as chief executive, development manager, or in very few cases', some other person who has the

required knowledge of the growth of the company. Interviews were planned to be conversational meetings with the qualitative questions and quantitative questionnaire and coffee; interviews took about 2 hours in each company.

Implications are based on the interviews mentioned above, material published on the company web-pages and participation to the meetings and to other activity of CIM2005 -project. This material was compared to the literature-based views handling the issues of growth.

4. Results

The high technology mechanics companies can be classified into four categories according to their size (Kallio 2002) and their position in distribution channel. Companies can be divided to a micro (number of employees <10), small (9< <100), medium (99< <250) and big size companies (<250). On the other hand, the companies can be divided to subcontracting companies, contract manufacturing companies, strategic partners and product developing companies. Subcontracting companies are selling the machine- and manpower to the main supplier. Contract manufacturing companies are more capable to co-operate with main supplier in phases of product development and manufacturing. The business idea of partners is to be able to control bigger parts of main suppliers business. Product developing companies focus on developing their own product. The classification of the studied high technology companies is presented in the Figure 4. The biggest part of the participants was small sized companies.

	subcontracting	contract manufacturing	strategic partnership	product developing
big company (249- employees)		x x	x ^x	x
middle-sized company (100-249)				
small-sized company (10-99)	x x x x	x x x	x x x x x	x x x x x x
micro-sized company (1-9)		x x		x

Figure 4. Classification of the studied high technology companies

Most of the studied companies are 20 years old or younger. Companies are operating in different branches of industry like electronics and telecommunications industry, welfare technology, security technology, usability technology, automotive industry, engine and equipment industry, metal industry etc.

The global changes in the electronics and telecommunications industry have influenced parts of the industry of high technology mechanics strongly. One entrepreneur commented the structural change as follows: “The line of business grew rapidly from 1995 until the market disturbance that started in the beginning of the 2001. Since 2001 has the line of business came down and the business was lost to China and other low cost countries. The electronics and telecommunication industry is not going to reach the same level of growth that was seen in 1990’s...” In the recent years, the consolidation has taken place in the field. The product design and testing has remained competitive business areas. That is why the prototyping and small scale production has not faced the same kind of drop than a mass production. Influence of the changes in other branches has not been nearly comparable to the influence of electronics and telecommunications industry.

The inner growth factors seem to be more important for the growth of the company than the outer growth factors. This gives us a message that there is more power inside than outside the companies to control the future growth.

The interviewees were first asked to estimate the significance of the list of growth factors for the future growth of the company and then to estimate the condition of the same factors in their company. By comparing the results was found chasms between the growth factors’ significance for growth and the condition of the factors in the companies. These chasms are factors that are, on the average estimation of the interviewees, important for growth but now in bad condition. The broadest chasms can be called the growth bottlenecks in the cluster of high technology mechanics in Oulu. The most significant bottlenecks of growth are presented in the Figure 5. The most critical bottleneck is the lack of marketing knowledge and after that come the incompetence in establishing network relationships. The strongest need for development can be found from these growth bottlenecks.

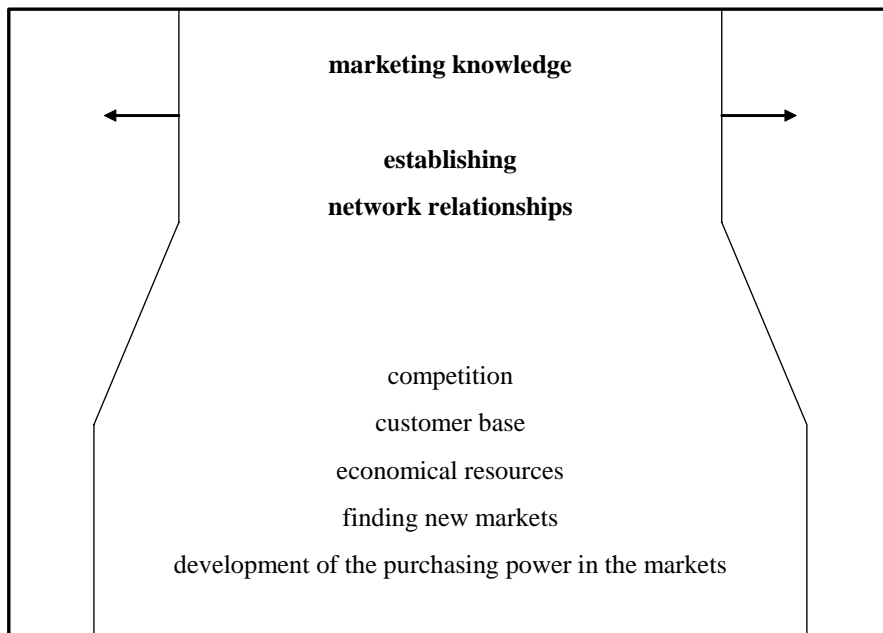


Figure 5. The bottlenecks of growth in the industry of high technology mechanics in Oulu

Developing marketing knowledge is the most critical objective for development in the future of high technology mechanics network in Oulu. Marketing knowledge was estimated the most significant growth factor in too. The second critical objective for development is to find competence in establishing network relationships. Establishing and developing network relationships helps to increase the agility of the network and ability to function according to shared vision. As a result the credibility of the network increases. The competition was seen in many companies as a limiting factor for growth. Local competitors were seen more as a threat than a possibility to co-operation.

Companies have not been able to use all available technological support. The most commonly way to obtain technological support is to get it from the other companies. The technological support receivable from educational establishments and research institutes is estimated useless in many companies. It would be useful for the companies to seek to get all the receivable technological support from other companies as well as from the educational establishments and the research institutes. To become the well known best high technology mechanics network in the world it is important to be able to use all the receivable technological in the local network as well as to be in touch with the best international high technology mechanics networks.

CIM2005 network has connections to a wide range of different local and global markets. In the Figure 6 is shown the examples of the markets. Telecommunication and electronics sector is the biggest market of the network, but not the only one. Shared distribution channels in a well functioning network can open a broad view. In a network, a single company has a possibility to activate its full potential by serving with its core competence, not only single distribution channel but many of them. At the same way the whole network can co-operate to be able to respond to the big challenge in a single distribution channel. A single company can target its resources to its core competencies while the whole network can build together the solutions to big problems. Development of the marketing and co-operation skills is the way to built credibility in international markets.

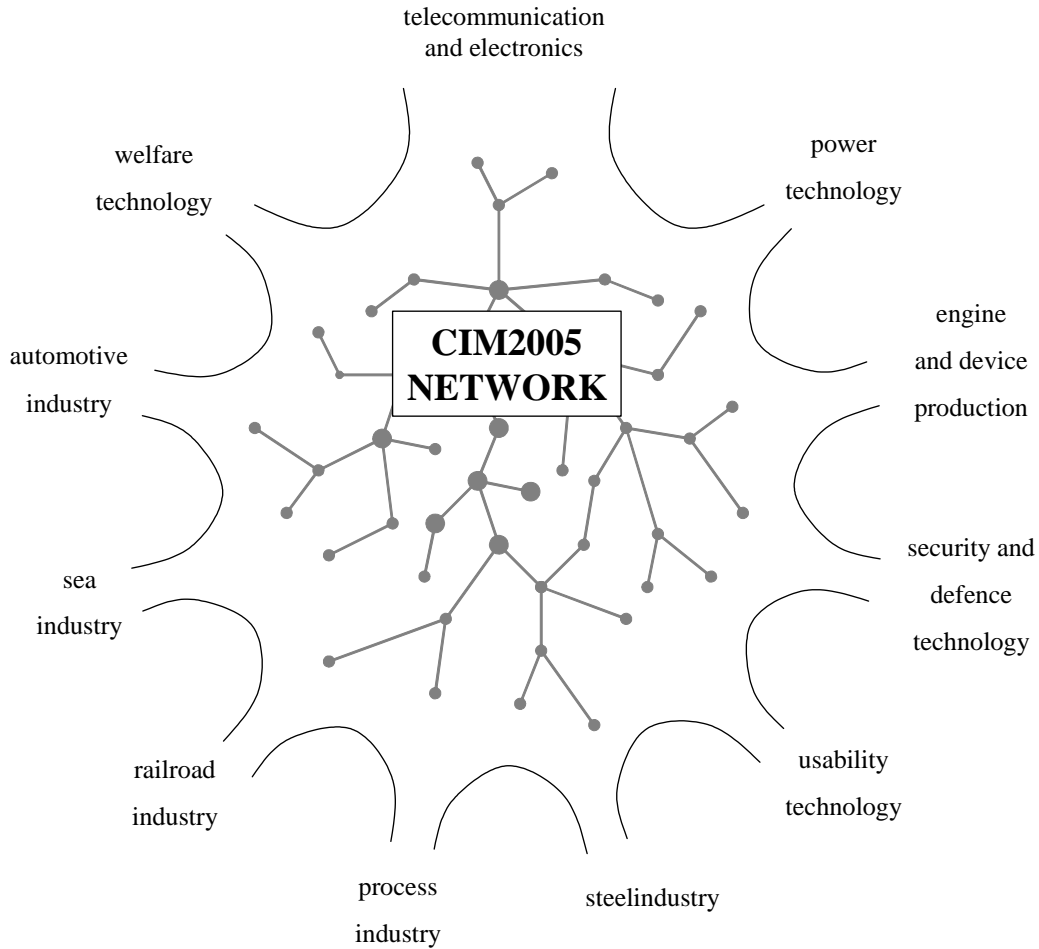


Figure 6. Examples of the market potential of CIM2005 network

A company can grow to be bigger, wiser and more valuable. Companies in CIM2005 -network try mostly grow bigger instead of growing wiser and more valuable. In a comparative sample the growth examples of the electronics industry take all three directions equally into account while planning the future growth. In the future the companies of high technology mechanics in Oulu should take into account all three dimensions of growth instead of just one. It is important to find the optimal balance between these three directions. Growth of one company to any of these directions can be seen as an advantage to a whole network because its credibility increases. In the Figure 7 is shown the required change in the direction of growth needed in the CIM2005 -network.

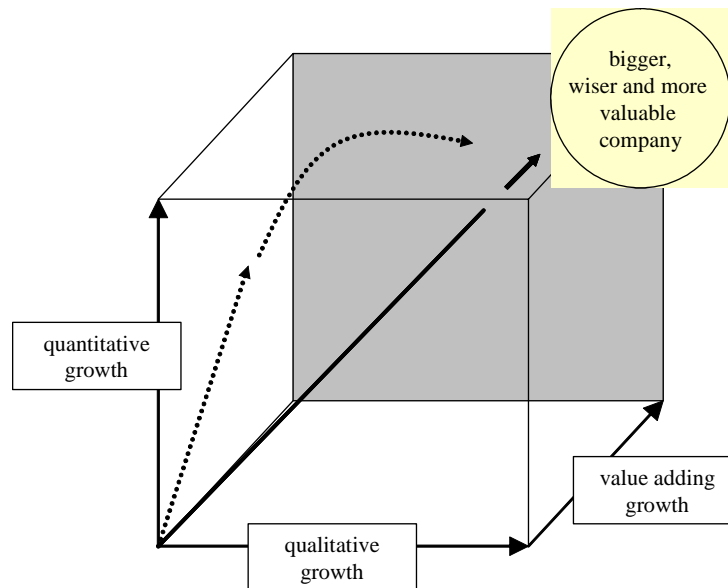


Figure 7. Directions of growth

The most important challenge for the companies of high technology companies in Oulu is to exploit the existing growth potential the best possible way. The key words for the success of the high technology mechanics cluster to find joint function and to increase the credibility of the cluster. By developing the marketing knowledge and by establishing network relationships the critical bottlenecks of growth can be expanded. Establishing the training for the entrepreneurs the knowledge of marketing and internationalisation can be increased. In CIM005 -network it is possible to create a joint brand that can be seen as unite from the market point of view. The network with well managed core competencies is more credible for the customer than a single company trying to work independently. The network is able to solve more challenging problems of a customer than a single company.

Conclusion

Case study has case descriptive, theory validating and theory creating natures (Järvinen 1999). The strongest contribution of the study is the description of the hi-tech industry of mechanics in Oulu area. Further the study creates operative contribution for the companies in their attempt to rapid growth and internationalisation. This study offers scientific contribution for the community by describing the cluster of hi-tech mechanics, validating the theories of growth with empirical evidence and creating *the directions of the growth* -model.

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