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PROGRESSING TOWARDS 2023: THE TRANSFORMATION OF ORGANISED INDUSTRIAL ZONES IN TURKEY

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REPUBLIC OF TURKEY MINISTRY OF
INDUSTRY AND TECHNOLOGY

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This publication has been prepared within the scope of the "Technology Development in OIZs" project, which was undertaken in collaboration with the executive partnership of the Ministry of Industry and Technology and the implementing authority of the United Nations Development Programme as part of the Investment Programme.

500 copies have been printed from this publication.

Our sincere thanks to all the managers and specialists from Turkish public institutions; the Technology Development Zone managers; academics; development agency executives; the representatives of the Ankara Chamber of Industry and the Aegean Chamber of Industry; TOBB (the Union of Chambers and Commodity Exchanges of Turkey) executives; mayors; TTGV (Technology Development Foundation of Turkey) executives; all the OIZ managers and employees as well as the company directors including Adana OIZ, Ankara Chamber of Industry OIZ-1, Bursa OIZ, Demirtaş OIZ, Eskişehir OIZ, Gaziantep OIZ, Gebze OIZ, İzmir Atatürk OIZ, Konya OIZ, Manisa OIZ, Middle East Industry and Trade Center (OSTİM) and the Automobile Supply Industry Specialised Organised Industrial Zone in particular, for sparing their time and making valuable contributions to the preparation of this publication and the implementation of all fieldwork.

Technology Development in OIZs Project, Project Team

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THE REPUBLIC OF TURKEY MINISTRY OF INDUSTRY AND TECHNOLOGY

The Ministry of Industry and Technology gives long-term, low interest loans to Organised Industrial Zones (OIZ), which have immensely contributed to the development of Turkey's industry, and prepares industrial parcels complete with infrastructure for industrialists. 311 OIZs have been registered and given a legal entity status since the 1960s, and as of the end of 2017, the number of completed OIZ projects has reached 180. Over the last 16-year period, crucial progress has been achieved in the context of spatial development for industrial zones, and the steps that have been taken have positively impacted the economy in a short time. In the 40-year period prior to 2002, on average only 2 OIZ projects a year were completed, whereas within the past 16 years, on average 8 OIZ projects a year have been completed.

Today 53,000 firms have been operating within OIZs, employing 1.8 million people. OIZs provide firms with infrastructure service opportunities such as gas, electricity, water and environmental planning, helping to reduce their financial burden and increase competitive capacity.

To add to the strength of the industry and to further increase competition, we have to structurally transform production. Digitalization will play a very important role in this structural transformation. Turkey has to participate actively in this process, which includes important opportunities for both its industry and its workforce. To this end, the Ministry is working with all its strength together with its stakeholders.

This study is focused on the question of how OIZs can further contribute to companies' successful transformation and increase their capability to innovate, which will be an important source of reference in bringing suggestions on how to achieve our medium- and long-term goals.

The "Technology Development in OIZs" Project was undertaken in partnership with the Strategy and Budget Office of the Presidency (Former Ministry of Development), the Ministry of Industry and Technology, and the United Nations Development Programme (UNDP). This study, a concrete output of the project, has been prepared as a result of extensive and lengthy fieldwork, aiming to develop a model to support the transformation of OIZs in production through a technological and innovative orientation. I thank everyone who has contributed to this study, which has determined the technology-based needs of firms and how OIZs can find a solution to these needs, and I also congratulate the authors who turned this research into a concrete publication.

Mustafa Varank
Minister of Industry and Technology

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The United Nations Development Programme (UNDP) has been supporting the national development priorities and innovative solutions for over 50 years in collaboration with the Turkish government, with a focus on inclusive and sustainable growth, inclusive and democratic governance, climate change and environmental issues. Innovativeness, gender mainstreaming studies, and collaborations with public and private sectors are at the center of all of the studies that we have been working on.

The Ministry of Industry and Science has been one of the most important partners in our studies undertaken in Turkey. Our joint initiatives in the field of competitiveness have made Turkey's first R&D and innovation-oriented clustering support programme possible, as hosted by our Ministry. The Cluster Support Programme, which has been continuing since 2012, is also a source of pride for UNDP Turkey. Similarly, the first integrated industrial development plan concluded with an investment in Şanlıurfa amounting to billions of Turkish liras in 2011 and created job opportunities for thousands of people, was undertaken via the collaboration of the Ministry and UNDP.

In addition, forward looking research studies that turned into prioritised Ministry actions were initiated. At the SME Capacity and Transformation Centers, which we were proud to have contributed towards during the implementation stage, our feasibility study on the productivity-based policy instruments has now been transformed into a state-owned policy instrument through additional funding and technical support.

We feel a great excitement in publishing this publication, an important knowledge product guiding the path to transform the Organised Industrial Zones, so that they can play a more specific role in technological development through the promotion of new generation services. We are pleased to have the opportunity to re-shape one of the most effective and efficient policy instruments of the Turkish government and contribute to this important process from the perspective of inclusive and sustainable development.

We believe that this experience in Turkey has made concrete progress towards reaching the Sustainable Development Goals and displaying positive transformations that contribute to the goals within the 2030 agenda.

I would like to thank the project team and authors for their valuable contributions in putting this important policy document into practice. We hope to continue our fruitful collaboration together to put our joint signatures towards building concrete results that will ensure Turkey has a stronger and more robust economy.

Claudio Tomasi
United Nations Development Programme Turkey

CONTENTS

ABBREVIATIONS

EU	European Union
EUBDC	European Union Business Development Centres
AOIZ	Adana Organised Industrial Zone
R&D	Research and Development
ACI OIZ-1	Ankara Chamber of Industry First Organised Industrial Zone
BASTA	Bilkent University Acoustics and Underwater Technologies Research Centre
See.	See
BLIS	Ankara Private Bilkent Laboratory Schools and International School
BOIZ	Bursa Organised Industrial Zone
BOTAŞ	Petroleum Pipeline Corporation
BSO	Bilkent Symphony Orchestra
MoIT	Ministry of Industry and Technology
BCIC	Bursa Chamber of Industry and Commerce
BUTEKOM	Bursa Technology Coordination and R&D Centre
DOIZ	Demirtaş Organised Industrial Zone
EOIZ	Eskişehir Organised Industrial Zone
ERP	Enterprise Resource Planning
GAOIZ	Gaziantep Organised Industrial Zone
GOIZ	Gebze Organised Industrial Zone
REIT	Real Estate Investment Trust
HAB	Ankara Aerospace Industrial Zone
IPA	Instrument for Pre-Accession Financial Assistance
ITRI	Taiwan's Industrial Technology Research Institute
İAL	Centre for Advanced Studies
İAOIZ	İzmir Atatürk Organised Industrial Zone
İSYAM	Communications and Spectrum Management Research Centre
ITU	Istanbul Technical University
SMEs	Small and Medium Enterprises
KOI	Konya Organised Industrial Zone
KOSGEB	Small and Medium Enterprises Development Organisation
MOIZ	Manisa Organised Industrial Zone
NANOTAM	Nanotechnology Research Centre
METU	Middle East Technical University
OEM	Original Equipment Manufacturer
OIZ	Organised Industrial Zone
OIZIW	Organised Industrial Zones Information Website
OTAM	Automotive Technology Research and Development Center
ÖSYM	Measuring, Selection and Placement Centre
RFP	Request for Proposal
RTÜK	Radio and Television Supreme Council
TEKNOSAB	Bursa Technology Organised
TEYDEB	Industrial Zone Technology and Innovation Support Programmes Directorate
TDZ	Technology Development Zones
TOSB	Automobile Supply Industry Specialised Organised Industrial Zone
TTGV	Technology Development Foundation of Turkey
TTO	Technology Transfer Office
TAI	Turkish Aircraft Industries Corporation
TÜBİTAK	The Scientific and Technological Research Council of Turkey
TurkStat	Technological Research Council of Turkey Turkish Statistical Institute
UMRAM	National Magnetic Resonance Research Centre
UNAM	National Nanotechnology Research Centre
UNDP	United Nations Development Programme
YÖK	Council of Higher Education

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EXECUTIVE SUMMARY

PHOTO 1. GEBZE OIZ

The main objective of this study is **to increase the contributions** of the Organised Industrial Zones **to Turkey's competitive capacity, national economy, industry on sectoral basis, and regional and local development** in a world where topics such as the knowledge-based society, innovation and digitalization through R&D are heavily discussed today.

In line with the priorities set out in the 9th and 10th Development Plans, the "Technology Development in Organised Industrial Zones Project" was designed and put into practice. The project has been undertaken with the support of the Strategy and Budget Office of the Presidency (Former Ministry of Development) and with the executive partnership of the Ministry of Industry and Technology (MoIT) and the implementing authority of the United Nations Development Programme (UNDP).

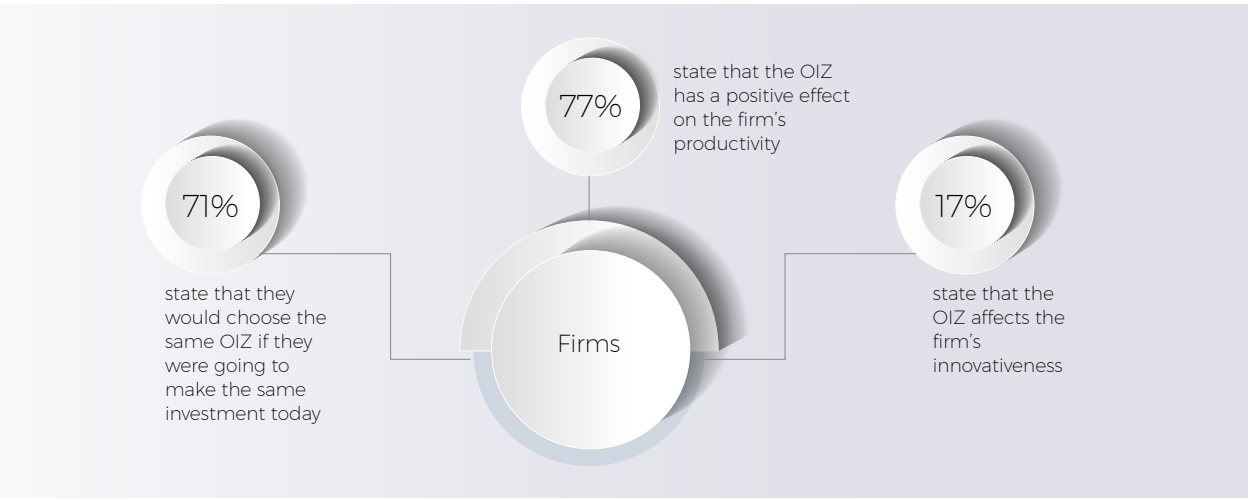
A total of 293 face-to-face interviews were conducted in 12 Organised Industrial Zones (OIZ) located in 9 provinces between March 2017 and January 2018. The effects of OIZs on the firms and the needs of the firms in technology related issues were determined through extensive fieldwork. The fieldwork examined how OIZs can provide better services based on the firm's innovation needs.

This study summarizes the research's field results conducted within the scope of the "Technology Development in OIZs Project". Through fieldwork, the impact of OIZs on the firms were evaluated, and the needs of the firms on technology-related issues were determined. Also, research was carried out to find out what kind of a model could assist OIZs to provide solutions for the firms' needs.

Impact Assessment

It is understood that firms are generally satisfied with the services provided by OIZs and that they choose OIZs especially for the factors such as high-quality infrastructure and a foreseeable investment environment.

One of the results of this research is that OIZs indeed make a positive contribution to the productivity of the Turkish industry. Hence, OIZs have an important role in our national economy's transformation into a productivity-based economy.



On the other hand, OIZ impacts on innovativeness are not at the expected level. The fact that OIZ impacts on productivity are high while the impacts on innovativeness are low indicates how important is to update the services provided by OIZs while Turkey is switching from a productivity-based economy to an innovation-based economy[1].

Looking at how the firms evaluate the OIZ functions in terms of service items, it is observed that the 5 basic functions, i.e. Infrastructure, One Stop Office, Supervision, Superstructure Services and Emergency Services, received 4 out of 5 points across the 12 OIZs interviewed. In other words, the firms think that OIZs have high effectiveness in these areas. However, the firms rate the effectiveness of OIZs in technology-related new generation services low, as they give such services 2.7 points out of 5.

Needs Analysis Results

The three service items with the highest need-effectiveness gap are highlighted as the (1) establishment and operation of Technology Development Zones (TDZ) within OIZs; (2) organisation of capacity building programmes for digitalization and Industry 4.0 and (3) activities for developing the university-industry cooperation (Technology Transfer Office-TTO). While the firms ranked their need for these three services at an average of 4.3 points, they gave only 2.5 points for the impact level. Immediately following these three services are the functions of pairing with mentors, new market development (for supporting internationalization) and investment promotion (attracting strategic investors with advanced technology).

1 World Economic Forum Classification

Model Alternatives

Model 1: Establishment of New Structures for Technology Usage in OIZs (Interface Model)

Specialised new interface structures can be established in order to provide services that will support the firms' technology usage in OIZs. Alternatives that can take place include a joint TDZ or TTO with a university; a joint market development centre/competency and digital transformation centre (model factory) or an innovation centre with a chamber of industry; a joint testing centre with a sector association/university; and a joint R&D organisation with a foreign research centre. According to needs, not only bilateral but also multi-cooperation options can also be considered. The success of this model depends on the correct construction and implementation capacity of the management style and governance structure, business model, financing model and service menu.

Although they are few in number today, it is seen that some OIZs are trying to establish similar structures by collaborating with different local organisations in pursuit of using different means to offer services to the firms operating within them. Among examples of such structures are Gebze OIZ Technopark; Innopark in Konya OIZ; SME Competency and Digital Transformation Centre (Model Factory) in Ankara Chamber of Industry OIZ -1; BUTEKOM in Bursa Demirtaş OIZ; and OTAM Test Centre in TOSB. However, as can also be seen from the results of the impact assessment, most of these structures cannot provide the desired impact today. Problems in the governance structures of these centres, firms failing to demand these services sufficiently, and problems in the business model/financing structure limit the impact of these structures.

The process of implementing this model can be considered as a two-stage process. While focusing on capacity building in the first phase, different services can be offered to firms on issues related to the use of technology through the establishment of new units in OIZ Managements. In the second stage, interface structures can be created through cooperation between OIZs and the institutions that have the expertise and experience in the fields needed by the firms. Also, services can be provided to the firms regarding the use of technology through such structures. The critical functions that are considered beneficial to focus upon in this context have been detailed:

Technology Transfer Office
Research, Application and Competency Centre
New Generation Technology Development Zone

Model 2: Designing and Management of Multifunctional New Generation Zones (Industry and Technology Cities)

Today, OIZs act as structures which are predominantly engaged in manufacturing and where other functions such as logistics, education, social facilities, arts, culture and living spaces are quite limited. The international success of examples such as Silicon Valley in the field of technology development on the other hand, indicate high performance of zones that do not only focus on the production function but also include the other above-mentioned functions. Behind this phenomenon is the fact that while manufacturing is gradually becoming an activity with less added value within the stages of the value chain, the significance of activities such as design, R&D, and marketing increases in creating value. In addition to this process, the digitalization trends in the industry are increasing the need for a highly qualified workforce, while reducing the need for a blue-collar workforce. It is observed that the proportion of white-collar employees carrying out these activities rises in companies with high added value and even nears 100% in some industrial companies with advanced technology or high added value.

In the past, the OIZ model was built to be workplaces with about 5 to 10 percent of white-collar employees and 90 percent of blue-collar employees. In addition, while the authorities and the impact area of OIZs increased, there also had been a separation from the municipalities; in most places, OIZs' access to urban services and facilities provided outside their own area remained limited, particularly when considering public transportation services. Meanwhile, the digitalization trend may have offered opportunities that would optimise production and increase productivity, but at the same time, it has also created pressures on enterprises to make changes to their operations, processes and competencies.

In an era where digital transformation requires changes in human resources and the technologies used, **the requirement of preparing a suitable environment for such changes becomes inevitable.**

Therefore, a zone that would be able to host highly value-added firms which are needed by Turkey, that use and develop advanced technology - as well as their employees - should be designed in a manner that involves production areas with a high number of white-collar employees whilst being in line with their needs and expectations.

It is thought that such a zone can include rentable and scalable/modular production areas, research centres, test centres for high-tech companies, while the immediate or close surrounding of such a zone can have houses where white-collar employees can reside in, with local primary and secondary schools providing high quality education, day care centres and kindergartens for employees' children, hospitals, as well as social, cultural and recreational areas.

The most important factor that necessitates such a model is the speed of urban development. The time that employees spend on the road while commuting, as well as the noise and chaos brought about by the city life, means there is not enough time for people to do their daily activities. Therefore, going to hospital, taking children to kindergarten, or participating in daily sports activities turn into activities that require extended periods of time due to the commute time spent on the road.

In addition to providing services such as kindergartens, schools, and primary health care services in the zone, providing services for the most time consuming errands for the employees, such as notarial and e-government transactions, can be considered. However, if a holistic approach is taken at the development of the zone, it is clear that the existence of high quality living spaces together with green spaces located not directly within the industrial zone but within a close range would turn the region into an attraction centre.

Especially considering that the innovative classes tend to choose a region, instead of a country or a city to work and live, it will only be possible to attract this class to high-tech production areas by creating such centres of attraction. The success of this model depends on the governance structure, the effectiveness of yet-to-be-established public-private-international collaborations, and a high level of political ownership at both the national and local levels.

INTRODUCTION

Organised Industrial Zones became established in Turkey during the planned development period. In this context, the public authorities give long-term, low interest loans to Organised Industrial Zone Entrepreneur Committees and prepare industrial parcels complete with infrastructure for industrialists.

PHOTO 2. İZMİR ATATÜRK OIZ

Turkey has an important experience when it comes to OIZs. 309 OIZs have been registered and given a legal entity status by the Ministry of Industry and Technology since 1962. The number of OIZ projects completed through public loans is 152. Taking into account 2018 prices, loans amounting to a total of 6.1 billion TL were allocated for such projects, of which approximately 5 billion TL were allocated for completed projects and 1.1 billion TL for on-going OIZ projects.

In the period since 2002, the number of OIZs increased from 70 to 152, and the number of industrial parcels created rose from 17,000 to 65,000. During the same period, the number employed in the firms operating within OIZs increased from 370,000 to 1.8 million. As can be seen, thanks to the public policies followed, crucial progress was experienced with very important advancements achieved in the context of spatial development, for industrial zones in Turkey after 2002.

Therefore, there is no problem with establishing an OIZ or opening new areas by investing and the OIZ support mechanism is being developed further daily with improved operations. On the other hand, the fact that OIZs in Turkey are structured through construction, zoning and municipal work can prevent OIZs from contributing more to entrepreneurs. In this context, is it possible for OIZs to contribute more to industry and firm transformation, as well as becoming more innovative and digital? More active OIZs will contribute greatly to the transformation of Turkey's industry. That is why the transformation of OIZs stands out as a truly significant topic.

Although OIZs managed to solve a fundamental problem of the industry in the past, today they are not sufficeint enough for solving such problems. While Turkey is changing from a productivity-based economy to an innovativeness-based economy, the basic needs of firms are changing too. Firms, which first focused on low cost production and then on quality, today need to increasingly enter into areas such as design, R&D, digitalization, global marketing and providing genuine solutions, all of which will boost their competitive capacity (Cansız, 2010:106-112).

Besides the infrastructural and municipal work services of OIZs, such as land allocation, gas, electric, water and environment, it is thought that it is possible to switch to a new model which can be built as an interface to increase the innovation, productivity and digitalization capacities of OIZ firms'.

Organised Industrial Zones are one of the most important political instruments in Turkey's industrialisation and urbanisation history. The success behind an OIZ, which is a model peculiar to Turkey, derives from the fact that an OIZ solves a concrete problem in the field by using central and local dynamics together.

Likewise, because OIZs can have the same stance towards both the innovative firms and the public enterprises, it is thought that OIZs will potentially have successful opportunities with interfaces to be built. To meet this need, the main purpose of this project is to create the scientific basis on how to transform OIZs, and how to transform the industrial zones practices, also known as the components of industrial policy, essentially into OIZ 2.0 in order to contribute further to the 2023 goals.

How can OIZs contribute to this process while the needs and priorities of the firms change? Should OIZs continue to focus on the role they had in the past, namely the function of providing an investment place and infrastructure, or should they assume a new role in our country's transformation into an innovation-based economy? If there is a role that OIZs can assume in this process, what kind of new OIZ model should be used to realize this? How should OIZs be positioned in the technology ecosystem which involves central institutions and organisations such as the Ministry of Industry and Technology and TÜBİTAK, as well as technoparks and nongovernmental organisations? Within this scope, the public needs programmes and projects to increase the effectiveness and successes of OIZs (Cansız, 2010: 112).

Thus, the main objective of this research is to increase Organised Industrial Zones' contributions to the competitive capacity of Turkey, the national economy, industry on sectoral basis and, regional and local development in today's world where the topics of a knowledge-based society, innovation and digitalization through R&D are discussed heavily.

To seek answers to these questions, in line with the priorities set out in the 9th and 10th Development Plans, the "Technology Development in OIZs Project" was designed, and it was included in the 2011 Investment Programme by the Strategy and Budget Office of the Presidency (Former Ministry of Development). The project has been carried out with the executive partnership of the Ministry of Industry and Technology and the implementing authority of the United Nations Development Programme. Under the project, fieldwork was undertaken in 12 OIZs in 9 different provinces between March 2017 and January 2018. A total of 293 face-to-face in depth interviews were conducted during this time. Through fieldwork, the impact of OIZs on the firms were evaluated and the needs of the firms in technology related issues were determined. Also, research was carried out to discover what kind of a model could help OIZs provide solutions for the needs of the firms.

The project has been shaped using three main components:

1. Creating a synthesis report which includes legislative reviews, the place of OIZs in technology investments, field analysis results, reviews of successful international cases along with analysis of the current situation, analysis of the legal and institutional framework, and a determination of the general situation;

2. Determining the pilot OIZs and pilot schemes, evaluating the results of the pilot schemes and developing scaling and application suggestions by using the knowledge gained, all guided by the synthesis report prepared using the current situation analysis;

3. Awareness raising and competence development programmes for relevant organisations. In the first stage for OIZ Managements and MoIT Staff, a determination of complementary tools aimed at addressing the primary needs for competence development programmes along with the development and application of programmes towards pilot OIZ Managements and MoIT Staff.

This study covers the main findings of the project's first component (the research process) and the recommendations for the model to be developed. It consists of six sections:

- The first section gives the conceptual framework for OIZs along with a brief assessment of the industrial zones in Turkey and globally.

- The second section summarizes the research method and its stages.

- The third section introduces the general characteristics of the firms interviewed within the research's scope.

- The fourth section evaluates the impacts of the 12 OIZs included in fieldwork, on firms, from the perspective of productivity and innovation.

- The fifth section analyses the need for services that can be offered for technology development in the firms operating within the 12 OIZs, where fieldwork was conducted.

- The sixth section provides a framework for model alternatives that can be developed in OIZs in the light of qualitative and quantitative findings. In this context, the reason for the two alternative models offers recommendations on what services could be provided within the scope of the model, which OIZs and which types of firms would request such services at most, and lastly, what could be the fundamental principles and rules of the pilot scheme design.

- In the conclusion section, all the findings are discussed.

1 Conceptual Framework for OIZs

PHOTO 3. ACI OIZ-1

1.1. Background: Industrial Zone Experiences in the World and Implications for Turkey

Important political lessons are learned from the world's 50-year-old "special economic zone" practices. The main objectives of the "special economic zone" practices can be positioned under two titles, with direct or indirect dynamic impacts. With increases in exportation, creation of employment, increase in foreign direct investments, reduction in current deficit, and improvements in public financing can be given as examples of direct impacts. Indirect impacts can include the development of skills in the workforce and management staff, technology transfer, forward and backward linkages, demonstrative effect, diversification of exports and the increase of information on external markets which are globally targeted in cases around the world. Taking a look at case studies of implementation from around the world, 4,500 special economic zones can be counted, however, there are actually few success stories. These include the Shannon Free Zone in Ireland, which is the first case of implementation in the world, along with implementations in Hong Kong, the Shenzhen Zone in China, Incheon in Korea, Johor Iskandar in Malaysia and the Jebel Ali Free Zone in the United Arab Emirates. In majority of these zones, different types of collaborations are established between the public and private sector. The "developer companies" led by the private sector obtain the right to develop and manage these zones through long-term concession agreements and are also audited by the public administrations that are focused on these zones.

In this context, especially recently the emergence of India and the experience of the semi-private organisation established under a Japan-India partnership forthe Delhi-Mumbai Industrial Development Corridor attract attention. (Farole and Akıncı, 2011). Considering such experiences in the world, a series of success criteria can be defined for the industrial zones whose performance is above average.

Coming into prominence in this context are the location selection and level of connection, a holistic (coordinated/integrated) approach towards development, and performance (skills, export, innovation) oriented management models.

It is also possible to learn a series of lessons from the discussions on the innovativeness and entrepreneurship of cities. In these discussions, the focal point shifts from "parks" to cities. The quality of life and cost of living are becoming more and more important, and the social dimensions are increasingly meaningful too. The ecosystem approach then, gathers weight and the collaborative tools and platforms now become the focus of interventions (World Bank, 2016).

Studies on business competence also offer insight into the possible functions of OIZs. Business competencies (management quality, micro level productivity etc.), which were like "black boxes" in the past, can be better measured today and the literature in this area is developing rapidly. Seven critical factors which are determinant of Turkish firms' productivity levels in Turkey are highlighted: (1) Business models: Positioning in value chains, (2) Integration into global supply chains, (3) Access to information, innovation and technology transfer, (4) Inter-company collaborations and long-term customer relationships, (5) Use of modern production techniques, (6) Firm management quality and institutionalisation and (7) Labour productivity and human resources practices (KB, 2018). For OIZs, it becomes critical to define the target audience, and it is found to be advantageous to classify firms according to their competencies, and to design interventions and support according to these classes.

On the other hand, the university-industry collaboration should also be one of the important dimensions in the future role of OIZs (Cansız, 2010: 110). In this context, it is important to take a closer look at the academia reform discussions, what needs to be done for commercialisation and the characteristics of ecosystem operations. In particular, "multi-disciplinary" research infrastructures and the roles of non-academic program managers are gaining importance in academia.

Given the discussions on the localisation of industrial policy, a hypothesis can be established on whether or not OIZs will be the local component of the industry strategy. OIZs may have critical roles in local programs to be implemented in line with the national objectives (e.g. national security). While increasing the effectiveness of commercialisation processes, important roles can be assigned for OIZs in matters such as localising such initiatives, building public-private partnerships at a local level and enabling risk sharing (Block and Keller, 2015).

When the literature on spatial strategic planning is considered from an OIZ perspective, it can be said that the functional zone and corridor development approach stand out. These discussions consider the physical infrastructure, economic assets and social relations from a holistic point of view (Audretsch, 2015). Maintaining relations and interactions, especially at these levels, beyond administrative borders is considered a fundamental challenge in many countries. EU countries in particular are included, where innovative interventions are constructed. These interactions, which mostly develop spontaneously (organically), also bring an important function to OIZs. For example, although the Gebze region, which forms Turkey's main industrial backbone, is located within the borders of Kocaeli in administrative terms, it is affected by the developments in Istanbul and Bursa in terms of economic and industrial interaction. How to intervene in this phenomenon in the most effective way is a critical planning question. It is beneficial to take a closer look at the "Functional Zone" and "Economic Development Corridors" which have risen to prominence in recent years as a phenomena independent of administrative borders, as well as in particular the "Corridor Development Companies" tools which have reached the agenda of many countries. The Boston Technology Corridor, which is one of the world's successful implementations, has been a successful centre of attraction in terms of technology and has functioned as a magnet for companies. Important technology companies (Intel, IBM, Facebook, Twitter, etc.) have benefitted from the corridor's human resources and innovation potential.

An example of the zone's magnet function is the company General Electric, who moved its headquarters to Boston. **These phenomena, which are quite new to Turkey, can be an inspiration for the future of OIZ policies.**

2 Objective and Method

PHOTO 4. KONYA OIZ

2.1. Research Process

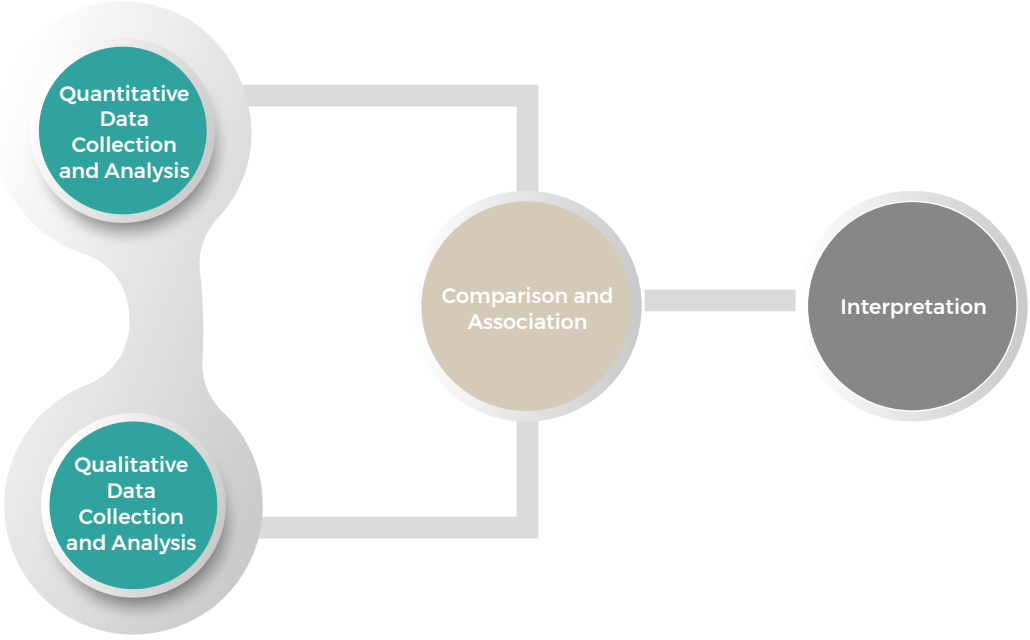
In order to achieve the objectives of the study, a research process consisting of three elements was followed: (i) preparation phase, (ii) field research process, (iii) findings synthesis and model development process. After the model development process, a focus group interview was planned to be conducted to discuss the research data and findings within the context of the case study. Following the completion of the research process, the other activities within the Project will be focused, such as field visits to examine implementation cases abroad, pilot schemes for models, and the capacity building components in the MoIT.

Design of Research

The fieldwork of this project has been designed as a mixed method research. In mixed research studies, qualitative and quantitative data are interpreted and evaluated by bringing them together. This approach makes it possible for the data collected through different methods and the information produced from such data to converge to each other, as well as to verify, clarify, broaden and exemplify each other. While in-depth interviews were conducted within the project to determine the current situation of OIZs and to obtain data on problems and solution recommendations for such problems, a method that collects quantitative data was used for the impact and needs analysis.

A simultaneous timing approach was adopted for the collection of quantitative and qualitative data. Also, a survey was conducted at the same time with the interviews. In this context, a mixed method model known as "convergent parallel design" in the literature was adopted in the field process. As part of this approach, the methods are given equal priority, the collected data is analysed separately and the results are combined during the general evaluation.

Figure 1. Mixed Method, Convergent Parallel Design Model [2]



Preparation Phase and Determination of Research Field (December 2016 - March 2017)

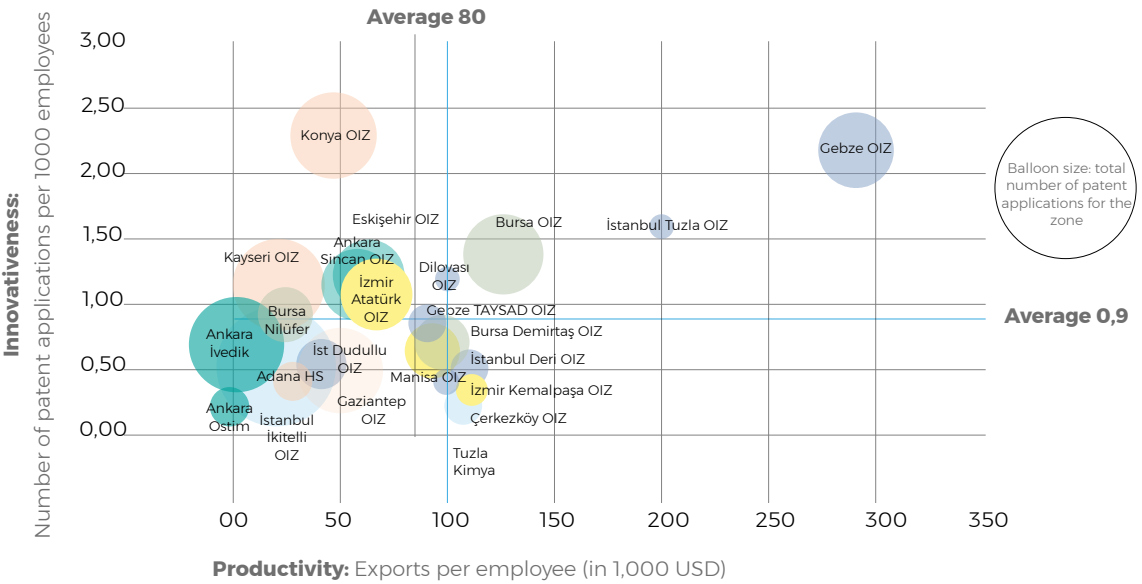
The research universe is composed of the Organised Industrial Zones in Turkey. By the year 2018, there are 309 OIZs in Turkey registered in the Organised Industrial Zones Information Website (OIZIW). The sampling method for this universe is a single-stage method, which is a method that can be used when the researcher can reach the complete list of the universe that can be sampled directly. For this research, the data related to the entire universe was reached. The suitability of the OIZs' structure for the research's purpose was taken as a basis in determining the selected sampling from this universe. Firstly, data analysis was undertaken to make sure that the OIZs for fieldwork are selected based on objective criteria.

2 Source: Creswell and Plano Clark, 2015

Data regarding every OIZ in Turkey was compiled from MoIT's database and from other public institutions. The data was grouped under three headings: inputs (electricity and gas consumption), size (employment, number of firms, export, etc.) and technology-innovativeness indicators (number of patent applications, number of R&D centres, number of TEYDEB projects). By analysing the data, a shortlist of 23 OIZs was created out of the initial list of approximately 300 OIZs in Turkey. These 23 OIZs own 77 percent of the patent applications made by the firms operating in the OIZs of Turkey, and the top 10 OIZs among them own 50 percent of the patent applications.

Later, performance indicators were created for the shortlisted 23 OIZs. The "export per employee" indicator was used to reflect the productivity dynamics while the "number of patent applications per 1000 employees" indicator was used to reflect the innovation trends. The results of this analysis are presented in Figure 2. It was observed that some OIZs in the Marmara Region (Gebze OIZ, Bursa OIZ, etc.) showed better performances compared to the average of these OIZs in terms of both productivity and innovativeness, while some OIZs fell behind the average only in one of the axes, and some fell behind the average in both of the axes.

Figure 2. Innovativeness (Number of Patent Applications per 1000 Employees) and Productivity (Export per Employee) Differences in the Top 25 OIZs in terms of Patent Application, 2016 [3]



3 Sources: Turkish Patent and Trademark Office, websites of OIZs, data compiled under the Project

In the light of the data analyses, the 12 OIZs where the fieldwork was undertaken were determined as follows, considering the performance indicators, regional diversity, sectoral and scale distribution:

- Adana Hacı Sabancı OIZ (AOIZ)
- ACI OIZ-1
- Bursa OIZ (BOIZ)
- Demirtaş OIZ (DOIZ)
- Eskişehir OIZ (EOIZ)
- Gaziantep OIZ (GAOIZ)
- Gebze OIZ (GOIZ)
- İzmir Atatürk OIZ (İAOIZ)
- Konya OIZ (KOI)
- Manisa OIZ (MOIZ)
- Automobile Supply Industry Specialised

The 12 OIZs within the scope of the research are located in 9 different provinces and 5 different geographical regions. However, it is possible to distinguish these 12 OIZs into three economic zones:

• Gebze-Bursa-Manisa-İzmir Corridor: In this region, which is becoming an economic corridor thanks to the currently under construction Istanbul-İzmir highway, there are 6 OIZs within the scope of the research.

• Ankara-Eskişehir-Konya Triangle: In this region where the economic interactions of cities are increasing thanks to the high-speed train infrastructure, there are 4 OIZs within the scope of the research.

• Adana-Gaziantep Corridor: In this region where highway infrastructure is connecting Mersin Port and Habur Border Gate, there are 2 OIZs within the scope of the research.

Figure 3. Economic Zones and OIZs within the scope of the Research

The firms in these OIZs, were selected based on technology and innovativeness. They all gave in-depth interviews and answered the structured questionnaire within the scope of the project.

When determining the number of participants to be interviewed throughout the field research, it is important to take into consideration the time when the participants' answers and the emerging concepts and processes may start becoming repetitive. In the literature this is referred to as the "saturation point" of data. The saturation point is an important criterion that determines the number of participants and the time spent in the field. From this point of view, the researcher acknowledges that the data reached its saturation point when they receive answers that started to be repetitive and as a result they stop collecting further data. Therefore, the number of in-depth interviews made in the OIZs was also determined depending on this process.

For the determination of the research scope, interviews were conducted with institutions related to OIZs in Ankara and desk-based research studies including the examination of foreign implementation cases were carried out. As a result of these studies, hypotheses were established and research questions were determined. Following the pilot fieldwork carried out in ASO 1. OIZ in March 2017, the question sets were finalised and the field research process was initiated.

Field Research (March 2017 - January 2018)

A total of 229 firms were interviewed face to face as part of the fieldwork conducted in 12 different OIZs in Turkey between March 2017 and January 2018. Nearly all of the interviews were conducted at the level of board chairman, general manager or board member. As part of the indepth interviews conducted with the firms for an average of 60 minutes, the questions were asked under five headings:

- Firm's Establishment Process and General Information
- Firm's Relations with OIZ and its Evaluations on OIZ
- Firm's Relations with City/Region and its Evaluations
- Firm's Strategy, Productivity and Innovation Agenda
- Future Agenda, Problems and Solution Suggestions

In addition to this information, quantitative data on the general characteristics of the firms interviewed, and their identification of efficiency and needs for OIZ services were collected in a separate questionnaire. A "non-probability sampling" was used for the selection of the interviewed firms. In this way, intensively examining the matter and reaching representative results were aimed. In this context, firms were chosen by means of quota sampling and fit-forpurpose sampling as part of the non-probability sampling methods. Finally, it was established that a firm meets at least one of the following six criteria to be included in the field research:

- Having an R&D centre established and registered under the Law No. 5746 on Supporting Research and Development Centres;
- Having made at least one patent application in the period between 1997 and 2017;
- Having carried out at least one TÜBİTAK - TEYDEB project;
- Having made the 2016 list of "Turkey's Top 1000 Exporters Research" published by the Turkish Exporters Assembly;
- Having made the 2016 lists of "Turkey's Top 500 Big Industrial Enterprises" and "Turkey's Second Top 500 Big Industrial Enterprises" published by the Istanbul Chamber of Industry;
- Having been recommended by their respective cities' stakeholders (Chamber of Industry, OIZ management) for the fieldwork due to its performance in elements such as value added production and technology use.

In addition to 229 firm interviews, 18 interviews were conducted with the managements of the 12 OIZs (OIZ Regional Directors and/or Chairpersons of the Board of Directors). The in-depth interviews with OIZ managements were carried out over an average of 120 minutes with the OIZ managements and structured around the following headings:

- OIZ's Establishment Process and General Information
- OIZ's Management Capacity and Services Offered
- OIZ's Impacts on the Firms and OIZ's Relations with Firms
- OIZ's Impacts on its City/Region and its Relations with that City/Region
- OIZ's Current Priorities and Future Agenda

A total of 46 ecosystem interviews were also conducted with the major stakeholders (Industry Chambers, Universities, Technology Development Zones, Technology Transfer Offices, Metropolitan Municipalities, etc.) of the technology ecosystem in the cities where the fieldwork took place. The ecosystem stakeholders were determined using the "snowball sampling" method. These interviews are structured around the following headings:

- Evaluation of the Region's Industry
- Evaluations Regarding the Relations Between the OIZ and its City/Region
- Future Agenda, Problems and Solution Suggestions

The interview forms developed for the fieldwork and applied to the firms, OIZ Managements and ecosystem stakeholders and the survey form containing the quantitative data gathered from the firms are presented in Annex 2.

During the collection of data, in-depth interviews were conducted within the framework of the above-mentioned interview forms and the firms were asked to fill out a structured questionnaire. The interviews with the firms were recorded in written form with the permission of the participants. However, some firms appeared hesitant to fill out the structured questionnaire. Participants who did not want to fill out the questionnaire were not forced to do so to reduce pressure as the indepth interviews were conducted concurrently with the structured questionnaire.

Accordingly, while the number of firms that accepted the in-depth interviews was 229, the number of firms that filled out the structured questionnaire remained at 220. Therefore, the findings section does not include the structured questionnaire results of the 9 firms that did not fill out the questionnaire.

Analysis of Data, Synthesis of Findings and Model Development (January 2018 to March 2018)

Two simultaneous analysis processes were carried out for the analysis of the data. The first process is the analysis of quantitative data. The analysis of the quantitative data includes the structured questionnaire analysis made by transferring the questionnaire to a digital environment (Excel). The participants' answers were subjected to a cross-analysis in the context of various variables.

The second analysis is the analysis of qualitative data. The qualitative data was analysed using the MAXQDA software. As MAXQDA is also a software that enables mixed design research studies, it provided the opportunity to compare the qualitative data results with the various variables found in the questionnaire by transferring the structured questionnaire results converted to the Excel format to a project file opened on MAXQDA. Likewise, various results extracted from the qualitative data were also transformed into variables and used in the analysis of the quantitative data.

The "inductive coding paradigm" was used in the analysis of the qualitative data (in-depth interview records). In this context, within the framework of the coding paradigm developed by Strauss and Corbin, the data was first subjected to open coding (Strauss and Corbin, 1998). Thus, an opportunity arose to ensure that even the smallest voice could be heard amongst the crowd. The final code book was created by combining the open codes under categories, and then finally by enacting selective coding (Charmaz, 2015; Kuckartz, 2014).

Thus, the process involving the data collection and analysis stage, and the findings interpretation stage was formulated as "quantitative data + qualitative data = complete comprehension" (Creswell and Plano Clark, 2015). As a result of the analysis of the quantitative and qualitative data, the findings were visualised in the form of frequency charts and graphs, cross tables, density matrixes and concept maps.

In this context, the findings were classified and synthesised under the headings of OIZs' impact assessment, needs analysis and model development. Research studies on the prominent model alternatives were deepened further and expert interviews were conducted. These findings are summarised in this synthesis report.

Case Study Process

During this stage, a case study was conducted on a focus group discussion where the research results were addressed in order to discuss the created models based on the findings of the research, to take the results to a deeper level and to develop the necessary policies.

The fact that this stage was accepted as a case study is about the use of technology in OIZs being addressed within the framework of models developed as a case. Accordingly, an internal case study was conducted.

The examination of a case to ensure a better understanding and comprehension of a subject is considered an internal case study (Creswell, 2017). At this stage, focus group discussions were adopted as a data collection technique. A focus group discussion is a powerful data collection technique that can enable richer data in a short period of time. In addition, the synergy created by the group is also very effective in bringing out ideas that have yet to be revealed. (Patton, 2014).

The focus group interview was held in the MoIT meeting hall on 26 April 2018. It lasted for approximately 4 hours and was attended by eight people. The general information about the focus group participants' institutions and the participant codes can be seen from the following list:

FGP1: Male, Firm Manager
FGP2: Male, Academician
FGP3: Female, OIZ Executive
FGP4: Female, OIZ Executive
FGP5: Male, OIZ Executive
FGP6: Female, Technopark Executive
FGP7: Female, OIZ Executive
FGP8: Male, OIZ Executive

The analysis of the focus group interview includes the same steps as the analysis of the main field data. The findings, on the other hand, are presented as an annex to the report.

3 FIRMS, OIZs AND ECOSYSTEM (RESEARCH FINDINGS)

PHOTO 5. GEBZE OIZ

3.1. Firm Characteristics within the Research

As the aim of the research is to contribute to the design of a future OIZ model, rather than to determine the current situation, the firms showing performance above the Turkish average were given priority to be included in the sampling scope. As will be described in this section, the firms which were interviewed during the research process are well above the average in their OIZs and above the Turkish average on issues such as technology, innovativeness, productivity, and exports. Therefore, it can be argued that these types of firms assume a leading role in Turkey's transformation to achieve a production structure with high added value. It is also important that both the current OIZs and the new generation OIZs to be established in the future, can meet the expectations and future needs of firms with this profile.

During the fieldwork, the data series regarding the characteristics of the firms were compiled. Two aims were pursued in the compilation of this data. The first aim was to be able to evaluate the firms' productivity and innovativeness agenda more closely and to shed light on how the new generation OIZ definition can meet this agenda. The second aim was to be able to clearly identify different groups of firms in terms of technology

usage potential and to find out how the needs for OIZ services change according to different groups.

Seven different groups of firms can be defined, using the data compiled from the research:

1. Firms by scale:
Micro, small, medium, and large firms.

2. Firms by sector:
Firms operating in the various sectors such as automotive, mechanical, textile, electronics, and defense, etc.

3. Firms by region and economic corridor:
Firms operating in the Gebze-Bursa-Manisa-İzmir Corridor, Ankara-Eskişehir-Konya Triangle, Adana-Gaziantep Corridor.

4. Firms by their form of management:
Family companies/others; those monitoring/not monitoring productivity

5. Firms by their employee profile:
Firms whose white-collar employee ratio is above or below the survey average (20%).

6. Firms with high added value:
Firms whose products' sales prices per kilogram are above or below the survey average (15 USD/kg).

7. Firms by export weight:
Firms whose sales' export ratio is above or below the survey average (40%).

3.1.1. Firms by Scale

41 percent of the firms interviewed during the fieldwork are large-scale where 40 percent of firms are medium-scale. While an average of 11 employees work in a firm in the manufacturing industry in Turkey, the average number of employees of the firms interviewed in the research is 336.

Table 1. Distribution of Interviewed Firms by OIZs and Scale

Large (250 employees)
Medium (50-249 employees)
Small (10-49 employees)
Micro (0-9 employees

	Micro	Small	Medium	Large	TOTAL
Adana OIZ		1	7	7	**16**
Atatürk OIZ		2	10	10	**19**
Bursa OIZ		2	13	13	**29**
Demirtaş OIZ		2	10	10	**26**
Eskişehir OIZ		6	9	9	**18**
Gaziantep OIZ		1	4	4	**14**
Gebze OIZ	8*	1	6	6	**22**
Konya OIZ		6	11	11	**21**
Manisa OIZ		1	5	5	**17**
OSTİM	2	6	6	6	**14**
ASO 1. OIZ		2	6	6	**18**
TOSB		1	1	1	**6**
Total	10	31	88	88	**220**

*The micro-scale firms in Gebze OIZ include the firms in Gebze OIZ Technopark.

As seen from Table 1, there is no information on 9 of the 229 interviewed firms. This is because, as mentioned in the methodology section, 9 firms did not fill out the survey form.

3.1.2. Firms by Sectors

During the fieldwork, the firms were asked about the sector they operate in. In the design process of this question, codes such as NACE, etc. were deliberately not asked so as to allow the firms to define their field of activity without any constraints. This method made it possible to also classify the fields of activity such as defense industry and white goods, which are difficult to be followed through NACE codes but have recently assumed an important role in the national economy.

4 According to the annual Industry and Service Statistics report published by TurkStat for the year 2015, the total number of enterprises in Turkey's manufacturing industry is 3,679,421 and the total number employed in this sector is 3,679,421. By dividing the total employment by the total number of enterprises, it was seen that the average number of employees in one manufacturing industry firm was 11. The 2016 data on this topic have yet to be released by TurkStat.

Subsequently, main sector groups were created by grouping some sub-sectors and related activity fields in the analysis stage.

According to these results, two-thirds of the surveyed firms operate in 5 sectors: automotive (22%), mechanical (14%), textile (12%), electronics (11%), and metal (9%). It was observed that most of the firms operating in the electronics sector are located in Gebze OIZ, whereas the firms operating in the Defense Industry sector are mainly clustered in Ankara and Eskişehir.

Table 2. Distribution of Firms by Sectors

NUMBER	PERCENTAGE (%)	SECTOR
51	22,3	Automotive (Automotive and Automotive Supply Industry)
31	13,5	Mechanical (Machinery, Machinery Equipment, Construction Equipment)
28	12,2	Textile (Textile, Ready-to-Wear and Leather)
25	10,9	Electronics (Electric, Electronics, Technology and Informatics)
20	8,7	Metal (Metal and Metal processing)
14	6,1	Plastics and Rubber
10	4,4	White Goods (White Goods and Air Conditioning)
10	4,4	Defense Industry
40	17,5	Others (12 Sectors)
229	100	Total

3.1.3. Firms by Region and Economic Corridor

Looking at the distribution of the interviewed firms according to the incentive zones, it can be said that the research was carried out in the most economically (and industrially) developed regions of Turkey. The distribution of interviewed firms according to incentive zones is as follows:

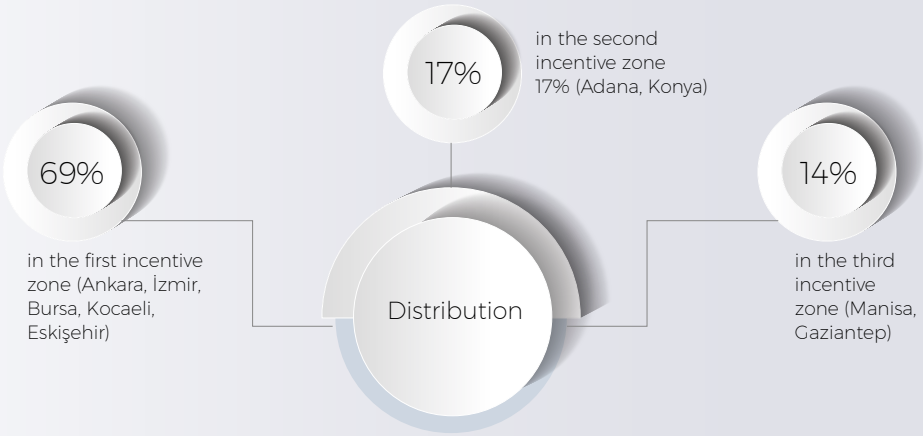
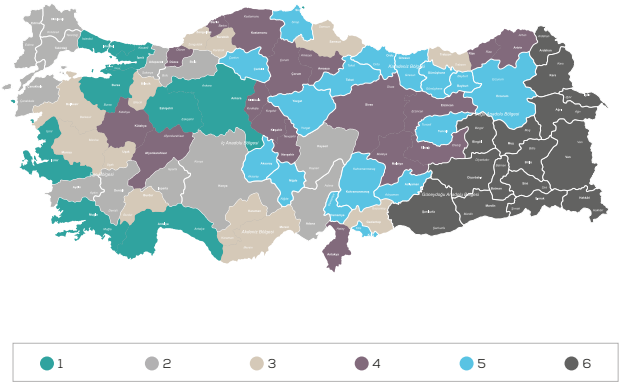


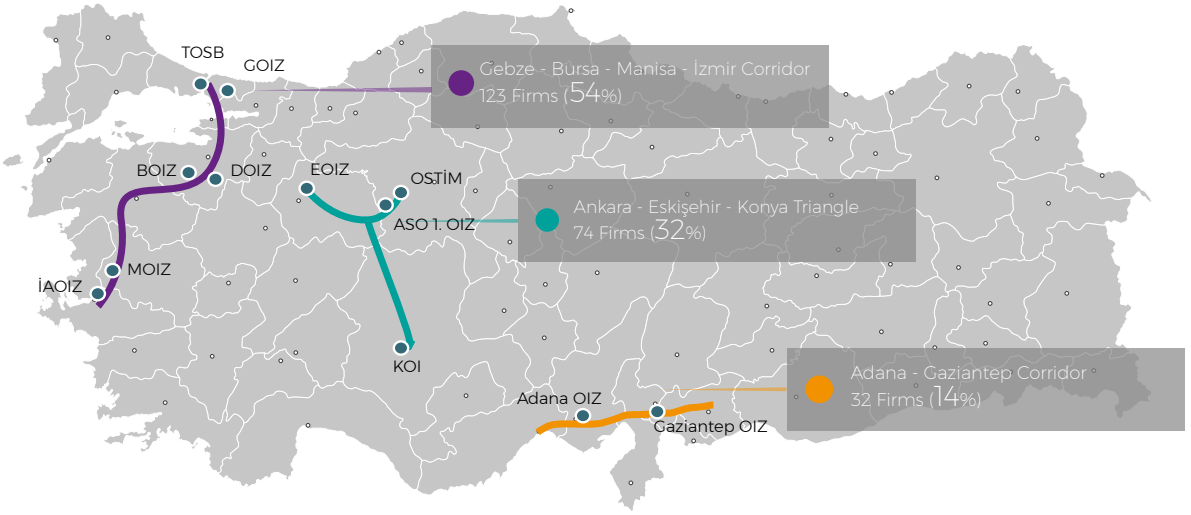
Table 3. The Incentive Zone, where the OIZs covered by the Research are Located, and the Number of Firms - Ministry of Economy Investment Incentive Zones

Adana OIZ	16	2
Atatürk OIZ	19	1
Bursa OIZ	29	1
Demirtaş OIZ	29	1
Eskişehir OIZ	19	1
Gaziantep OIZ	16	3
Gebze OIZ	22	1
Konya OIZ	21	2
Manisa OIZ	18	3
OSTİM	15	1
ASO 1. OIZ	19	1
TOSB	6	1
Total	229	



It is also possible to group the regions containing the firms according to corridors, which will assume new functions in Turkey's spatial development process, along with the influence of infrastructure investments such as highways and high-speed trains. In this context, it can be said that the research was carried out in three different industrial/technological development corridors. The distribution of the firms according to the three development corridors is shown as follows.

Figure 4. Distribution of Firms Covered by the Research According to Development Corridors



3.1.4. Firms by their Management Form

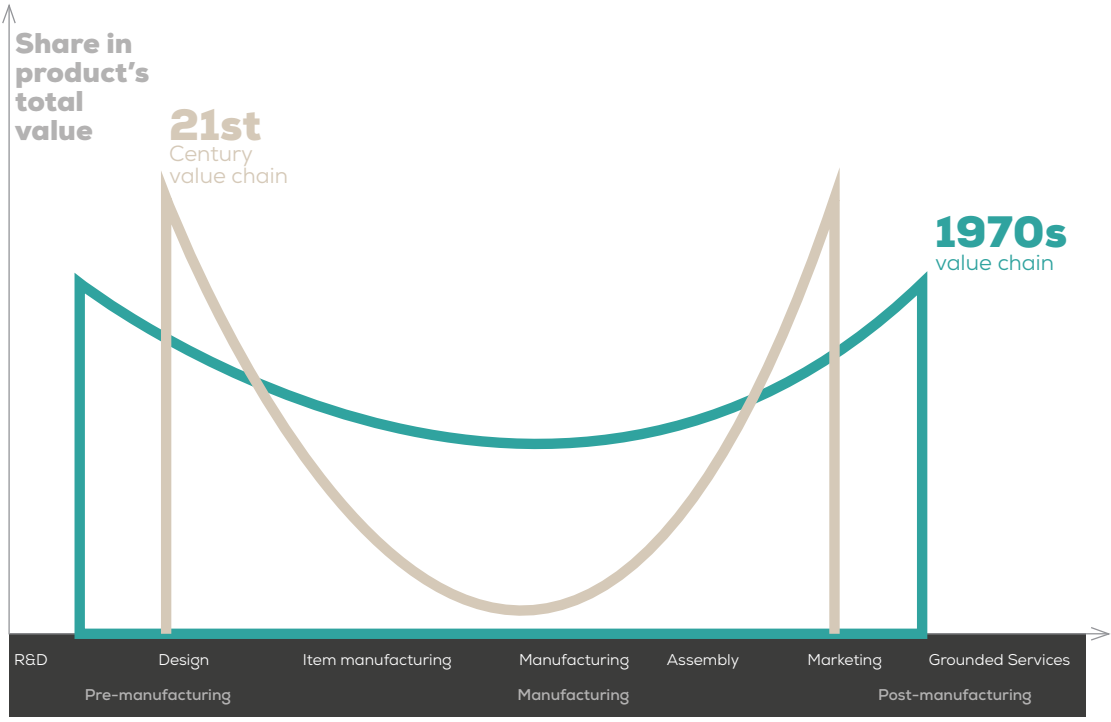
159 (71%) of the firms in the research defined themselves as "family companies". 66 firms (29%) opted for the "other" category. Within this category, there are investments of multi-partnered companies, publicly held companies and multinational companies that do not belong to any particular family.

58% of the firms use Enterprise Resource Planning (ERP) software, and it is known that this ratio is about 18% in the medium and large-scale enterprises throughout Turkey (IDC, 2014). While 17% of the interviewed firms indicated that they do not monitor productivity performance using any method, 25% of the firms support their management systems with software such as MRP and NETSIS.

3.1.5. Firms by their Employee Profile

As a result of the world's technological developments, manufacturing/assembly activities are becoming the lowest value-added stage in the value chain, and elements such as R&D, design, marketing, after-sales services are creating higher added value. These high value-added activities include actions such as identifying the yet to be met global needs which generally whitecollar employees focus upon; developing concepts for these needs; undertaking laboratory tests; developing prototypes; undertaking international market research and testing; improving concepts according to feedback; producing, testing and developing the functional product/prototype; carrying out the relevant engineering processes; investing in small-scale production; marketing and enabling market acceptance; establishing distribution networks; and offering complementary services.

Figure 5. Value Chain Stages and Distribution of Added Value, 1970s and 21st Century Manufacturing Industry [5]



5 Source: (Hallward-Driennеierve Nayyar, 2017)

The fieldwork shows that the percentage of white-collar employees in firms that improve their position in the value chain and thus are able to fulfil these functions, is close to reaching 100%. When the ratio of white-collar employees to the total number of employees is taken into account, Gaziantep OIZ has the lowest rate with 10% and Gebze OIZ has the highest rate with 50%. Again, when the ratio of the number of engineers to the total number of employees is considered, Adana OIZ has the lowest rate with 3.9% and Gebze OIZ has the highest rate with 20.2%. The ratio of female workers to the total number of employees in all of the interviewed firms is 16.3%. The lowest rate is in Gaziantep OIZ with 5,2% and the highest rate is in Eskisehir OIZ with 41,3%

Table 4. Female Employee Ratio, White-Collar Employee Ratio and Engineer Ratio in the Firms operating within the Researched OIZs

	Female Employee Ratio (%)	White-Collar Employee Ratio (%)	Engineer Ratio (%)
Adana OIZ	10,7	11	3,9
Atatürk OIZ	11,3	24	6,0
Bursa OIZ	13,6	21	5,3
Demirtaş OIZ	19,5	21	6,9
Eskişehir OIZ	41,3	34	6,8
Gaziantep OIZ	5,2	10	4,4
Gebze OIZ	16,0	50	20,2
Konya OIZ	7,3	22	5,7
Manisa OIZ	22,5	13	6,4
OSTİM	15,9	22	14,1
ASO 1. OIZ	*	18	9,7
TOSB	**	18	**
General Average	16,3	22	8,1

* The number of female employees was not asked during the pilot work.

** The interviews conducted in TOSB fell short of the number to provide enough input for the fieldwork.

The ratio of white-collar employees to the total number of employees is 22% in the 220 firms that filled out the structured questionnaire during the fieldwork. There are 126 firms that are above this average, and these firms are divided into two groups:

The **first group** consists of firms that employ white collared employees between 35% to 100%. There are 50 of these firms in the sample. Among them are 17 firms from Gebze OIZ and 8 firms each from İzmir Atatürk OIZ and Eskişehir OIZ.

The **second group** consists of the firms which employ white collared employees between 20% to 35%. In the sample, there are 76 of these firms. Among them are 15 firms from Bursa OIZ, 13 from Konya OIZ and 10 from Bursa Demirtaş OIZ.

Table 5. Distribution of White-Collar Intensive Firms: First Group and Second Group

Gebze OIZ	17	4	21
Bursa OIZ	4	15	19
Atatürk OIZ	8	9	17
Konya OIZ	1	13	14
Demirtaş OIZ	3	10	13
Eskişehir OSB	8	5	13
OSTİM	4	4	8
Manisa OIZ		6	6
ASO 1. OIZ	1	5	6
Adana OIZ	2	2	4
TOSB	1	2	3
Gaziantep OIZ	1	1	2
Total	50	76	126

White-Collar Ratio
35%-100%
First Group

TOTAL

White-Collar Ratio
20%-35%
Second Group

3.1.6. Firms by Export Density

The export rate of the firms based on their turnover is 39.7%. When OSTİM, where mostly micro and small scale enterprises that deal with indirect exports are located, is excluded, the lowest export rate is in Adana OIZ with 32.7% and the highest rate is in Gaziantep OIZ with 54.2%.

The ratio of the firms with an export/turnover ratio between 60% and 100% is 28%. 42% of the firms have an export/turnover ratio between 30% and 59%, and there is a 30% ratio of firms with an export/turnover ratio below 30%.

Table 6. Average Export/Turnover Ratio of Firms in the OIZs covered by the Research (%)

OIZ Name	Export/ Turnover Ratio (%)
Adana OIZ	32,7
Atatürk OIZ	44,7
Bursa OIZ	41,0
Demirtaş OIZ	49,0
Eskişehir OIZ	41,4
Gaziantep OIZ	54,2
Gebze OIZ	33,9
Konya OIZ	39,6
Manisa OIZ	45,6
OSTİM	17,5
ASO 1. OIZ	37,7
TOSB	39,0
GENERAL AVERAGE	39,7

3.1.7. Firms by Added Value

When determining firms to be included in the research, the criteria used as a basis for inclusion included the lodgment of patent applications, completion of a TÜBİTAK project, and having successfully reached the list of Turkey's top 1000 industry firms and Turkey's top 1000 exporters. The purpose of this criteria is to understand the needs of the firms that are above average in terms of technology in Turkey.

The firms were not asked to provide their balance sheet data but were asked to provide the kilogram sales price of an average product they sell. Although this indicator is not an ideal indicator for measuring the added value, it can give important clues for reflecting the general trends and the technology content of a product. Turkey's general average in this area is 1.4 USD.

The kilogram sales prices of the 220 firms show a significant variance between 1 USD and 1000 USD while the average is 14.9 USD.

It is observed that the firms with high USD/kg values are concentrated in the automotive supply industry, mechanical, defense and electronics sectors and export mainly to western countries such as Germany, France, USA and Italy and also sell to Istanbul, Ankara, İzmir, Kocaeli and Bursa in domestic markets. Middle East Technical University (METU), Uludağ University and Bursa Technical University all stand out among the universities that these firms cooperate with.

3.2. Impact Assessment: How do OIZs Affect the Firms' Performance?

A set of questions was designed to assess the impact of OIZs on the performance of firms and to evaluate how effective the firms think that the OIZ services are. Both quantitative and qualitative findings were obtained from the firms' in response to this question set. The firms were first asked whether their presence in OIZs affects their productivity levels and innovation capacities and if their answer was a "yes", they were asked to describe via which channels this influence was seen. In addition, the firms were asked whether they would make their investment in the same place again if they were going to make the same investment decision today.

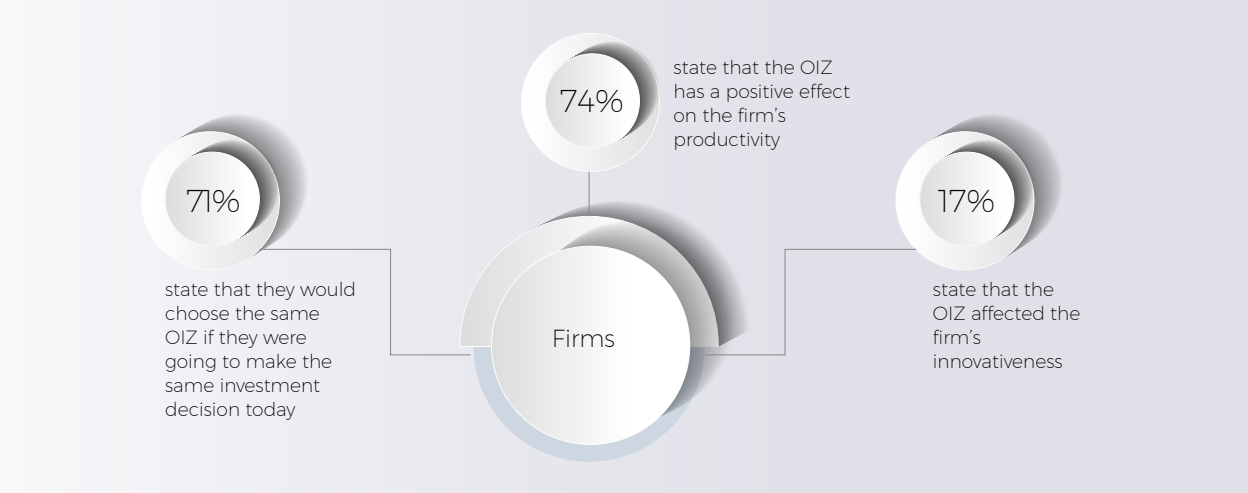
Questions about the impact assessment:

- How does being located in an OIZ affect the firm's productivity?
- How does being located in an OIZ affect the firm's innovativeness?
- If you were going to make the same investment decision today, would you make this investment in this OIZ again,? What would change your decision on choice of location?

A separate module was applied to analyse the firms' assessments on the OIZ services. A list of functions available in the firm survey found in ANNEX 2A was shown to the interviewed firms and they were asked about how effectively the OIZ services written in this list are offered by the OIZ then they were asked to rate each service area on a scale from 1 to 5. These services can be evaluated under two main groups. The first group consists of functions such as infrastructure, one stop office (licenses and permits), supervision, superstructure and emergency services, which are undertaken by every OIZ, are stipulated in law and can be defined as the conventional functions of an OIZ. Other functions include the functions which are not provided by every OIZ today, but some are closely related to technology. Among them are the service areas such as technology development zone, increasing collaboration between firms, attracting strategic investors, developing new markets, and pairing with mentors. Again, within this group, there are also functions such as vocational training, kindergarten, and logistical centres which are indirectly related to technology development.

General Impact Assessment Results

It is understood that firms are generally satisfied with the services provided by OIZs and that they choose OIZs especially for the factors such as high-quality infrastructure and a foreseeable investment environment.



OIZs have had an important role and significant influence in our national economy's transformation into a productivity-based economy.

The results of this research support the positive contribution of OIZs to the productivity of the Turkish industry. Hence, OIZs have had an important role and influence in our national economy's transformation into a productivity-based economy.

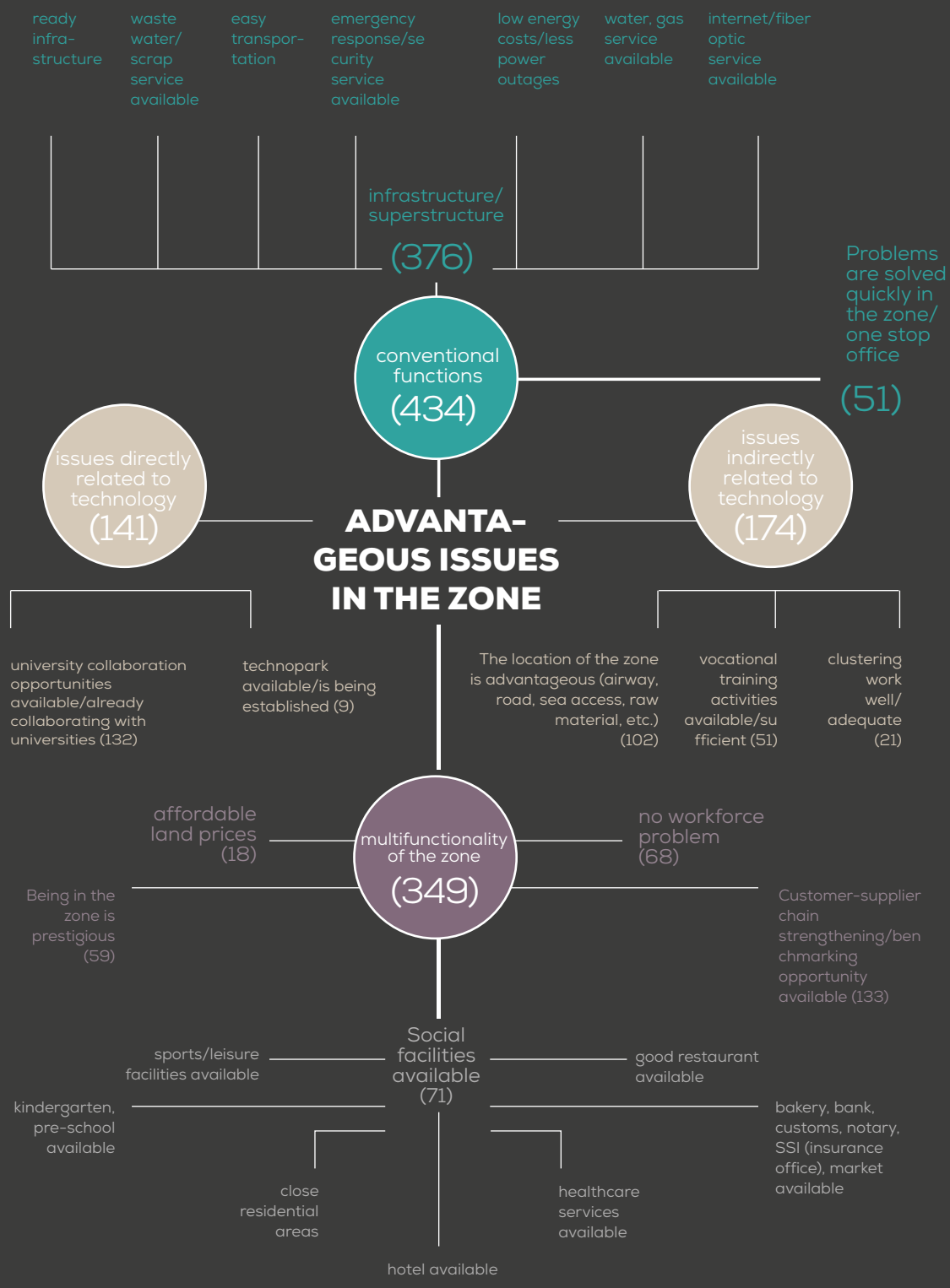
Meanwhile, the fact that OIZs impacts on productivity are so high while the impacts on innovativeness are quite limited, indicates how important it is to update the services provided by OIZs while switching from a productivity-based economy to an innovation-based economy in the World Economic Forum classification. Social engineering, which means creating a new structure in society through the use of scientific knowledge, will also play a crucial role in this transformation process by increasing social participation and motivation. The use of new generation technologies by OIZ managements and the firms settled in OIZs depends on the participation of social engineers in these management structures.

Major OIZ Impact Channels on Firms' Performance

Both the interviews conducted and the data contained in the structured questionnaire are evaluated together under this title. Accordingly, when the participants were asked about the impact of the OIZ on the productivity of the firm, they explained their answer by associating it with the subjects shown in Figure 6. Figure 6 shows the results obtained from the in-depth interviews conducted.

A conclusion can be reached to state that OIZs provide conventional services but fall short of providing technology related services. On the other hand, using a mixed method approach in this research enabled the researchers to understand the participants better by obtaining greater detailed perspectives on the OIZ-related issues which are thought advantageous, as well as the services they receive. Figure 6 shows a model developed as a result of the interviews conducted with the firms regarding the OIZ services and issues which the participants think are advantageous and are satisfied with. As seen, the firms primarily emphasize the conventional services offered in OIZs and the prestige and productivity impacts provided by OIZs.

Figure 6. Participant Opinions on the Issues Considered Advantageous in the Region



Effectiveness of Conventional OIZ Services

Taking a look at how the firms evaluated the OIZ functions in terms of service items, the 5 basic functions including Infrastructure, One Stop Office, Supervision, Superstructure Services and Emergency Services received 4 points out of 5 across the 12 OIZs interviewed. In other words, the firms evaluated the effectiveness of OIZs in these areas between effective and very effective.

It can be deduced from Table 7 that the high service quality is present across the 12 interviewed OIZs. The firms gave 4.2 points to emergency services and 3.8 points to the supervision function. As for the overall services, Manisa OIZ stands out as the OIZ with the highest score among the 12 OIZs with 4.7 points.

Table 7. Firms' Opinions on Service Effectiveness in the Conventional OIZ Services Group

	GENERAL	Adana OIZ	Atatürk OIZ	Bursa OIZ	Demirtaş OIZ	ESO OIZ	Gaziantep OIZ	Gebze OIZ	Konya OIZ	Manisa OIZ	OSTİM	ASO 1. OIZ	TOSB
Infrastructure (connection, sales, operation)	4,1	4,3	4,0	4,1	4,2	4,2	4,0	4,0	4,0	4,8	4,1	4,3	4,0
One Stop Office (licenses and permits)	4,0	4,3	3,4	4,1	4,3	3,9	3,8	4,0	3,7	4,8	4,1	4,1	3,8
Supervision	3,8	3,8	3,3	3,8	3,9	3,6	3,4	3,7	3,8	4,5	3,9	4,3	4,2
Superstructure Services (energy management, cleaning, weighbridge)	4,1	4,3	3,9	3,9	4,3	3,8	4,2	3,9	4,1	4,8	3,8	4,3	4,3
Emergency Services (fire, security)	4,2	4,7	3,9	4,3	4,0	4,0	4,1	4,1	4,2	4,6	3,7	4,4	4,2
ORTALAMA	4,0	4,3	3,7	4,0	4,1	3,9	3,9	3,9	4,0	4,7	3,9	4,3	4,1

When it comes to conventional functions of OIZs, the results obtained from the structured interview form and the results obtained from the in-depth interviews confirm each other.

Two issues stand out in the conventional services. The first is that the infrastructure and superstructure activities are carried out flawlessly, which also corresponds with the results obtained from the applied structured interview form. The other important issue is the emphasis on obtaining quick solutions for problems faced by firms. It is a very important criterion for an industrialist to have no need to reach local government or institutions that increase bureaucratic procedures and that they have their problems resolved within the zone directly. Speaking to this, some of the participants made the following statements:

> *"... acts as a solution partner when I face difficulties. They guide me even if they cannot provide a solution. We receive really quick responses. The regulation, law and by-law that OIZs are subject to provides a more integrated structure within itself. This structure refers to one respondent, one place, quick response" (ASO 1. OIZ)*

> *"It is advantageous. The infrastructure services and the OIZ itself, being the respondent are advantageous issues. It's easier than working with a municipality. Being within the borders of an OIZ is a privilege. Rules and legislations are simplified. A firm which is rigorously regulated. The advantage of being here is the image and the prestige." (Gebze OIZ)*

> *"You receive all the services from one single centre. Being in contact with municipalities causes difficulties with the implementation of some regulations. ... here there is a structure that protects the industrialist. Receiving infrastructure services from a municipality would be expensive. For example, there is a 12 percent price difference between the electricity price here and the one in Muradiye OIZ. You cannot receive electricity service according to demand when you receive the electricity from a certain place. Having a treatment plant here is also an advantage for us." (Manisa OIZ)*

As can be seen, the firms seem satisfied with the infrastructure services available in OIZs. Likewise, the fact that having only one responder for the service reception point is very important for them.

Effectiveness of OIZs in the Other Service Areas Related to Technology Development

In addition to the conventional OIZ functions, 13 different service and function areas were also asked to the firms and evaluations were received on their effectiveness within the research scope. This service list can be classified as services indirectly related to technology, services directly related to technology and single-functionality (manufacture) or multifunctionality (housing, education, knowledge) levels of the zone as a result of screening the successful implementation cases domestically and abroad.

The hypothesis tested was that in the current situation, most of these services are only offered in limited terms, since they are not required by legislation. In addition, the scope of the model to be developed regarding technology use is addressed in parallel with the level of need for these services.

Table 8. List of Services Related to Technology

A detailed examination of these services will be carried out in the needs analysis section. However, the following findings can be highlighted when the present situation is considered:

• While the effectiveness of the conventional OIZ services was 4 out of 5, the effectiveness of the services in this group was only 2.7 points in the 12 OIZs included in the fieldwork.

• Among these service items, the most effective as of today are Vocational and Technical Training and Social Services (restaurants, shopping malls, sports activities).

• The overall average is 2.7 points for Logistics Centre service.

• Among the services with the lowest effectiveness level are the issues such as Pairing with Mentors (2.3 points) and Technology Development Zone and capacity building for digitalization, Industry 4.0 (2.4 points).

• The effectiveness differences in technology-related services among OIZs are higher than those of conventional services.

Table 9. Effectiveness Level of OIZs in Technology Related Services (1 Not Effective At All, 5 Very Effective)

	GENERAL	Adana OIZ	Atatürk OIZ	Bursa OIZ	Demirtaş OIZ	Eskişehir OIZ	Gaziantep OSB	Gebze OIZ	Konya OIZ	Manisa OIZ	OSTİM	ASO 1. OIZ	TOSB
Social Services (Restaurants, shopping malls, sports)	3,5	3,6	4,1	3,0	4,0	3,2	2,9	3,6	3,1	4,6	2,7	3,1	3,7
Vocational and technical training	3,3	4,1	3,1	2,9	3,8	3,4	3,2	2,2	2,3	4,3	3,4	3,6	3,5
Kindergarten	2,5	0,5	3,1	1,2	4,0	1,6	3,0	1,7	1,4	4,4	2,4	3,2	3,2
Logistics Centre	2,7	1,8	1,7	2,0	2,8	3,4	3,3	2,3	2,1	4,7	2,7	3,3	2,3
Technology Development Zone	2,4	1,5	1,2	1,6	2,8	3,5	2,2	3,3	2,7	2,5	3,3	2,5	2,2
Investment promotion, attracting new investors	2,6	2,8	1,4	2,2	2,2	2,5	2,6	2,6	2,7	4,1	3,1	2,9	3,8
Increasing collaboration between firms	2,8	3,1	2,4	2,6	2,8	2,5	2,3	3,0	2,4	3,4	3,1	2,5	3,5
Incubator and accelerator - to provide support for newly-established firms	2,5	3,0	1,8	2,4	2,1	2,5	2,7	2,5	2,3	3,5	3,6	2,6	2,0
Support for new market development, internationalisation	2,7	3,1	1,9	3,0	3,0	2,7	2,4	2,4	2,1	2,7	3,3	2,3	3,2
Industry - university collaboration, technology transfer office	2,7	3,0	2,4	2,4	2,6	2,9	2,1	2,7	2,5	2,9	3,3	2,9	3,2
Pairing with mentors	2,3	2,2	2,1	2,0	2,2	2,7	2,2	2,1	1,7	3,1	3,0	2,3	3,0
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	2,4	2,7	2,2	1,8	2,5	2,8	2,3	2,0	2,1	3,1	2,8	2,4	3,0
Living areas in the zone (housing, entertainment, education, health)	2,7	2,5	2,5	2,5	3,4	2,3	2,7	2,1	1,6	4,1	2,9	2,6	2,5
AVERAGE	2,7	2,6	2,3	2,3	2,9	2,8	2,6	2,5	2,2	3,6	3,1	2,8	3,0

When service areas related to technology are ranked according to effectiveness level, it is seen that only three services have effectiveness scores above average and that most services related to clustering management and technology development are evaluated between 2.3 and 2.7 points across all OIZs. This level of scoring can be interpreted as most services related to technology are not being provided by OIZs or are being offered at a very limited effectiveness level. The 12 OIZs where the fieldwork took place are among Turkey's best leading OIZs in terms of competitive business capacity of the firms they host, and the financial and administrative capacity of the OIZ managements. Accordingly, the table below confirms the reason for this project, namely the need for technology development in OIZs.

Table 10. Effectiveness Ranking of Technology Related Services

The aggregated results for the **12 OIZs**
(1 not effective at all, 5 very effective)

	Impact score (out of 5)
Social services (Restaurants, shopping malls, sports)	3,5
Vocational and technical training	3,3
Increasing collaboration between firms	2,8
Support for new market development, internationalisation	2,7
Living areas in the zone (housing, entertainment, education, health)	2,7
Industry - university collaboration, technology transfer office	2,7
Investment promotion, attracting new investors	2,6
Incubator and accelerator - to provide support for newly-established firms	2,5
Kindergarten	2,5
Technology Development Zone	2,4
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	2,4
Pairing with mentors	2,3
Average	2,7

The prestige and the productivity impacts provided by OIZs are another group of subjects that the participants particularly emphasized. The prestige that comes from being in the zone, the ease of reaching out to the workforce, the contribution of being in the zone to the customer-supplier chain, and the opportunity of benchmarking with other firms were particularly mentioned by the participants.

Since OIZs are locations that allow many firms to operate in the same zone, the firms from the zone consider this to be advantageous due in two aspects. The first aspect is the accessibility of customers, suppliers and supply chains of important firms. The customer-supplier relationship that firms establish with each other is important for firms in many subjects such as time, cost, workforce and logistics.

The second aspect is the possibility of benchmarking with other firms operating in the zone. A particular issue to be mentioned at this point is that the item increasing collaboration between firms is positioned at 0.1 points above the average by receiving 2.8 points in the effectiveness scale of the services offered to the participants (See Table 10). As a result of the interviews, it is seen that the participants refer to the opportunity to strengthen the customer-supply chain and to benchmark within the zone when discussing the zone's advantages. From the results obtained from both types of data, it is understood that the firms emphasize the functionality of the zone rather than the OIZ management when it comes to the item increasing collaboration between firms in particular.

> *"In the OIZ there are firms which help us determine our targeted level. We couldn't have observed what those firms were doing if we were outside the OIZ. Here, they serve as a model for us" (ASO 1. OIZ)*

> *"Being in the OIZ has had an influence when it comes to our innovativeness and improving our relationships. Clustering has provided a lobbying force and enabled the use of the current production capacity. OIZ provided promotion and marketing support. Thus, production has increased to meet the demands, and it has enabled the integration of systems" (Ankara OSTİM)*

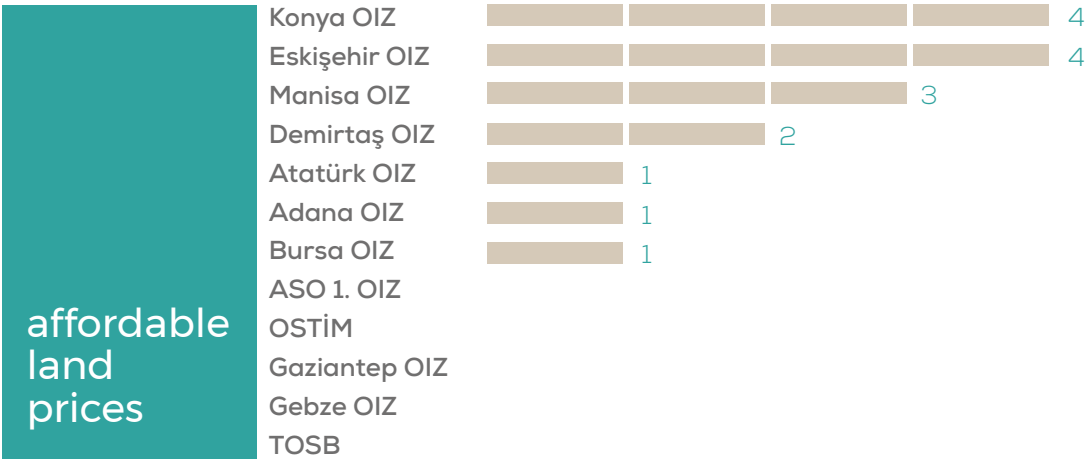
> *"Malatya OIZ remains in the background in terms of establishing a logistics centre. Manisa organises fairs and enables industrialists to establish networks. What's best for the firms are not considered in Malatya. The only important thing for them is the firm's production. However, after a while, firms need guidance. Iftar meals are organised for firms in Manisa and you meet people in such meetings." (Manisa OIZ)*

In addition, the affordability of land prices is another subsection that is considered partially functional for the participants. Another point of curiosity is the regions of the participants who stated that land prices were affordable. A portion of the participants operating in Konya, Eskişehir and Manisa, commented on the affordability of land prices. Among those who stated that the land prices were affordable, the firms operating in Manisa are tenant firms and commented on the affordability of the m^2 prices of the rents whereas the firms operating in Eskişehir and Konya mentioned the m^2 sales prices of the land. Another point that is noteworthy here is that the Ankara and Gebze firms did not report any positive opinions on this issue. The reason for this is that especially in zones such as OSTİM and Gebze OIZ, land m2 prices have reached very high figures.

"The prices in the Konya OIZ are very attractive at the allocation stage, and allocation is offered by installments. Of course, it may also be appropriate to invest in machinery instead of land. Not having to invest capital in land is a blessing for the industrialist. The industrialist should create the business capital, produce products and then market it. If the industrialist invests this land money into technology and R&D, this will lead to an increase in export too" (Konya OIZ)

"Infrastructure services are good. Land costs are low in OIZ. We are an R&D firm. We project the desired product and come up with a product with certificates and software." (Eskişehir OIZ)

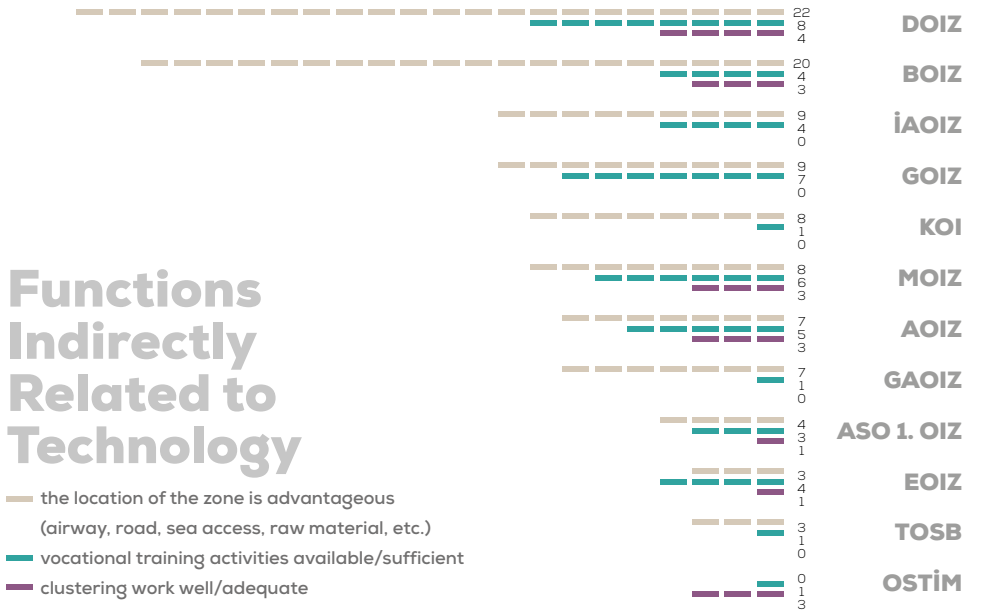
Figure 7. OIZs which Participants Consider to Have Affordable Land Prices



During the in-depth interviews, three issues came to the forefront when the participants assessed their respective zones regarding the services indirectly related to technology: Sufficiency of vocational training activities, sufficiency of clustering work and suitability of the logistical position of the zone. Nearly all of the firms interviewed in Bursa provided positive opinions regarding the position of the zone. Naturally, one of the main reasons why a firm chooses a specific OIZ is the logistical position of that OIZ. In this context, almost half of the firms that were interviewed, except the ones in OSTİM, mentioned this issue. Here are the statements of several participants in Manisa OIZ regarding vocational training:

> *"The most important problem here is the workforce. The school upgraded their standards. There will be 2000 students in the school. 500 students will graduate each year. If half of them are employed by firms, it would make a significant workforce. They spend the time, which they are required to spend in the industry as per their internship rules or the law, here." (Manisa OIZ)*
>
> *"We have a vocational high school, and it's very nice. It is a model for Turkey. The curriculum is determined according to the needs of the industry. It has transformed from national education to an OIZ private school status. Students with high scores prefer studying here. It is not our purpose for the children to study in a university. It is not the goal to have vocational high school graduates to study in a university." (Manisa OIZ)*

Figure 8. Distribution of Participants Regarding the Functions Indirectly Related to Technology



There is a clear consensus that OIZs have a positive productivity impact on firms.

The only issue that is directly related to technology for the participants is the collaboration with universities. However, one thing to note here is that the collaboration with universities is not realised through the initiative of the OIZ management, instead it is mainly realised with the initiatives of the firms. Although what was mentioned in the scale completed by the participants regarding the OIZ services was about a university-industry collaboration through the zone management, it is important to state that during the in-depth interviews the participants emphasized their own initiatives in this subject.

The presence of technoparks, on the other hand, is hardly ever on the participants' agenda. It remains as a small matter that only a few participants mentioned when commenting on the advantages of the zone. Likewise, in the focus group interview, the fact that more software companies operate in the Technology Development Zones within OIZs compared to other types of firms, and that TDZs transformed into a structure which does not serve the firms in OIZs, were emphasized.

As a result of the evaluation of of the findings, the following determinations can be made on the channels that OIZs affect the firms:

• **Positive productivity impact:** There is a clear consensus that OIZs have a positive productivity impact on firms. The quality and cost of the energy used including electricity in particular; a decrease in logistical costs due to proximity to the suppliers and buyers in the same OIZ; the fulfilment of the functioning as a "one stop office" by the OIZ; less bureaucracy and the elimination of uncertainties about the investment environment (durations and costs for licenses, permits and supervisions) can be considered as positive impacts of OIZs.

• **Overall satisfaction as an investment place:** Receiving services from structures managed by industrialists instead of having to deal with municipalities for issues such as licenses, permits and infrastructure connections has a particular influence on why many firms prefer OIZs.

The impact of OIZs on the level of firm innovativeness is very limited or scarcely visible.

High prestige/perception impact: For small firms especially, being in an OIZ can make a positive difference on how potentially bigger buyers/customers perceive them. This can create a significant impact for small-scale, unbranded and/or newly established firms. And as for large firms, it is important to be in a well-kept, planned and clean environment. Many firms pointed out that the OIZ environment creates a meaningful and positive image in the eye of their international customers.

• **Limited clustering impact:** It was determined that only a limited portion of the interviewed OIZs had systematic clustering activities, and firms' commercial or technological interactions with the other firms within the OIZ are limited to date, however the OIZ Managements are open for improvement in order to develop these relations.

• **Limited innovativeness impact:** The impact of OIZs on the level of firm innovativeness is very limited or scarcely visible. In terms of scale and institutionalisation, an "etiquette impact" can be mentioned for those at a low level. The possibility of being in close proximity to major leading firms and observing their activities can be referred to as an impact channel, even in part. However, in all of the OIZs interviewed, it was determined that the tendencies towards collaborating with universities are very weak to date and that OIZ managements have very limited services in this area.

Box 1: Vocational Education Schools under OIZs

It is known that in Turkey some OIZs have made long-term investments in consideration of vocational training. The effects of these investments will be seen in the long term. During the fieldwork, firm evaluations were received regarding this service. The effectiveness of these services received 3.3 points across the 12 OIZs. The Manisa OIZ surpassed other OIZs in terms of vocational education services with 4.3 points, with the help of Manisa Organised Industrial Zone Technical and Industrial Vocational High School, whose curriculum is determined by taking into account the industrialists' needs.

Figure 9. Assessment of Vocational Education Services in OIZs

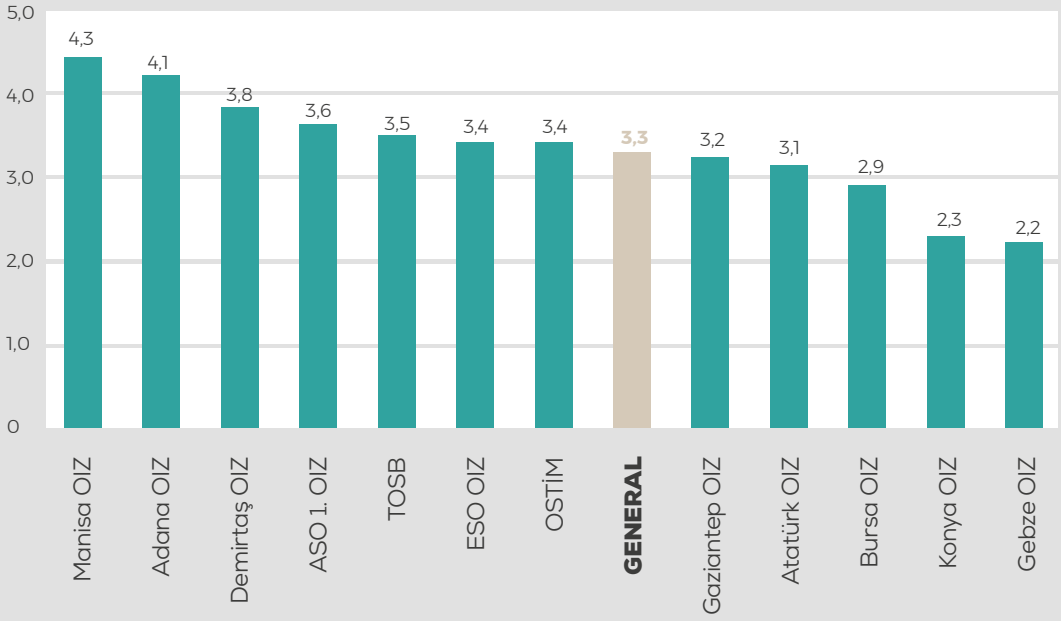


PHOTO 6

Private Manisa OIZ
Vocational and Technical Anatolian
High School

PHOTO 7

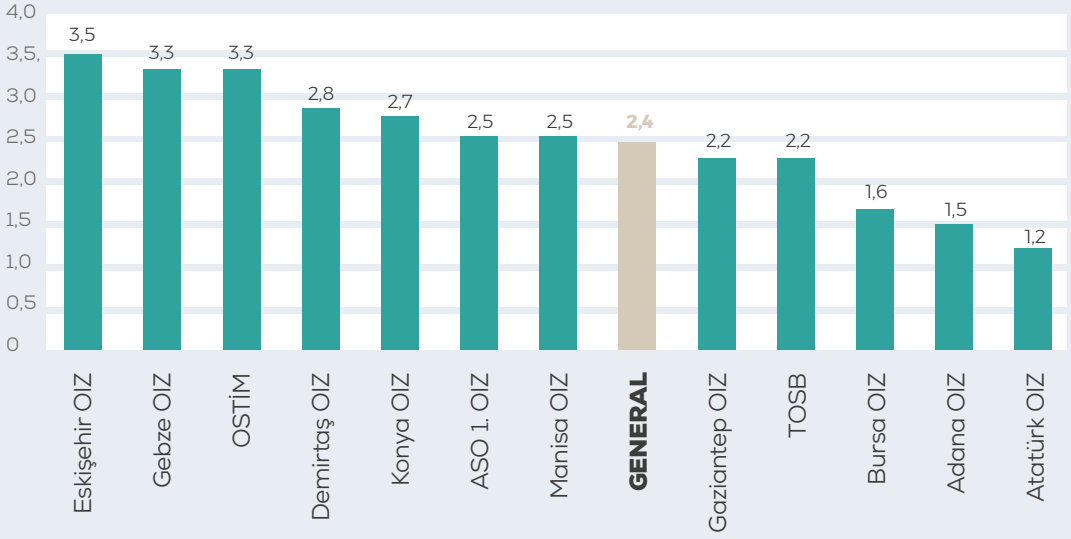
Private İzmir Atatürk OIZ Nedim Uysal
Vocational and Technical Anatolian
High School

Box 2: Technology Development Zones under OIZs

The OIZs that incorporate a Technology Development Zone (TDZ) are Eskişehir OIZ, Gebze OIZ, OSTİM (not yet active) and Konya OIZ. The firms evaluated these TDZs with points ranging between 2.7 and 3.5. This situation leads to a significant improvement area in terms of the TDZs within OIZs affecting the firms in OIZs.

Although some OIZs do not have TDZs, it is understood that the firms still rated this service. While evaluating the services offered to them, the firms had a tendency to evaluate the effectiveness of a service from a general perspective, irrespective of direct availability of the service by the OIZ in some cases. In this respect, it would be beneficial to note that some services are provided by TDZs which are established by chambers of industry or universities.

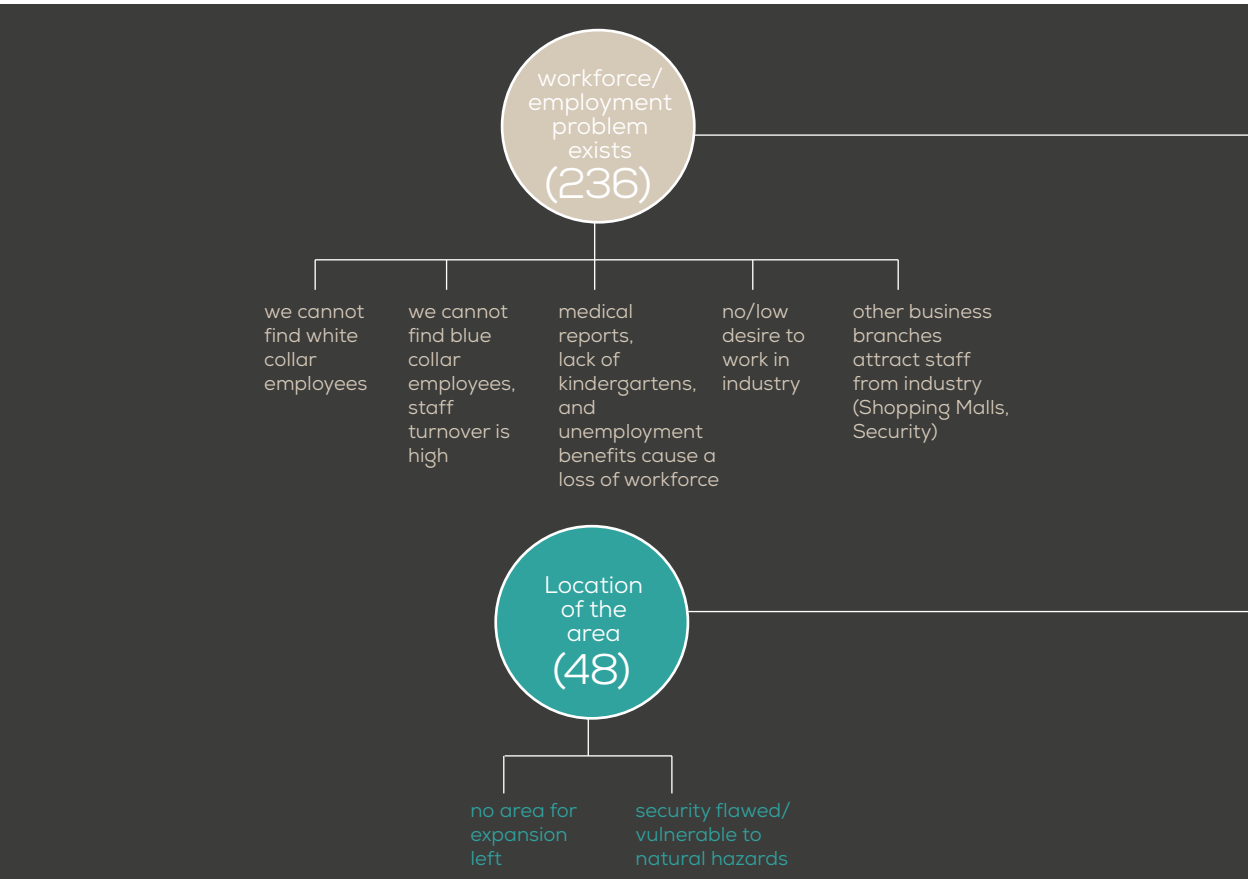
Figure 10. Evaluation of the Effectiveness of the OIZs in the Technology Development Zone

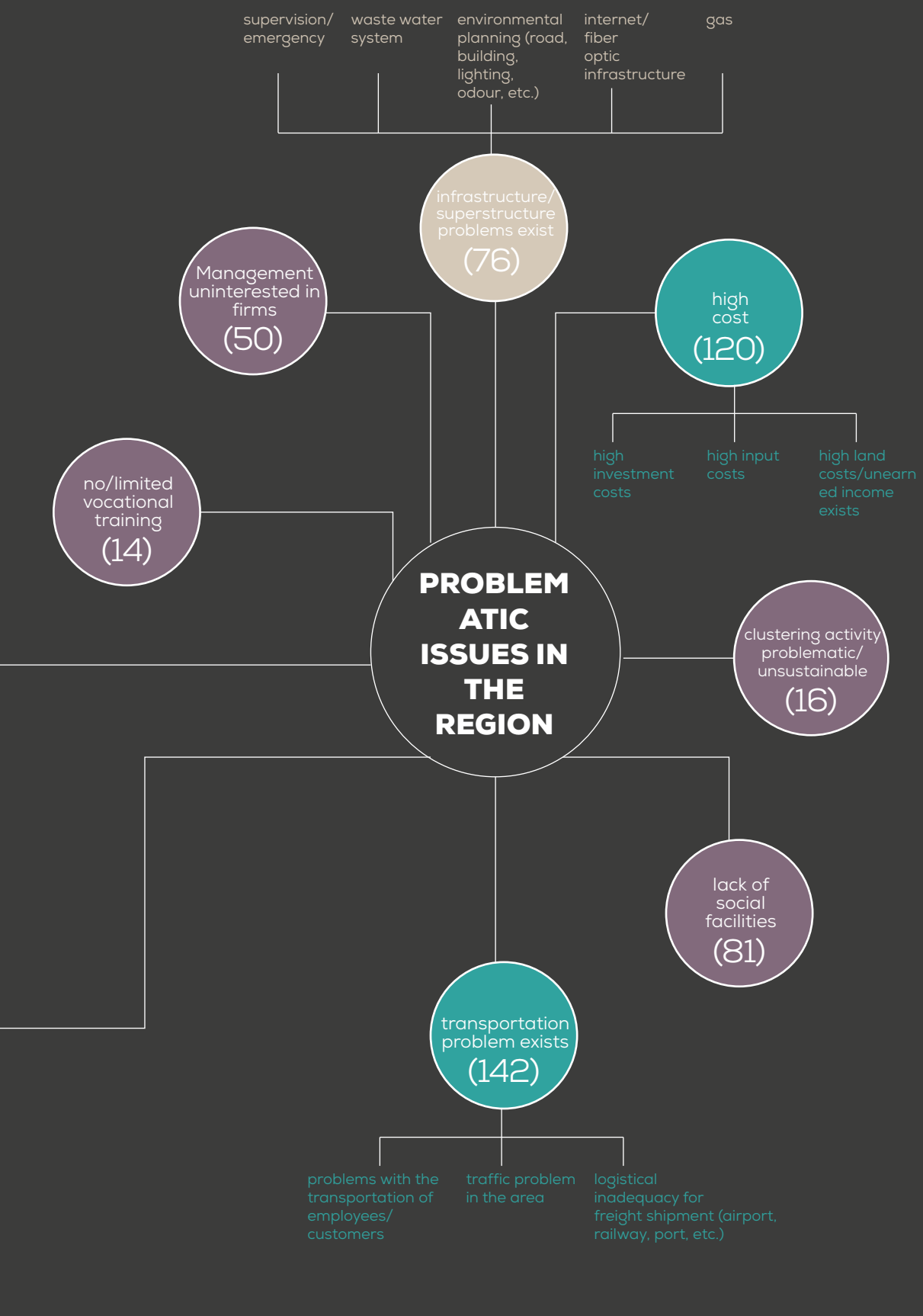


3.3. Internal and External Problems in Organised Industrial Zones

The research identified some common important issues that the firms addressed in the in-depth interviews. It is seen that three issues, which were pointed out in particular by the firms interviewed, are greatly emphasized in comparison to others. These include workforce and employment problems, transportation problems and high production costs. Figure 11 summarizes the participants' opinions on the problems in the zone, with degrees of density.

Figure 11. Participant Opinions on the Issues Considered Problematic in the Region




supervision/ emergency
waste water system
environmental planning (road, building, lighting, odour, etc.)
internet/ fiber optic infrastructure
gas
infrastructure/ superstructure problems exist (76)
Management uninterested in firms (50)
high cost (120)
high investment costs
high input costs
high land costs/unearned income exists
no/limited vocational training (14)
PROBLEMATIC ISSUES IN THE REGION
clustering activity problematic/ unsustainable (16)
lack of social facilities (81)
transportation problem exists (142)
problems with the transportation of employees/ customers
traffic problem in the area
logistical inadequacy for freight shipment (airport, railway, port, etc.)

Workforce and employment are major problems across Turkey and in OIZs. The employment rate was 46.4% in January 2018 with 19.9% working in the industry sector, according to TurkStat. According to data from 2018, the number of people working in the industry increased by 60,000 compared to the previous year. The unemployment rate for the year 2018 is 10.8% between the ages 15-64, while the unemployment rate for the youth population (15-24) is 19.9%. Although the number of people working in the industry sector has increased, the unemployment in Turkey is clear. The participants emphasized in the interviews that the workforce does not prefer working in industrial areas and therefore they have been experiencing significant workforce and employment problems. The participants particularly mentioned issues such as other business sectors drawing staff away from the industry and individuals losing desire to work in industrial areas, as factors that cause such problems. Some participants stated the following regarding this issue:

> *"Eskişehir is a difficult place. I don't know the unemployment rates in Turkey, but there is no unemployment here. At the same time, people seeking jobs also act very picky. People prefer to take little part in production. This is a potential danger for Turkey. At this point, I am in favour of the application of positive discrimination for critical production areas in Turkey. Proper tax models and incentives should be established for employers whose production models are related to the operations that meet national needs." (Eskişehir OIZ)*

> *"If we were running a cafeteria here, we would find workers very easily. There would be plenty of manpower. Here is an event from yesterday. We hire temporary workers from time to time. On Monday, five temporary workers came here. We all agreed that they were going to start working today. However, four people did not show up. The employee thinks that they would make the same money by waiting tables at a restaurant. It smells of paint in here. That smell is hard for the worker. The employee does not have a chance to get fresh air. When we look at the sector, we have such a problem. On the other hand, there are various troubles in recruiting permanent workers." (İzmir Atatürk OIZ)*

In addition, among the OIZs covered by the project, the participants in Manisa OIZ talked about being in an agricultural region and that agriculture is leading to a workforce problem. This is due to workers having to leave the factories to go to the fields during harvesting periods. This then creates an unfavourable situation in terms of industrial employee discipline.

Another major problem industrialists face in OIZs is the financial problem. The industrialist generally faces difficulties as investment costs and input costs are high and the land costs are too high:

> *"The increase in the land values led to the emergence of industrialists using these lands as investments while they were supposed to be sold to industrialists. Many of the industrialist friends we know are buying a place from here and renting it. I would prohibit it or set a leasing limit if I were in the management of the OIZ. There are firms engaged in real estate business instead of production." (ASO 1. OIZ)*

> *"The prices per square meter are much more affordable abroad. In the American state of Indiana, services such as transportation, heating, parking, water, and electricity are very good and the prices per square meter are much more affordable. Incentives for industry are not enough. Property owners in OIZs are making a lot of profit and because of this, buying land and renting it looks much more profitable than getting involved in industrial production." (Ankara OSTİM)*

> *"People are doing trade here. They purchase parcels and they rent it. The price per square meter of land is too high. Our biggest problem is workmanship and rent. We spend 30,000 TL per month in rent. If land with an infrastructure price was established for us so that we could purchase the land as industrialists, everything would be very different. There are many of those who purchase some land, although they do not need it, they rent it. They are getting unearned income through land." (İzmir Atatürk OIZ)*

As you can see, land costs are an important issue on the industrialists' agenda. In order to examine this issue in more detail, the types of land ownership of the firms operating in organised industrial zones should be investigated. From the data, 207 of the 229 interviewed firms gave information about land ownership. According to Table II, it is seen that firms tend to purchase the lands on which they operate. Some of the interviewed firms stated that the firm owner has the land ownership. At the same time, there are also cases where production is taking place on rented land. Some of the firms stated that their land ownership belongs to a holding company within their organisation and that they choose to rent it from there.

"They bought the land. ... paying rent to their own private company." (Gebze OIZ)
"The family is paid the rent. The land is not owned by the firm. It is for manipulating the balance sheet." (Gebze OIZ)
"The land is owned by the family and the company pays rent." (TOSB)

Attention is drawn to the 8 interviewed micro-scale firms in Gebze OIZ that are located in the technopark and are operating their production on a rented area. These results show that the number of firms which use rented lands is higher in Gebze OIZ. Firms who rent are classified into two groups. The first group consists of the firms that preferred not to purchase the land as a strategical move (especially multinational companies) and the other group consists of those which could not purchase a land due to financial reasons:

"At that time the land was ours. Our debt increased significantly because of the exchange rates. By the end of 2013, the land was sold. They cleared their debts to the banks. Of course, they would like to be property owners. Here, 15 year contracts can be made as per law." (Konya OIZ)

"Right now, the subject that needs to be handled is the unearned income issue. The industrialist is not supported. For example, we do not own this place. They hire these places to the industrialist and they make money by using us. In other countries, it is allocated by the state. The prices here went crazy, reaching 600 dollars. We are paying 3-4 euros for rent per square meter." (Bursa OIZ)

Table 11. Distribution of the Interviewed Firms by OIZs

	Rented	Owned by the Firm	Total
ASO 1. OIZ	0	5	5
OSTİM	4	10	14
Konya OIZ	2	19	21
Eskişehir OIZ	3	15	18
Atatürk OIZ	5	14	19
Manisa OIZ	3	14	17
Adana OIZ	1	15	16
Gaziantep OIZ	1	13	14
Gebze OIZ	12	10	22
TOSB	1	5	6
Bursa OIZ	6	21	27
Demirtaş OIZ	5	23	28
TOTAL	43	164	207

Land Ownership

Transportation is again seen as one of the most important problems of the industrialists. Participants here expressed that not only there are important problems in the transportation of OIZs' employees but also traffic itself became a problem in the zones making the transport of goods problematic.

The indifference of OIZ management in its relations with firms is again an important problem stated in the research. In addition to this, infrastructure and superstructure problems, lack of social facilities, and inadequacy or lack of vocational education are among the other problematic issues stated.

So far, problems related to the internal dynamics of OIZs have been raised. There are also important external problems that the participants emphasized during the interviews. These problems are seen in detail in Figure 12. Problems based on external dynamics are collected under three main headings. The most important external problem is about education which can also be divided in two within itseld.

Firstly, the participants mentioned a number of fundamental problems from the curriculum to the educational policies of vocational and technical high schools, which are expected to provide the industry with new skills and talents. The participants mentioned these as the basis of the workforce problem as seen in Figure 12. Secondly, they highlighted the problems related to universities, which are expected to bring technological developments to the industry both from an intellectual and practical perspective. The problems related to universities are focused on the weak relations, the theoretical approach of the educators in universities, and the fact that the academicians and industrialists have different perspectives and expectations.

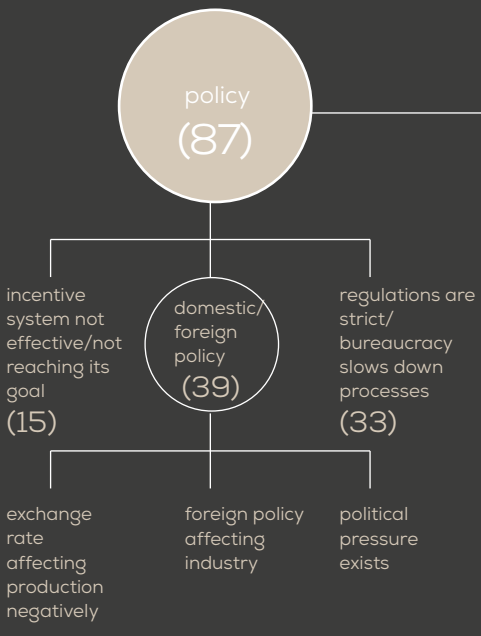
> *"Germany's engineering faculties have applied engineering departments in addition to theoretical engineering. When we talked to the engineers there, they said that those who graduate from theoretical departments become a professor but those who graduate from the applied engineering department know about management and production. For example, in Turkey, I visit a professor when I would be conducting a project. I then approach the issue from a profit perspective. And the professor tells you a superb theoretical thing, but they get stuck whenever you ask about the application." (Ankara OSTİM)*

"It is unclear to what extent the university professors know about the treatment facilities. The OIZ requests the university professors to write a report on treatment facilities, but the university professors do not have practical knowledge." (İzmir Atatürk OIZ)

Problems related to production are another issue that the industrialists emphasized. In this respect, among the highlighted matters are unfair competition, inability to produce domestically, incapability to commercialize domestic products, and lack of appropriate profiles of people in the industry to enable technological developments.

Finally, the significant influence of politics on industry is another important external factor. The participants expressed that the industry is affected by internal and external politics, that foreign exchange rates reflect negatively on them and, finally, regulations are so strict that they could interrupt production, and that bureaucracy slows down business.

Figure 12. Participant Opinions on Factors Faced as Out-of-Zone Problems



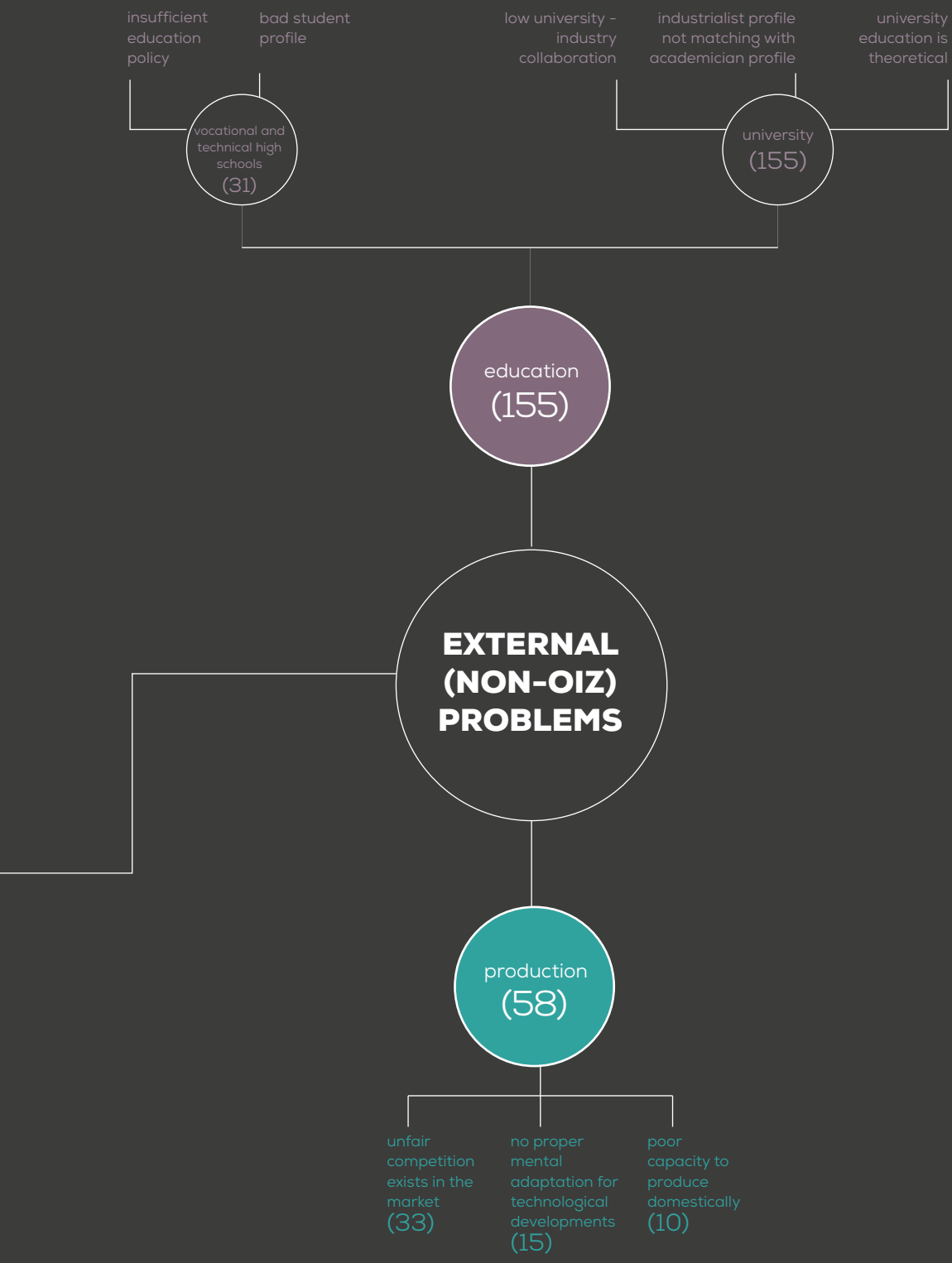
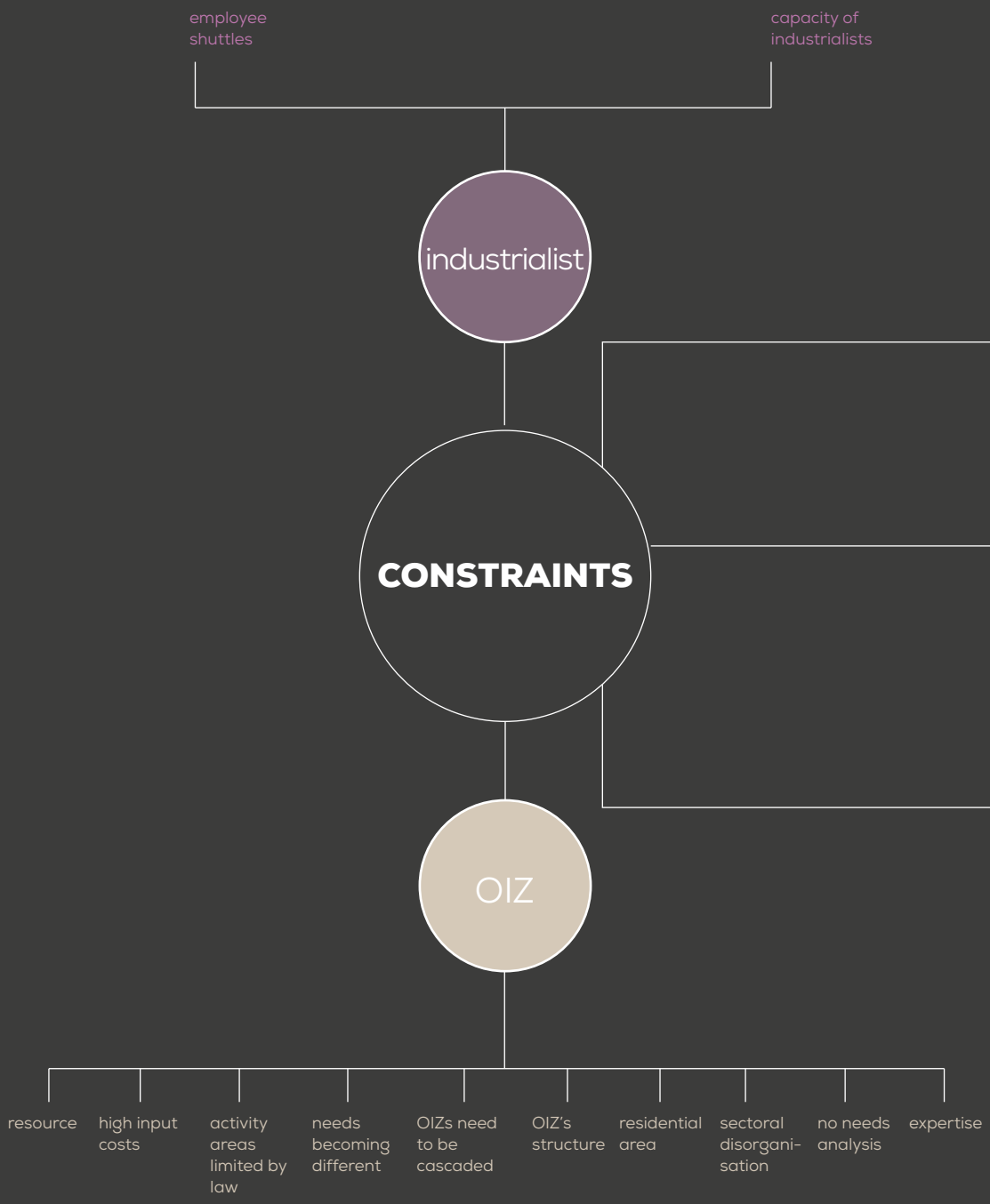
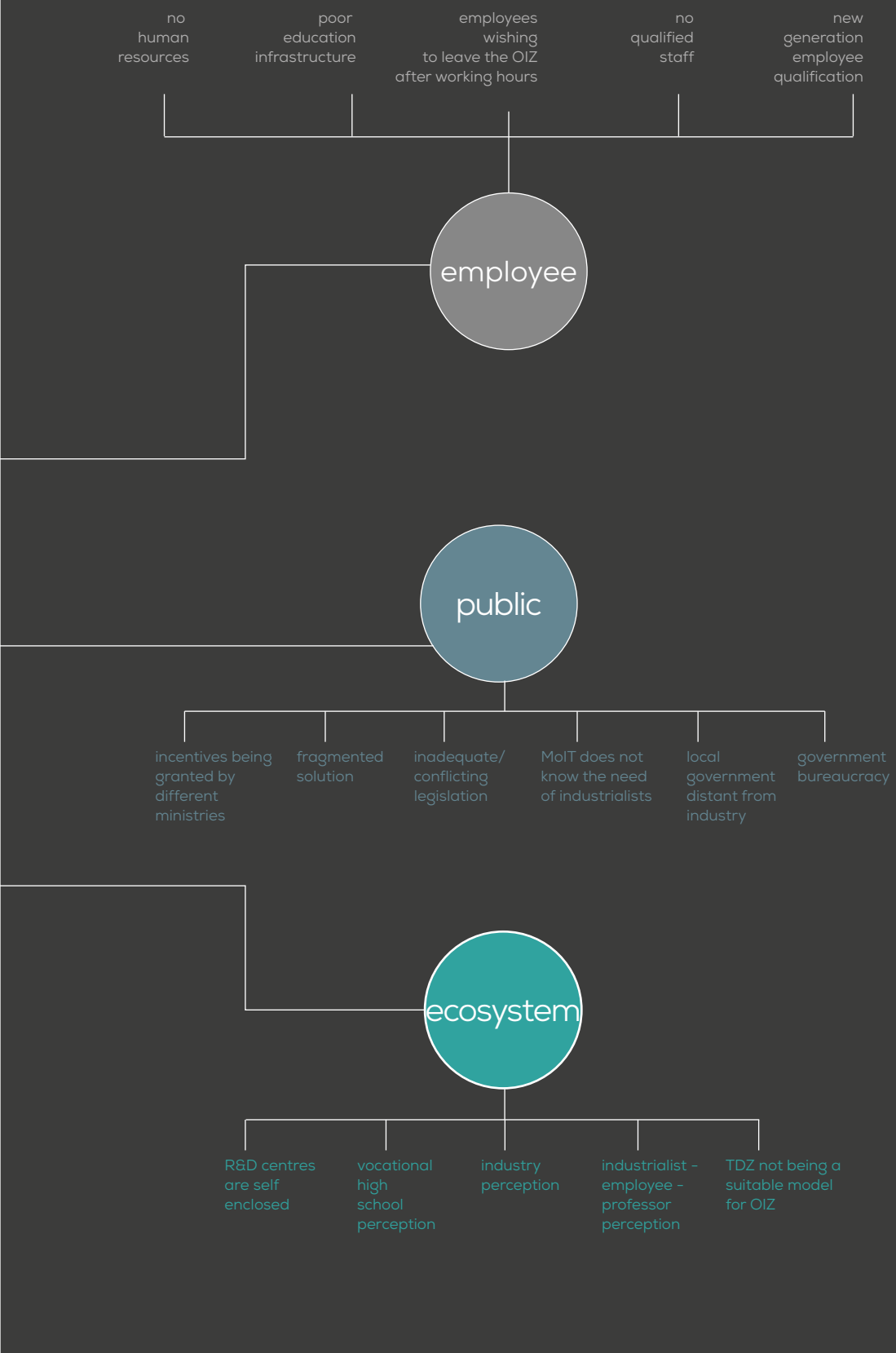

insufficient education policy
bad student profile
vocational and technical high schools (31)
low university - industry collaboration
industrialist profile not matching with academician profile
university education is theoretical
university (155)
education (155)
EXTERNAL (NON-OIZ) PROBLEMS
production (58)
unfair competition exists in the market (33)
no proper mental adaptation for technological developments (15)
poor capacity to produce domestically (10)

Figure 13. Constraints Expressed by the Focus Group Participants




no human resources
poor education infrastructure
employees wishing to leave the OIZ after working hours
no qualified staff
new generation employee qualification
employee
public
incentives being granted by different ministries
fragmented solution
inadequate/ conflicting legislation
MoIT does not know the need of industrialists
local government distant from industry
government bureaucracy
ecosystem
R&D centres are self enclosed
vocational high school perception
industry perception
industrialist - employee - professor perception
TDZ not being a suitable model for OIZ

3.4. Needs Analysis: What Do Firms Need in terms of Technology? What Do They Expect from OIZs?

Besides the effectiveness of the services, the question "How much do you think the services offered by the OIZ are necessary?" was directed to firms under the research's scope, and they were asked to give a score between 1 to 5 (1 not necessary at all, 5 very necessary).

During the in-depth interviews, the following questions were also directed to the firms:

- If all the authority was given to you and you were asked to establish a new OIZ, what activities would you prioritize and what kind of a structure would you design?
- What kind of a relationship do you think there is between the OIZ and the region's life quality, qualified workforce, university infrastructure, industry capacity and technology production infrastructure?
- What should be done to increase the collaboration/partnership capacity in the OIZ?
- What are your expectations from the OIZ management?
- What do you think the OIZ management can do to strengthen collaboration and competitiveness?
- In which of your activities do you need the support of the OIZ?
- Given your firm's goal of improving productivity and innovativeness performances, can we learn your views on the following options for the future of OIZs?

While the average effectiveness score of the 12 OIZs in the fields of services, which we define as the conventional OIZ services, is 4, the need for these services is evaluated with a score of 4.7. There is a consensus on the necessity of OIZs to provide these services, confirming that these services are the primary components of OIZs. Infrastructure and emergency services are the highest demanded services.

Table 12. Conventional Services Group: "How Much Do You Think These Services are Needed?" (1 not needed at all, 5 very much needed)

	GENERAL	Adana OIZ	Atatürk OIZ	Bursa OIZ	Demirtaş OIZ	Eskişehir OIZ	Gaziantep OIZ	Gebze OIZ	Konya OIZ	Manisa OIZ	OSTİM	ASO 1. OIZ	TOSB
Infrastructure (connection, sales, operation)	4,8	4,7	4,6	4,6	4,8	4,7	4,7	4,9	5,0	4,9	4,8	4,8	4,7
One Stop Office (licenses and permits)	4,7	4,7	4,4	4,6	4,8	4,5	4,8	4,8	4,6	4,9	4,5	4,6	4,8
Supervision	4,5	4,5	4,1	4,6	4,6	4,5	4,6	4,5	4,4	4,5	4,3	4,5	4,7
Superstructure services (energy management, cleaning, weighbridge)	4,7	4,8	4,6	4,8	4,8	4,4	4,8	4,7	4,8	4,8	4,7	4,6	4,8
Emergency services (fire, security)	4,8	4,9	4,9	4,9	4,9	4,5	4,8	4,8	5,0	4,8	4,4	4,9	5,0
AVERAGE	4,7	4,7	4,5	4,7	4,8	4,5	4,7	4,7	4,8	4,8	4,5	4,7	4,8

Table 13 shows both the conventional services and the services indirectly and directly related to technology, and they are ranked according to the firm's levels of need. In this ranking, the highest score was in the area of emergency (4.8) and the lowest score was in the area of region's living spaces (housing, entertainment, education, health, etc.) (3.9). However, the fact that even the lowest service area received 4.0 points indicates the need for the effective provision of all these services. An analysis regarding which of those services are demanded by what types of firms will shed light on determining the scope of the model. The fact that vocational education (4.5) and university-industry collaboration (4.5) received higher scores than supervision, which is one of the main functions of OIZs, confirms the hypothesis that these functions are now seen among the main tasks of OIZs.

Table 13. Need Ranking of Conventional OIZ Services and Technology Related Services

The results brought together for the
12 OIZ (1 not needed at all, 5 very much needed)

Emergency services (fire, security)	4,8
Infrastructure (connection, sales, operation)	4,8
Superstructure services (energy management, cleaning, weighbridge)	4,7
One Stop Office (licenses and permits)	4,7
Vocational and technical training	4,5
Industry - university collaboration, TTO	4,5
Supervision	4,5
Technology Development Zone	4,4
Support for new market development, internationalisation	4,4
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	4,3
Networking - increasing collaboration between firms	4,3
Investment promotion, attracting new investors	4,3
Logistics Centre	4,3
Social Services (Restaurants, shopping malls, sports)	4,2
Incubator and accelerator - to provide support for newly-established firm	4,2
Kindergarten	4,0
Pairing with mentors	4,0
Living areas in the region (housing, entertainment, education, health)	3,9

It is seen that the firms, which indicated the services in this group as the needs in the highest level, are located in Demirtaş OIZ, Gaziantep OIZ, Manisa OIZ and ASO 1. OIZ with an average of 4.4 points.

The differences between OIZs in the demands for some services also stand out. For example, while the firms in Sincan OIZ gave 4.6 points to incubator and accelerator services, the firms in Atatürk OIZ gave 3.8 points for this service. While the firms in Manisa OIZ gave 4.7 points for the training on digitalization, Industry 4.0, and the establishment of competency and digital transformation centre, the firms in OSTİM gave this 3.8 3.8 points for this criterion.

Table 14. Need Level of OIZs in Technology Related Services (1 not needed at all, 5 very much needed)

	GENERAL	Adana OIZ	Atatürk OIZ	Bursa OIZ	Demirtaş OIZ	Eskişehir OIZ	Gaziantep OIZ	Gebze OIZ	Konya OIZ	Manisa OIZ	OSTİM	ASO 1. OIZ	TOSB
Social Services (Restaurants, shopping malls, sports)	4,2	4,3	3,9	4,1	4,3	4,1	4,1	4,2	4,4	4,3	4,3	4,4	4,2
Vocational and technical training	4,5	4,6	4,4	4,6	4,8	4,7	4,5	4,0	4,6	4,6	4,8	4,5	4,2
Kindergarten	4,0	3,7	4,0	3,8	4,6	4,1	4,1	3,6	3,7	4,4	3,8	4,6	3,7
Logistics Centre	4,3	4,2	3,8	4,2	4,4	4,5	4,6	3,8	4,3	4,6	4,2	4,7	3,8
Technology Development Zone	4,4	4,4	4,1	4,4	4,6	4,4	4,3	4,3	4,6	4,6	4,4	4,5	4,2
Investment promotion, attracting new investors	4,3	4,7	4,2	4,2	4,2	4,3	4,3	4,0	4,6	4,4	4,3	4,6	4,3
Increasing collaboration between firms	4,4	4,2	4,3	4,4	4,2	4,4	4,4	4,3	4,1	4,5	4,5	4,6	4,3
Incubator and accelerator - to provide support for newly-established firms	4,2	4,3	3,8	4,3	4,2	4,1	4,3	4,0	4,4	4,4	4,2	4,6	4,2
Support for new market development, internationalisation	4,4	4,4	4,2	4,6	4,4	4,3	4,5	4,3	4,4	4,2	4,4	4,3	4,3
Industry - university collaboration, technology transfer office	4,4	4,4	4,4	4,6	4,7	4,3	4,5	4,4	4,7	4,5	4,1	4,3	4,3
Pairing with mentors	4,0	3,9	3,8	3,8	4,1	3,9	4,2	3,9	4,2	4,3	4,1	4,0	4,0
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	4,3	4,6	4,3	4,2	4,6	4,1	4,6	4,0	4,4	4,7	3,8	4,2	4,3
Living areas in the zone (housing, entertainment, education, health)	3,9	4,3	3,6	3,6	4,0	3,9	4,2	4,0	3,8	4,2	3,4	4,1	4,0
AVERAGE	4,3	4,3	4,1	4,2	4,4	4,2	4,4	4,1	4,3	4,4	4,2	4,4	4,1

Table 15 shows the difference in the level of need for each service item by the 220 firms within the scope of the research and the level of effectiveness of the service provision by OIZs in the eye of the firms.

According to the ranking possible based on this difference, the three service items with the highest need-effectiveness spread are as follows: the establishment and operation of TDZs within OIZs, the organisation of capacity building programmes for digitalization and Industry 4.0 and the activities for developing the university-industry collaboration (TTO). While the firms ranked their need for these three services at an average of 4.3 points, they gave only 2.5 points for the impact level. Immediately following these three services are the functions of pairing with mentors, new market development (supporting for internationalization) and investment promotion (attracting strategic investors with advanced technology).

At the bottom of this list are the superstructure services (energy management, cleaning, weighbridge, etc.), infrastructure (connection, sales and operation) and one stop office (licenses and permits) which are among the conventional functions of OIZs.

This list sheds light on which functions should be prioritized while defining the new generation OIZs and transforming the current OIZs in this direction.

Table 15. Differences Between the Need for OIZ Services and the Effectiveness Level of Such Services

	Need level	Impact score	DIFFERENCE
Technology Development Zone	4,4	2,4	2,0
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	4,3	2,4	1,9
Industry - university collaboration, technology transfer office	4,5	2,7	1,8
Pairing with mentors	4,0	2,3	1,7
Support for new market development, internationalization	4,4	2,7	1,7
Investment promotion, attracting new investors	4,3	2,6	1,7
Incubator and accelerator - to provide support for newly-established firms	4,2	2,5	1,7
Logistics Centre	4,3	2,7	1,6
Kindergarten	4,0	2,5	1,6
Increasing collaboration between firms	4,3	2,8	1,5
Vocational and technical training	4,5	3,3	1,3
Living areas in the zone (housing, entertainment, education, health)	3,9	2,7	1,2
Social Services (Restaurants, shopping malls, sports)	4,2	3,5	0,7
Emergency services (fire, security)	4,8	4,2	0,6
Supervision	4,5	3,8	0,6
One Stop Office (licenses and permits)	4,7	4,0	0,6
Infrastructure (connection, sales, operation)	4,8	4,1	0,6
Superstructure services (energy management, cleaning, weighbridge)	4,7	4,1	0,6

The table below shows the need scores given by all firms, white collar intensive firms and high value-added firms for 18 different OIZ service areas. While there is no significant difference between the needs of firms in general, it is seen that in white collar intensive firm group, firms are mainly in need of conventional OIZ functions.

Table 16. The Need for Conventional OIZ Services and Technology Related Services: All Firms, White-Collar Intensive Firms and High Value-Added Firms

	"ALL FIRMS (220 FIRMS)"	"WHITE COLLAR INTENSIVE FIRMS (40 FIRMS WHOSE WHITE COLLAR RATE IS ABOVE 35%*) Small Scale: 8 firms, Medium Scale: 21 firms, Large Scale: 11 firms*	"HIGH VALUE-ADDED FIRMS (47 FIRMS WHOSE PRICE PER KG IS OVER 10 USD*) Small Scale: 6 firms, Medium Scale: 23 firms, Large Scale: 11 firms* Micro
Infrastructure (connection, sales, operation)	4,76	4,75	4,67
One Stop Office (licenses and permits)	4,66	4,61	4,63
Supervision	4,47	4,44	4,58
Superstructure Services (energy management, cleaning, weighbridge)	4,70	4,69	4,65
Emergency services (fire, security)	4,82	4,80	4,82
Social Services (Restaurants, shopping malls, sports)	4,22	4,19	4,26
Vocational and technical training	4,54	4,52	4,70
Kindergarten	4,03	3,95	4,24
Logistics Centre	4,26	4,21	4,38
Technology Development Zone	4,42	4,45	4,46
Investment promotion, attracting new investors	4,32	4,31	4,38
Increasing collaboration between firms	4,32	4,33	4,45
Incubator and accelerator	4,20	4,13	4,20
New market development, internationalisation	4,38	4,37	4,43
Industry-university collaboration, TTO	4,48	4,52	4,58
Pairing with mentors	4,01	4,03	3,96
Training on digitalization, Industry 4.0, establishing and operating a competency and digital transformation centre (model factory)	4,34	4,28	4,54
Living areas in the zone (housing, entertainment, education, health)	3,89	3,88	4,12

How Do the Demands of the Sectors from OIZs Differentiate?

In general, there are significant differences in the various sectors' demands from OIZs. The service areas that attract attention regarding these differences are as follows:

• The most important difference in the ranking of priorities among sectors is seen in the new market development service, which can also be seen as a clustering activity. While this service area is among the top priorities in the sectors such as mechanical, electronics and defense, for firms in the white appliances sector it is ranked the lowest.

• Social services (restaurants, shopping malls, sports, etc.) are among the top priority demands for firms in the defense and white appliances sectors, while they rank 10th in the automotive and plastics sectors.

• While services in the field of digitalization are ranked 2nd for the textile and white appliances sectors, they are 11th for the electronics sector and 8th for the defense sector.

• While the investment promotion (attracting new strategic investors to OIZs) is the 4th priority for the automotive supply industry, electronics and plastics sectors, it is the 10th for the white appliances sector and 12th for the defense sector.

On the other hand, it is possible to say that there is a consensus among all sectors for some service areas. Among these service areas, the following stands out as the prioritized service areas across the sectors:

• Vocational and technical training
• Industry-university collaboration, TTO
• Technology Development Zone

Table 17. Sectors, Priority Ranking for 13 Service Areas Directly and Indirectly Related to Technology

	"Automotive (Automotive and Automotive Supply Industry) – (51 firms)"	"Mechanical (Machinery, Machinery Equipment and Construction Equipment) – (31 firms)"	"Tekstil (Tekstil, Hazır Giyim ve Deri) (28 firma)"	"Textile (Textile, Ready-to-Wear and Leather) – (28 firms)"	"Metal (Metal and Metal processing) – (20 firms)"	"Plastics and Rubber – (14 firms)"	"White Goods (White Goods and Air Conditioning) – (10 firms)"	"Defense – (10 firms)"	"Others – (12 Sectors) – (40 firms)"
New market development, internationalization	7	3	7	3	4	5	13	4	1
Social services (Restaurants, shopping malls, sports)	10	8	9	7	5	10	3	3	11
Competency and digital transformation centre for digitalization (model factory)	5	6	2	11	7	6	2	8	3
Investment promotion, attracting new investors	4	5	8	4	8	4	10	12	7
Collaboration between firms	6	7	6	1	10	7	5	10	5
Technology Development Zone	3	4	4	2	2	2	6	9	6
Industry-university collaboration, TTO	1	2	1	6	3	3	8	2	2
Logistics Centre	8	10	5	8	6	8	4	5	10
Kindergarten	11	12	10	10	11	11	9	6	13
Vocational and technical training	2	1	3	5	1	1	1	1	4
Incubator and accelerator	9	9	12	9	9	9	7	7	8
Pairing with mentors	12	11	11	13	12	12	11	13	9
Living areas in the region (housing, entertainment, education, etc.)	13	13	13	12	13	13	12	11	12

Demands of Exporter Firms from OIZs

There is a positive relationship between the export density of firms and the tendency to demand OIZ services. For example, while the firms whose share of export in their sales is more than 60 percent gave 4.6 points for vocational education service, the firms whose export ratio is less than 30 percent gave 4.4 points for vocational education. In particular, the export-oriented firms demand services such as, industry-university collaboration, technology development zone, digitalization, logistics centre and networking, more compared to the firms with low export rates.

Based on this finding, it can be said that the chances of success of the model will increase if first the export-oriented firms are designated as the target audience of the services to be offered under the model to be developed.

In the meantime, firms with low export rates demand the services such as investment promotion (attracting new investors) and new market development (internationalisation) more.

Table 18. The Relationship Between Firms' Expectations from OIZs and the Export Rates in Firm Sales

1: Not Needed At All 5: Very Much Needed **Group A:** Those exporting less than 30% **Group B:** Those exporting between 30% and 60% **Group C:** Those exporting between 60% and 100%	A Companies with less than 30% of exports in sales (57 companies)	B Companies with 30 to 59% of exports in sales (82 companies)	C Companies with 60 to 100% of exports in sales (54 companies)	A B C
Vocational and technical training	4,4	4,6	4,6	
Industry-university collaboration, TTO	4,4	4,6	4,5	
Technology Development Zone	4,3	4,4	4,4	
Education, competency and digital transformation centre for digitalization (model factory)	4,2	4,4	4,3	
Logistics Centre	4,0	4,3	4,3	
Increasing collaboration between firms	4,2	4,3	4,3	
Investment promotion, attracting new investors	4,4	4,3	4,2	
New market development, internationalization	4,4	4,4	4,1	
Incubator and accelerator	4,1	4,3	4,1	
Social Services (Restaurants, shopping malls, sports)	4,2	4,3	4,1	
Kindergarten	3,9	4,0	4,1	
Living areas in the zone (housing, entertainment, education, health)	3,8	3,9	4,0	
Pairing with mentors	4,0	4,1	3,8	

Differences With Respect to Management Quality

While 58 percent of the firms stated that they monitor their productivity using Enterprise Resource Planning (ERP) software, 17 percent of the firms said that they do not systematically monitor their productivity using any method. There are some differences between the expectations of these two group of firms from OIZs.

Firms, which do not monitor their productivity, give greater priority to issues such as pairing with mentors, investment promotion, vocational technical education compared to firms which monitor their productivity.

Table 19. Expectations for OIZ Services (Differences Between Firms Using Programs such as ERP, etc and Firms That Do Not Monitor Productivity)

	A Programs such as ERP, etc. exist (147 firms)	B No productivity monitoring (30 firms)	A B
Social Services (Restaurants, shopping malls, sports)	4,2	4,1	
Education, competency and digital transformation centre for digitalization (model factory)	4,3	4,2	
Increasing collaboration between firms	4,3	4,2	
Incubator and accelerator	4,2	4,1	
Kindergarten	4,1	4,0	
Technology Development Zone	4,4	4,4	
New market development, internationalization	4,3	4,3	
Living areas in the zone (housing, entertainment, education, health)	3,9	3,9	
Logistics Centre	4,3	4,3	
Industry-university collaboration, TTO	4,5	4,6	
Vocational and technical training	4,5	4,7	
Investment promotion, attracting new investors	4,2	4,4	
Pairing with mentors	3,9	4,2	

Differences According to Form of Management Style

During the fieldwork, it was asked whether or not the firms define themselves as family businesses. 71 percent of the firms identify themselves as family businesses. The category of "others" includes publicly-owned corporations, companies where managers are partners, and multinational corporations, etc. Although there are no major differences between family companies and other companies, it is seen that the most notable differences are in new market development and digitalization fields. In addition, support services such as mentoring, clustering, etc. seem to be more popular among second generation managers who have had better education opportunities compared to the first generation members of family companies.

Table 20. Expectations for OIZ Services (Differences Between Family Companies and Other Companies)

	A Programs such as ERP, etc. exist (147 firms)	B No productivity monitoring (30 firms)	A B
New market development, internationalization	4,5	4,2	
Education, competency and digital transformation centre for digitalization (model factory)	4,4	4,2	
Industry-university collaboration, TTO	4,5	4,3	
Vocational and technical training	4,6	4,5	
Increasing collaboration between firms	4,4	4,2	
Investment promotion, attracting new investors	4,4	4,3	
Logistics Centre	4,3	4,2	
Pairing with mentors	4,0	4,0	
Social Services (Restaurants, shopping malls, sports)	4,2	4,2	
Technology Development Zone	4,4	4,4	
Incubator and accelerator	4,2	4,2	
Kindergarten	4,0	4,1	
Living areas in the zone (housing, entertainment, education, health)	3,8	4,0	

Analysis of Qualitative Data on the Needs and Expectations of Firms, General Results

In the in-depth interviews, the participants were asked about their needs and expectations. In this context, the participants' answers are combined under the expectations and needs category and shown in Table 21. It is seen in Table 21 that the expectations and recommendations of the participants from all OIZs are collected under 13 headings. The highlights of these are summarised in this section.

Table 21. Density of Participant Expectations and Recommendations for OIZs

Vocational training activities come to the forefront among expectations related to education in the region. The participants mention not only a limited range of education, such as high school education, but also the kind of education that can be considered in the context of lifelong learning. According to this, some participants' statements are as follows:

""I would increase the capacity of Erkunt Vocational Education Centre. I would accept students after secondary school by holding an exam. They would receive training from teachers for two days and work with us for three days. Then we would hire these children. We would raise our own workforce. Because they would be trained with our mentality, their productivity would be higher. There could be some among them who would go to the university. I would try to operate this structure in here. I think such a structure would be useful." (ASO 1. OIZ)

"We need vocational education. We work with the OIZ, we send our employees to the Municipal courses, but it will be better if the OIZ organizes training sessions." (Konya OIZ)

"Manisa OIZ should give support when it comes to raising qualified personnel. Industrialists cannot build their own apprenticeship school. It would be irrational if all the industrialists go and try this individually. Instead, OIZs should undertake work to find us personnel." (Manisa OIZ)

"We are having difficulties in finding vocational high school graduates. Vocational high school graduates are less than 10%. There are plastic injections in 2 high schools here. There are no graduates from that school in moulding plastic injection. Even if people at vocational high schools do their duties, the graduates go to the service industry. The OIZ should cooperate. If it could offer to train these children and then ask us for employment, employment can be found in the OIZ." (Bursa Demirtaş OIZ)

In fact, the expectations regarding educational activities are very closely related to the workforce and employment problems, which, as indicated in Figure 12, were stated by the participants as the main issue they considered problematic in the zone. The participants emphasized that educational activities are an issue that lies at the core of the workforce problems and that is also an area that will solve such problems. However, the expectation here is not to train vocational high school graduates who would be very successful and make tremendous impacts in Turkey and around the world, but to create suggestions which will find solutions to the current issues and solve both the workforce problem in general and the qualified personnel problem specifically. This is closely related to the industrialists' obligation to save the day, eliminate the internal and external problems struggled with, take actions that will increase efficiency in production.

Compared to the new generation, the subgeneration of this generation is now demanding completely different things. The children are in the company, and this is the common problem of all companies, you need to provide them comfort within the company.

The employment of individuals in the industry, who speak foreign languages and have the knowledge and skills regarding Industry 4.0, is also among the expectations related to education.

> *"The greatest problem we experience in this factory is about the workforce. Unemployment is very high, but also qualified personnel cannot be found. This will further increase with Industry 4.0. We need to focus on how to establish this qualified workforce. Wage policies should be determined accordingly." (ASO 1. OIZ)*

> *"4.0 project... There is the need to train people who could become technicians for robots in the future. Personnel who could meet this requirement should be trained, incentives should be granted, and collaborations between universities and the industry should be strengthened." (Bursa Demirtaş OIZ)*

During the focus group interview, the necessity of attracting qualified workforce to industrial zones was mentioned and participants made various suggestions. Emphasis was placed on the improvement of the social areas in the region, the development of living spaces and, the holistic improvement and development of the region including the industrial zone.

> *"We are constantly talking about how to keep our qualified personnel; actually it is pretty obvious how to keep those personnel. Compared to the new generation, the sub-generation of this generation is now demanding completely different things. The children are in the company, this is the common problem of all companies, you need to provide comfort to them within the company, you need to provide flexibility, you need to give autonomy, you need to grant authority. We must absolutely create social spaces. Currently, all the OIZs in this area have social spaces. You have to create an environment where people can have a coffee, relax and even rest for an hour. Otherwise, you cannot have qualified technological production made in OIZs or any industrial plant." (FGP3)*

Another expectation that firms from all OIZs agreed upon is that supporting services should be provided for technology development processes in the zone. These include elements such as common laboratories and technopark activities. The participants expressed that most small to medium-scale firms do not have the power to establish their own laboratories, and that it is a very costly and time-consuming process to obtain product test results sent for testing overseas. They also stated that, due to such factors, the establishment of a common testing centre or a laboratory in OIZ would provide a strong motivation for firms to faster produce more innovative products. However, in addition to an appropriate operation and finance model, there is one other critical element for such centres to achieve their targets, which is the human resource needed to work as managers.

> *"There should be test laboratories. It could be in a large facility, in a small facility, all may not have the opportunity to reach the same test laboratory... These test laboratories are also important in guiding the supplier." (İzmir Atatürk OIZ)*

> *"Maybe mentorship in the field of informatics. I can bring consultants who are world experts in their own fields, and make contributions that will shape their investments." (Konya OIZ)*

> *"What if they bring the R&D departments together? Firm-based R&D centres are important. All they need is two R&Ds. Maybe oils are used in the system. They are purchasing them from abroad. Everyone opened up with the R&D coming into play. We presented the R&D centres, most of them are now our customers. We now have common customers. But we did this with our own efforts. A synergy emerges when both sides make efforts. R&D centres should be brought together. Universities must be invited. More information must be shared." (Gebze OIZ)*

In addition to this, another one of the most important expectations expressed by the participants is about offering consultancy to the firms. It is observed that the firms need consultancy services in terms of innovations, production plans and investment activities. It was examined whether or not the demand for consultancy differentiates according to the company scale. No differences were observed.

In other words, both micro-scale firms, large-scale firms and others expressed that they will be able to increase their investment capacities and involve in innovation activities by receiving consultancy services. The same expectation is also mentioned regarding the incentives. Statements of some participants in this context are as follows:

> *"Having departments that will bring technology trends to the OIZ will be something that would attract new firms and be beneficial for the firms." (ASO 1. OIZ)*

> *"Firm owners are not aware of the latest technologies. That's the biggest problem. Especially, Ankara remains behind in this. There is no model such as machine learning that will transfer this technology to the company to provide knowledge." (ASO 1. OIZ)*

> *"For example, they provide information about Industry 4.0, but it would be more beneficial if they can mentor by visiting firms individually." (Atatürk OIZ)*

> *"The owners of the firms in the technopark are engineering graduates. They do not know how to make sales. They wait until someone realises." (Gebze OIZ)*

What actually lies at the core of the expectations about training, technology and consultancy activities is the fact that firms are looking for a way to innovate.

The OIZ executives stated during the focus group interview that they could take on the role of providing services to firms regarding their activities on technology usage. Among the service provision activities discussed were e-commerce portal, consultancy, training programmes, fiber infrastructure, company analyses, common use workshop, joint procurement, server control centre and internationalisation services.

> *"They will be able to buy consultancy services. That is to say, they will be able to develop products with us. Because one or two engineers work with them. They do not have enough power to hire a third engineer or they think that even if they hire a third engineer they will not be able to make them work full time anyway. In this case, we need to support them in some way." (FGP6)*

"There would be an office there, but experts need to be able to take an x-ray of firms individually. They should visit and listen to the firm, enter in it, get in touch with it." (FGP8)

"If we want to achieve technological transformation in OIZs, we need to make them more integrated with micro enterprises, start-ups." (FGP6)

Awareness-raising of the firms' technology usage under capacity building activities, and consultancy and training programmes under the heading of providing services for firms were the featured functions.

"Some of such firms in our zone - which would not exceed 20% - have already progressed in digitalization by themselves. There is a big gap with the others. The others do not even have an intention, they do not even think it will bring them any advantages. Those clearly need to understand. When they understand, things will change." (FGP1)

Given that the focus group discussion participants are predominantly composed of OIZ managements, it can be deduced that OIZs have the ability to perform these prominent functions. However, the focus group participants also noted that OIZs have important constraints on issues such as what specialization they have, resources held, activity areas limited by law, structure of OIZ and sectoral disorganisation in fulfilling the new functions to be given to them.

"I think that we should first decide what we will become, based on a service according to the member profile of each OIZ, their own development level, in other words, where do the OIZ and the industrialists within OIZs stand in their life. Will we become an awareness-raising agency, will we become an interface, or will we become a service provider?" (FGP7)

The public authorities have a very important place in the transformation of the industry in terms of legislation, incentives and bureaucracy. In light of the fact that public authorities are influential in the transformation of OIZs, the first important constraint expressed by

the participants is about legislation being inadequate and the existing legislation being of a conflicting nature.

> *"The second one is about the conflicting legislation. While I'm doing something here the public authorities do not really care, maybe ministries and relevant departments are working, for example, they tell the OIZ that they did something good for the technopark or that they support R&D centres. ... They decrease it from 50 to 30, from 30 to 15, but while doing such things they are unknowingly demolishing the technopark. Without dealing with ... so there is conflicting legislation and this is not calculated very well." (FGP2)*

Industrialist Profile

In the transformation process of the Organised Industrial Zones, entrepreneurial and innovative ecosystem actors will play an important role. Interactions between the social structure and actors are of great importance for these ecosystems (Cansız et al., 2018). Coming into prominence among them are the capacities of the public authorities, OIZ managements and industrialists. The transformation of industry and culture in Turkey will enable and accelerate the transformation of organised industrial zones into innovativeness.

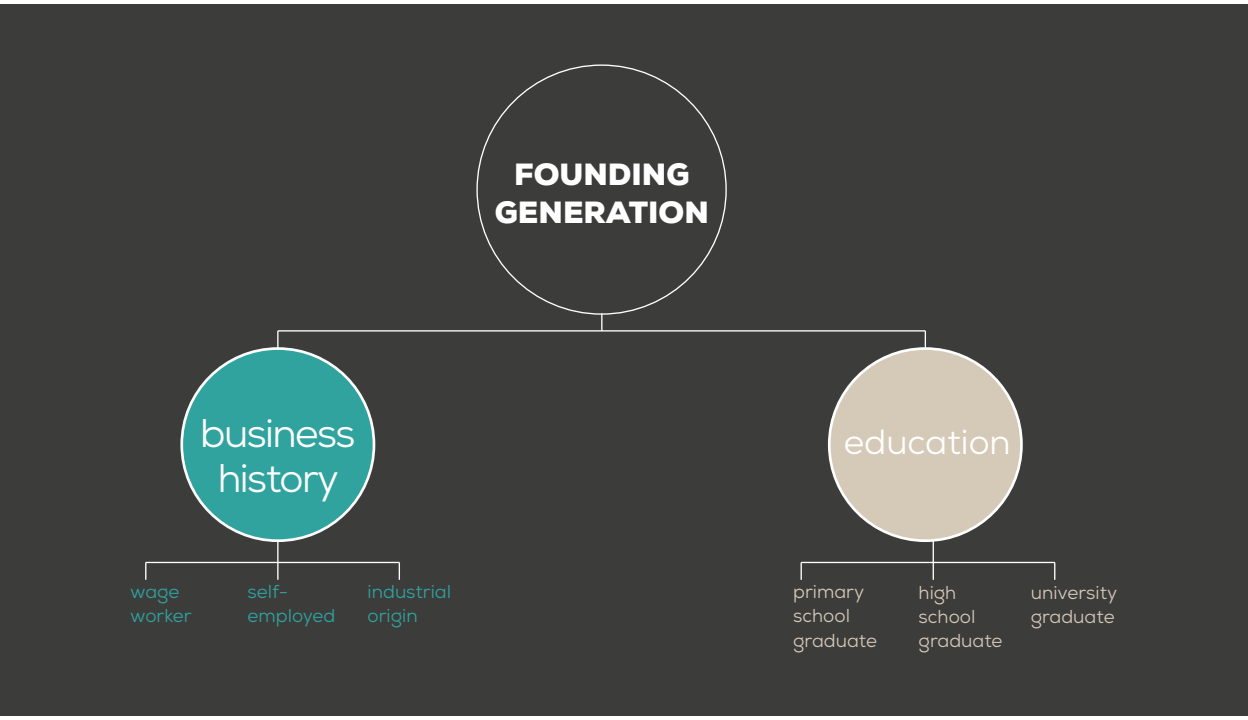
During the in-depth interviews, the participants were asked questions about the educational background of the founding generation and the trends seen in the industry. The findings are shown in Figures 14 and 15.

According to this, it is seen that while the founding generation in the industry are mainly composed of university graduate entrepreneurs, there are also primary school or high school graduate industrialists.

At the same time, the pre-entrepreneurial business histories of industrialists show a wide range of professional experience. Wage workers come from different professions including a teacher, factory worker, or an academic. Self-employed individuals, on the other hand, shifted to industry from professions such as farming, trading and attorneyships.

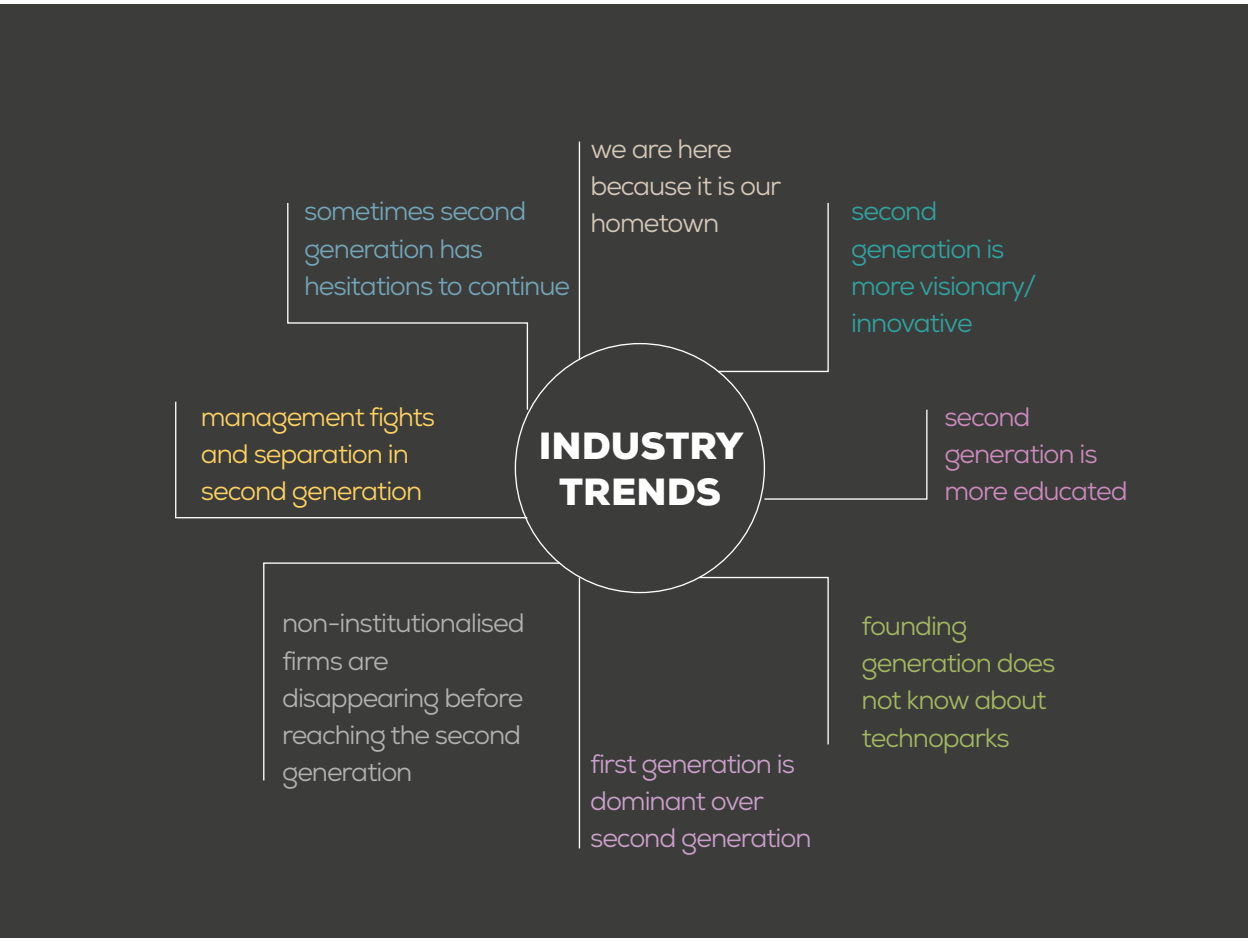
It can be stated that education is an important driving force behind individuals' shift to industry in Turkey, according to Figure 14.

Figure 14. Information about the Founding Generation



Various findings were also obtained regarding industrial trends in OIZs. These can be seen in Figure 15. It is seen that industrialists tend to invest in their hometowns. As for the differences between generations, it was stated that the generations following the founding generation have higher education and are more visionary.

Figure 15. Industrial Trends



Here are the statements of some of the participants:

> *"The second generation developed a different vision. There is a move towards taking the system to a higher level in business models. There are developments in ERP areas, for example." (Adana OIZ)*

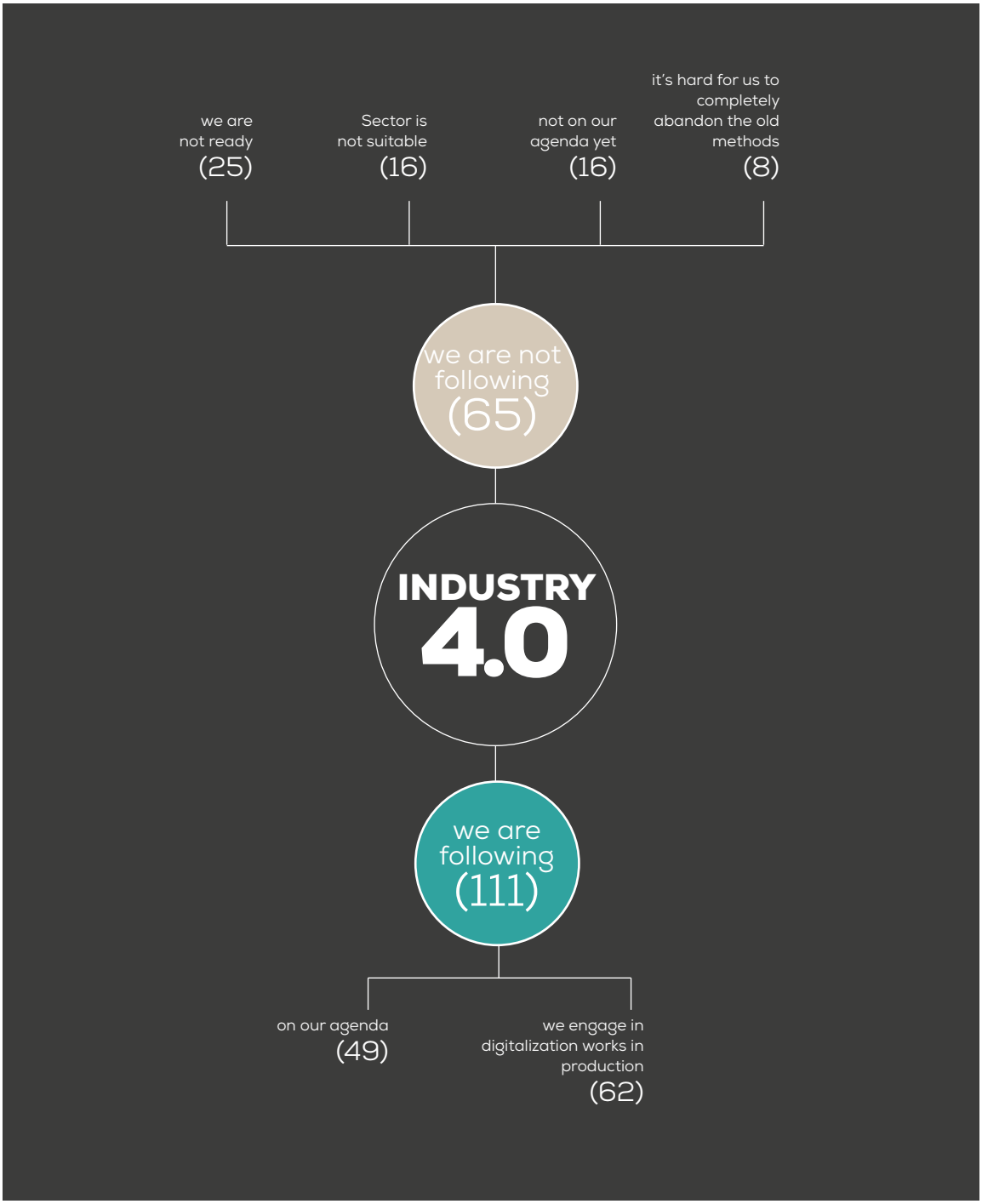
> *"The second generation is leading the firm. The second generation is university graduate, they are more technology oriented and open to innovation." (Gaziantep OIZ)*

> *"It was transferred to the second generation. The factory became more open to innovation with the second generation. Entering the built-in business... was the product of brain work. The trend towards R&D also started with the second generation." (Eskişehir OIZ)*

In some firms, there are also cases where there is no possibility of the second generation to continue to lead the firm. There are also cases where the second generation is leaving the firms.

During the in-depth interviews conducted to understand the industry culture and comprehend the solutions regarding its transformation, the firms were asked whether or not they were following Industry 4.0. The participants' status of following Industry 4.0 and their views on their adaptation to it can be seen in Figure 16. Again in Table 22, Table 23 and Table 24, it can be seen how intensively the interviewed firms are following Industry 4.0 according to the productivity monitoring, scale of firm and white-collar employment rates. According to this, it was determined that the rate of firms following Industry 4.0 was 68%, whereas the rate of those not following was at 32%. The firms following Industry 4.0 are divided into those who only express that they follow and those who make digitalization efforts. However, even though there are firms which state that they follow Industry 4.0, it is noteworthy to mention that many of them have hesitations about the issue.

Figure 16. Participant Opinions on Industry 4.0



"We use robots, but there are 400 blue collars inside. We are thinking about what these people will do after Industry 4.0. We are trying to apply Total Factor Productivity with an expert from Japan. We have robots, all of them are automated, but we have a team that manages visually." (ASO 1. OIZ)

"We are not following Industry 4.0 very much, but in some areas, we can start using robots. We have steps for that. We aimed at switching to CNC and 3-D devices, but although we made our project application for the incentive, we couldn't receive it." (Konya OIZ)

"We have 120 robots in the new factory. All compliant with Industry 4.0. We created an automation unit in a way to include the white goods. Not just the robots and automation, but all systems can work from one single centre. Say, the production department went for lunch. The system understands that the line has a lunch break. It adjusts everything like lights, etc., it's a living system, it adjusts itself." (Manisa OIZ)

"Yes, we are following. It is not currently possible to purchase new versions of our machines. 5 presses, 8 robot press lines are €15 million. We ensure that the electrical components fit the present conditions. We continue to use the presses by replacing their worn parts." (Demirtaş OIZ)

On the other hand, there are also participants who expressed in all their sincerity that they weren't following Industry 4.0.

"Not for now. Mails keep coming and we are checking them. But we aren't doing anything else. We don't need this in this sector." (Konya OIZ)

"It is early for Turkey. We are trying to reduce the use of human resources. We aren't using digitalization." (Eskişehir OIZ)

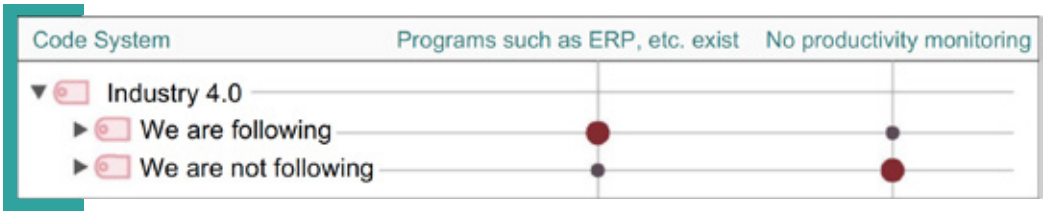
"We are at the 1.0 of Industry 4.0. It needs a discussion whether this is necessary for our sector. There cannot be Industry 4.0 where there is unfair competition and unlicensed production.

Unfair competition and the informal economy are the biggest problems. Our biggest rival uses one dispatch note for 5 lorries of goods. They use the idiom of whether necktie or bowtie." (Atatürk OIZ)

"We started to work. Nobody asks what is 3.0. There is automation in some products, but not in the majority. We're somewhere around 2.5. Don't panic... When you understand 3.0 to the full extent then you will need to understand 4.0. Everyone stays away because the costs are very high as 4.0 is very expensive." (Bursa OIZ)

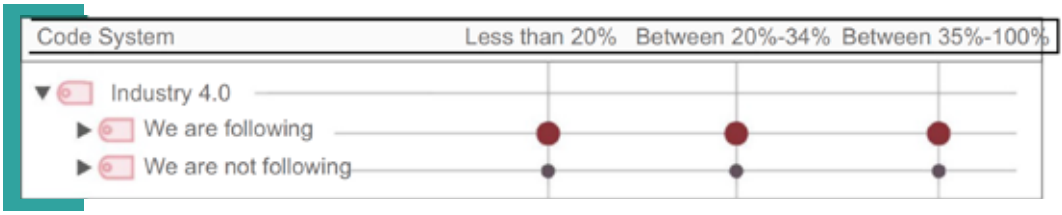
As you can see, the reasons expressed by the participants who are not following Industry 4.0 include the reasons such as the production structure in the sector not being compatible, the firms themselves not being ready and not being able to completely abandon the old methods. It can take decades to finish paying for a machine that is compatible with Industry 4.0, while it takes only a few years for a technology to grow old. This is an important problem which makes the industrialist think carefully about.

Table 22. Density of the Relation Between Participant Firms Monitoring of Productivity



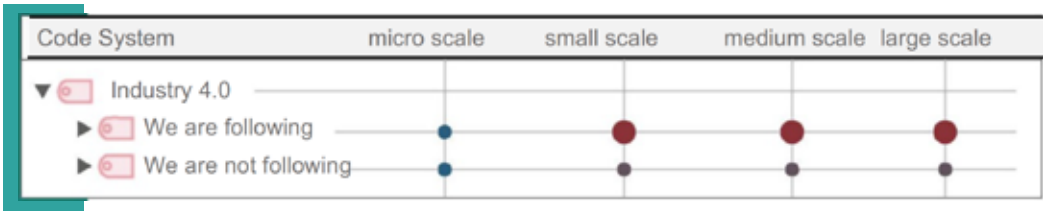
From Table 22, it is seen that the firms using ERP and similar productivity monitoring programs also follow Industry 4.0. In addition, it is observed that firms that are not monitoring their productivity also do not follow Industry 4.0.

Table 23. Density of the Relation Between Participant Firms' White Collar Employee Ratios and their Following of Industry 4.0



It is observed that the fact that employees are white collar-intensive does not affect the firms in regards to following the Industry 4.0.

Table 24. Density of the Relation Between Participant Firms' Firm Scales and their Following of Industry 4.0



Again, from Table 24, it can be seen that the firm scale is not very determinant in following Industry 4.0.

4

New Generation OIZs (Models)

PHOTO 8. MANİSA OIZ

In order to build model(s) for technology development in OIZs, a five-step method was followed.

• Firstly, in the initial phase of the research process, four different model frameworks were developed as a result of scanning the successful international implementation cases and analyzing the current situation.

• Secondly, these framework models were introduced to all the firms interviewed during the fieldwork and their opinions were received. A total of 173 positive and negative opinions were noted for the alternative models.

• Thirdly, evaluations were made on how to contextualise the different model frameworks in accordance with the results of the needs analysis discussed in the previous section. These evaluations include the new service areas that can be offered primarily and the target groups (firm segments) that are at the focus of the model.

• Finally, the research studies were deepened with international implementation cases in order to contextualise the model frameworks and the four model options were combined in two different model proposals.

This section of the report firstly describes the development of the model frameworks and secondly summarizes the firms' evaluations regarding these model frameworks. Thirdly, the recommendations related to the scope and the focus of the proposed models are discussed. This context includes some aspects such as the aim of the model, the method to be followed, the target audience, success criteria, pilot selection criteria and suggestions on where to start.

Two Different Model Frameworks

The financial and managerial capacity of the management of OIZs, the level of technology use and needs of the firms operating within the OIZ vary considerably from region to region. Because of these differences, an approach was adopted to develop unique models corresponding to the different needs and priorities of different OIZs rather than focusing on a single model across the country and mainstreaming it. Both models differ in terms of expected economic impacts, organisational restructuring and budgetary needs.

In this section, evaluations and recommendations for both models are elaborated. First of all, it is necessary to consider which types of OIZs are suitable for the models from a conceptual aspect. In this context, Model 1 can be considered for the existing OIZs, and Model 2 for OIZs that will be established in the future. More specifically, the following findings can be made regarding in which types of OIZs can the models be applied.

Model 1 can in the first stage, be applied in some certain OIZs as this model incorporates a new approach and requires visionary, financial and managerial capacity both in firms and OIZ Regional Directorates. The capacity building (establishment of a new unit related to technology) element contained in this model can be realized in almost all of the 12 OIZs covered by the research and even in other developed OIZs.

Model 2 can be implemented in Turkey's regions which have the highest potential to develop technology and produce high added value and have the highest quality of urban life, considering the resource, target audience and creative class attraction required by this model.

It will be possible for a structure, which will be hosted by an OIZ or will operate under the partnership of OIZ but will also incorporate other specialised institutions and organisations within its governance, to provide the clusters and firms with more specialised services, in other words, "firm-specific" services.

The most fundamental element that separates Model 1 from the existing OIZ practices is the concept of firm-specific service delivery specific. In the first phase of this model, there may be relatively more generic, general activities through capacity enhancement in the field of technology in OIZs, and the areas recognized as a common ground for all firms can be focused on. And the advanced phase of the model stipulates a structure, which will be hosted by an OIZ or will operate under the partnership of OIZ but will also incorporate other specialized institutions and organisations within its governance. It will be possible for such a structure to provide the clusters and firms with more specialized services, in other words, "firm-specific" services.

Among the potential new service areas addressed within the scope of the impact assessment and needs analysis, those relatively more generic and more firm-specific are classified in the table below.

Table 25. Generic and Firm Specific Service Areas Covered in Model 1

Generic Service Areas that may be Covered in Model 1	"Firm-Specific" Service Areas that may be Covered in Model 1
Providing support services in the field of vocational and technical education	Technology Development Zone
Training and awareness-raising activities on Digitalization, Industry 4.0	Industry-university collaboration, TTO
Investment promotion, attracting new strategic investment to OIZ	Pairing with mentors
Social Services (Restaurants, shopping malls, sports, culture, art, etc.)	New market development, internationalization
Investment Planning	Incubator and accelerator, to provide support for newly-established firms
	Increasing collaboration between firms

Thirdly and finally, it is important to develop an implementation framework for each model. In this endeavour, the following should be defined: the aim of the model, the method to be followed, the target audience, success criteria, enabling factors, pilot selection criteria and suggestions on where to start from. In addition, the communication strategy and action plan of the model should also be prepared. Below are the related evaluations for both models.

4.1. Model 1: Establishment of New Structures for Technology Usage in OIZs (Interface Model)

Both the corporate culture in OIZs and the interaction habits of firms with OIZs make it difficult to provide firms with specific services in areas that directly affect a firm's strategy, such as technology and innovativeness. Besides, while the needs related to technology show significant differences from one sector to another, most of the OIZs presently have developed as mix structures independent from the specific needs of the sectors. Therefore, it is not easy for an OIZ Regional Directorate to go beyond the common needs, which horizontally intersect all firms, such as infrastructure, and provide specific services to firms. While technology requires taking risks by its nature, the fact that the governance structures of OIZs are not able to tolerate risk further reduces the chance of these attempts.

Despite all these difficulties in the present situation, since the needs of the firms in this area are rapidly increasing, some OIZ Regional Directorates and local actors have initiated attempts to provide firms with support in the field of technology. However, during the fieldwork it was seen that the implementation cases which were evaluated (or perceived) by the firms as being sufficient in performance and contribution were very limited in number. Table 26 shows the main implementation and activity cases identified in the 12 OIZs where the fieldwork was conducted.

Table 26. Current OIZ Applications in Technology-Oriented Services and Activities

Service Area Related to Technology	Host and/or Conduct Executive OIZs
Technology Development Zones within OIZ	GOIZ Technopark (Gebze OIZ) ATAP Anadolu Technology and Research Park (Eskişehir OIZ) INNOPARK Konya Technology Development Zone (Konya OIZ) OSTİM Technopark (OSTİM)
R&D and Testing Centres within OIZ	BUTEKOM Bursa Technology Coordination and R&D Centre (Demirtaş OIZ) - first established to focus on Technical Textile OTAM Otomotiv Teknolojileri Araştırma Geliştirme A.Ş. (TOSB) MOIZ Education and Research Development Foundation (Manisa OIZ) - planned to establish an industrial research and application centre in a land of about 50 ha.
Structures and Activities for University and Industry Collaboration; Universities established by OIZs	University and Industry Collaboration Centre (Adana OIZ) Meeting of İAOIZ Industrialists and İzmir Universities (İzmir Atatürk OIZ) OSTİM Technical University (OSTİM) - at planning stage İAOIZ Foundation and University - at planning stage
Cluster Management - Those available in the P&D good practice manual	BURSA OIZ Textile Cluster DOIZ Home Textile Cluster OSTİM Defense and Aviation Cluster OSTİM Medical Clustering
Increasing Collaboration Between Firms	Breakfasts with firms (Adana OIZ) GOIZ Meetings (Gebze OIZ)
Consultancy and Mentorship	Industrialist Support Office and Project Development Desk (İzmir Atatürk OIZ) Project Writing Support for the Establishment of R&D Centres (Manisa OIZ, Adana OIZ) INNOTEAM A competition system in which the innovation management skills of the firms in the Kocaeli-Sakarya-Bolu-Düzce-Yalova region are measured, evaluated and developed (East Marmara Development Agency) Konya Technopark Grow Up Programme (Selçuk University) - Consultancy services are provided to the technology firms with a turnover above 5 million TL, settled in the Turkish market under the cooperation of the Turkish Economy Bank and which desire to open up to foreign markets. SANGEM Eskişehir Industrial Development Centre (Eskişehir Chamber of Industry) - closed ABIGEM Gaziantep European Union Business Development Centre (Gaziantep Chamber of Industry) - closed
Other Centres	Science Centre (in Konya OIZ, a Konya Metropolitan Municipality initiative) SME Competency and Digital Transformation Centre (Model Factory) (in ASO 1. OIZ, a MoIT, UNDP, Ankara Chamber of Industry and ASO 1. OIZ initiative)

Many of the existing structures are of a joint stock company nature that OIZs jointly established with related stakeholders. Some of them, on the other hand, are initiatives within the OIZ and have the status of a foundation or company. Although an evaluation into the governance models, service delivery capacities and performances of all these structures requires a separate study, it is seen that the rapport between the service receiver, service provider, and service financier has yet to be harmonious.

Government or international organisations (Development Agency Guided Project Grants, EU IPA Competitive Sectors Projects, etc.) offer financial support for such initiatives. However, the existing support often includes investment and construction costs. Based on the results of the fieldwork, it can be determined that this situation has led local actors to concentrate on issues concerning buildings and furnishings. The design of these structures do not sufficiently focus on the provision of high value added services for the target audience needs, including governance in particular. It is seen that the technology related initiatives led by OIZ managements (e.g. the technoparks within OIZs) generally concentrate on facility management and keep the delivery of value added services for the needs of firms in the background. Beyond that, among the TDZs established within Turkish universities, the structures that go beyond real estate management and provide the firms with quality services are very limited in number (Cansız, 2018).

It is known that the main element, which will bring success to these structures focused on offering services, is qualified human resources. However, the operating cost required for this is left to the operating institutions (OIZs, Chambers of Industry, etc.) in the existing support system. In the ABIGEM experience supported through EU funds, it is seen that certain instabilities and sustainability problems arise if highly paid qualified personnel starts working within an organisation. Regardless, local actors have been provided with resource support through the Ministry of Economy for the managers of clustering projects, and TÜBİTAK for the managers of TTOs. It is obvious that there is a necessity to design the right support model that can provide solutions for the technological needs of Turkish industrial firms by taking the right lessons from all of these successful and unsuccessful experiences.

Within the scope of the study, the models of some foreign structures that provide services to firms regarding the technology development were also examined. Among these structures are United Kingdom's Catapult Programme, Taiwan's Industrial Technology Research Institute (ITRI) and Germany's Fraunhofer Institute. The evaluation and summarized information related to these structures are presented in Annex 4. The common lesson derived from this examination indicates both the importance of correctly defining the technological needs of the firms and the necessity of integrating a set of solutions which would meet these needs with the right business model and support tools. The scope of the above-mentioned business model includes a service menu to be offered and the necessary governance-partnership structure and financing model.

This model can be realised in two stages:

The first stage is capacity building. Capacity building to support the use of technology by firms in OIZs is the first stage of this model. This stage can be realised in most of the OIZs in Turkey. In this context, the unit or units to be established under the OIZ Regional Directorate can focus on the service areas recognised as a common ground for all firms within an OIZ. The main priority of these units is to carry out high value added and effective activities in new service areas by establishing a qualified team.

The second stage is to establish interface structures. The establishment of new specialized interface structures in order to provide services that will support the firms' technology usage in OIZs is the second stage of this model. Interface structures can be created by establishing collaborations between OIZs and the institutions having expertise and experience in the fields needed by the firms.

First Stage - Capacity Building:

What Can Be the Functions of the New Units to be Established in OIZs?

Five different functions (service areas) may be involved at the capacity building stage to support the firms' technology usage in OIZs. All these functions can be focused on, or some certain functions can be highlighted according to the priorities of each OIZ. These functions are described below:

• **Vocational and technical education:** Vocational and technical education is increasingly sen by every firm as one of the main service elements of OIZs. There is an important consensus on this issue. On the other hand, it is understood that the services related to this area are not carried out systematically in most OIZs. Across the 12 OIZs, the efficiency of this service area received an average of 3.3 points out of 5 (neither effective nor ineffective), and the need for this service received 4.5 out of 5. The quality development of schools and vocational education centres within OIZs, the harmonisation of the relevant programmes with the technological needs of the firms, and the strengthening of the relationship between the firms and the schools/centres can be defined as the mission of a unit to be established in the future. The initiative of Manisa OIZ in this respect can be generalised as a good example since the curriculum is determined according to the needs of the industry.

• **Development of human resources in firms:** While vocational and technical education focuses on meeting the manpower requirement of the future, it is also necessary to take measures to improve the existing human resources in the firms. In this context, the implementation of activities aimed at improving the human resources of the existing firms can be defined as the mission of a new unit to be established in some OIZs. These units, which will be established in the OIZ Regional Directorates, can function as an interface between the organisations providing education in the market and the firms within OIZs. These units can execute a similar version of the activity run by human resources departments in many large-scale firms for the small and medium scale firms operating in OIZs.

• **Training and awareness-raising activities on digitalization, Industry 4.0 and modern production techniques:** Most firms in Turkey are aware of taking necessary action in areas such as lean production, digital transformation, automation, three-dimensional (3-D) printers, and internet of things. However, as far as can be seen from the fieldwork, the number of firms that have a concrete road map in this area is rather limited. In general, the firms ranked the need for this service with an average point of 4.3 out of 5, and this area ranked 5th among 13 services in the group of services related to technology. On the other hand, the effectiveness level of this service area received only 2.4 points across the 12 OIZs.

A systematic and comprehensive unit in this area to organise educational programmes aiming awareness and implementation can have important contributions to firms within OIZs. The agenda of this unit may include training and services, and collaboration on smart technologies and innovation to increase the e-export capacity of firms. Initially, works such as an human resources, technology usage and production, data production and analysis, collaboration with universities can be designed by the unit established in OIZ to be an example project.

• **Social Services (Restaurants, shopping malls, sports, culture, art, etc.):** It is becoming increasingly difficult for firms in OIZs to attract qualified human resources as the services sector in Turkey develops. Most firms are trying to keep and develop their human resources by improving their working conditions and opportunities. It is also important for OIZs to contribute to this process as well. There are important roles on the part of OIZ managements especially in improving the common social areas and solving public transportation problems. The literature in the field of technology development especially emphasizes the importance of interactions among creative people and points out the importance of the social spaces that will provide this interaction. While the need for social services received 4.2 points out of 5 in the 12 OIZs, the effectiveness level of OIZs in this area received 3.5 points. Strengthening the capacity in this area will provide a complementary and critical contribution to the technology development agenda. In particular, it is important for artistic activities, which play an important role in the development of creativity in the industry, to find more room in OIZs.

• **Investment Planning:** One of the establishment objectives of the OIZ is to provide efficiency in production and growth in profits by enabling industrialists, who are complementary to each other and promote subsidiary products of one other, to produce together under a programme. The planning required to determine which investors should be attracted to the OIZ in order to increase productivity can be made under this service item.

An evaluation of the fieldwork results showed that a large number of OIZs demand these services. This indicates that the capacity development phase may be generalized in most OIZs within a short period of time.

Second Stage: Establishing the Interface Structures

What Can be the Functions of the Recommended Interfaces in OIZs?

Compared to most institutions in Turkey's ecosystem, OIZ managements have a more critical role in carrying the model into effect. The main reason for this is the high level of interaction and potential of OIZ managements that come from their spatial proximity to the firms.

The services to be offered at this stage of Model 1 will aim at the firms that are eager to be involved in the technologic transformation, rather than the horizontal areas to be offered to all the firms across the OIZ.

These services may be directed at one single firm or may also be directed at groups of companies and clusters. The "Interface Structures" to be established within OIZs can be seen as mechanisms, which can take part in the implementation of state policies regarding technology usage, execute the strategic programmes on behalf of the government, and redefine the relationship between the government and the firm based on trust and development by acting as a part of the incentive system reform. The reason why such structures are called "interface" is that they will operate at the exact intersection point of the different layers such as public-firmuniversity and global-national-local.

When the qualitative and quantitative analysis results are evaluated together, it is concluded that there must be five different new service groups closely related to each other at the focus of the interface structures to be established in OIZs:

- Technology Transfer Office
- Research, Application and Competency Centre
- New Generation Technology Development Zone
- Open Innovation Platform
- Cluster Development Services Unit

All five different service areas can be focused on under this model, as well as certain service areas can come to the forefront according to the strategic priority of each OIZ and the needs of the firms. Likewise, an effective interface structure established in an OIZ can ensure the provision of these services in the form of sub-units of a company by focusing on all of these functions.

Most firms underline the need for a catalyst when it comes to collaborating with universities.

These service areas are described below:

• **Technology Transfer Office (TTO):** In an increasing manner, the development of universityindustry relations is seen by all firms as one of the main service elements of OIZs. There is an important consensus on this issue; the need for this service received 4.5 points out of 5. However, this service area differs from the vocational education which received a similar score. This difference comes from the fact that vocational education is a horizontal area but universityindustry relations are something that should be offered as a firm-specific service.

Most firms that are on a mission in this area underline the need for a catalyst when it comes to collaborating with universities.

It would be beneficial to reconsider positioning the structures similar to the Technology Transfer Offices at universities, which were also designed as an action that TÜBİTAK was responsible for within the scope of the Commercialization Programme in Primary Areas of Technology, but failed to be put into practice, in order to offer services to firms within an OIZ. These programmes currently consist of 5 fundamental modules: (1) Awareness and Promotion Activities, (2) Project Support, (3) Support for University-Industry collaboration and R&D commercialization, (4) Consultancy on Intellectual Property Rights and (5) Support related to Entrepreneurship. In line with the needs analysis to be carried out, those with priority among these modules can be built and executed based on the basic needs of the firms in an OIZ. In order to offer these services to all the firms, first of all, a data management function may be required. A need for an informatics infrastructure that firms will be able to access, create content and keep the data updated may arise with this data platform.

Even though different structures such as Chambers of Industry, Small and Medium Enterprises Development Organisation (KOSGEB), TÜBİTAK and university TTOs try to provide services to firms in technological fields, there is no structure which may be the "first contact point" for a firm operating in an OIZ yet. A TTO established in OIZs can undertake this contact point function.

Those who will run the programme should regularly meet with their targeted firms and listen to their problems and agenda. The same team should also develop relations with universities and research institutions through systematic methods and undertake the function of being a guide and facilitator in the development of the interaction between the two parties.

A structure established in this area should not only become the first contact point for the firms within its target area, but also act as the first contact point for the technology service providers including, in particular, the universities to interact with the firms. In addition, if there is no Cluster Management unit in the OIZ, this structure can execute some on which the unit can focus through a technology development perspective. Examples of activities of the structure in question may include:

Monitoring the technological developments in the global markets of the dominant clusters of the OIZ;
• Helping the industrialists in OIZs find the technologies related to them;
• Strengthening the collaboration between big industrial firms and start-ups; ensuring that start-ups which cannot reach the customer, come together with industrial companies;
• Acting as a guide for the related industrialists to become angel investors;
• Developing collaborative efforts with incubators which generate sectoral solutions;
• Developing the relations between the Large Integrator firms (e.g. a defense industry company which integrates the products of 30 different firms) and the OIZ firms;
• Providing support for the writing of R&D projects;
• Carrying out the Technology Audit works for the related firms or providing the necessary

• **Research, Application and Competency Centres:** While the number of R&D centres established within firms rapidly increases, serious capacity constraints arising from scale economies in these centres are likely to arise. Because in a small R&D centre of 15 people, it may not be possible to employ multi-disciplinary, PhD graduate engineers who may be needed to solve a complex problem.

The Research and Application Centres that will operate under OIZs can act as accelerators in the capacity building processes in the field of technology.

It is clear that there may be a serious demand from firms if a high-level research centre "with a global ambition beyond mediocre" operates in an OIZ. Execution of industrial research projects by the firms can also be supported in these centres, which will be designed in a manner suitable for common usage as far as possible. Technology demonstration and transfer centres which can help firms learn and experiment with new technologies, facilitate the transfer of technology by large firms, and support the training of qualified intermediate technical workforce can also be established within these structures. Works should also be conducted to find management, operation and financing models for these centres. Industrialists' fair and transparent use of the infrastructure to be offered by these centres is important. Legislative amendments that will enable the services to be received from these centres to be shown as R&D expenditure are also of critical importance. With regards to the issue, some of the participants stated the following:

> *"Establishing a TDZ is not a solution to support a common R&D. It is important for the OIZ to be able to work as a cluster manager as is the case with the models in Holland." (Gebze OIZ)*

> *"We did not collaborate with a university, but we need a catalyst. It would be hard for me to find a contact in the university by myself. I need someone to establish this relationship. Our employees here are studying for a master's degree." (Manisa OIZ)*

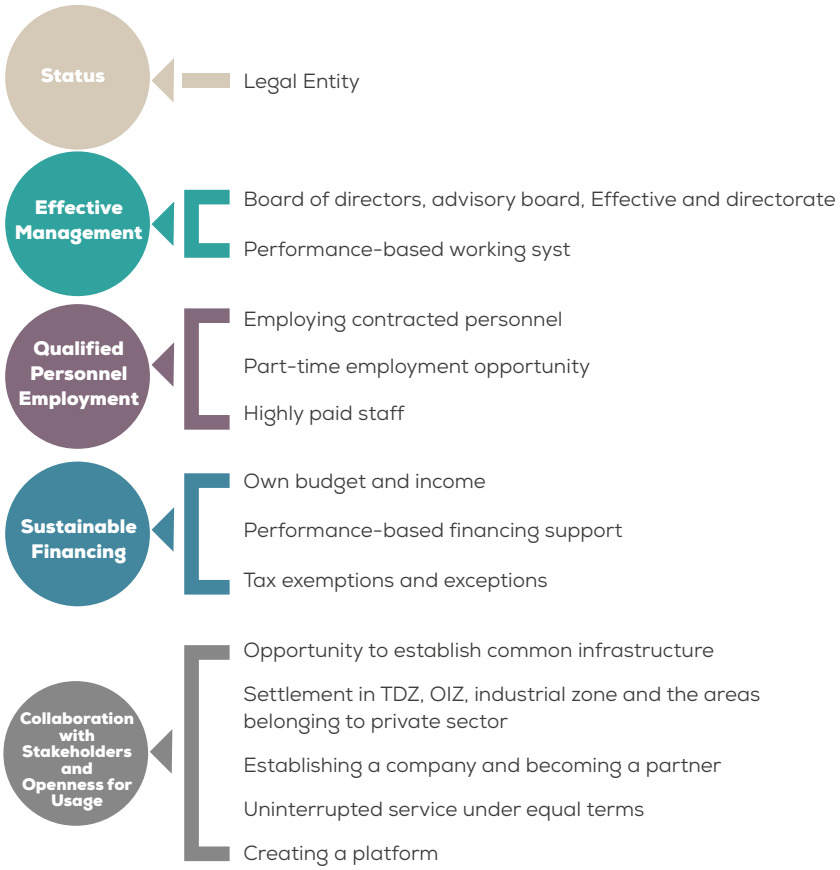
> *"I think it is necessary here because Turkey has progressed with family companies up to some extent but then come to a deadlock. Approaching the firms with such a structure may work." (İzmir Atatürk OIZ)*

Manisa OIZ's recent attempt to establish a joint centre with the Fraunhofer Institute headquartered in Germany, as well as BUTEKOM in DOIZ and OTAM in TOIZ can be seen as the leading examples in this area.

In addition, the recent attempt to establish an SME Competency and Digital Transformation Centre (Model Factory) in ASO 1. OIZ in collaboration with MoIT and UNDP can also be considered in this regard.

For the establishment of interface structures within the scope of Model 1, the framework for Research Infrastructures supported by Law No. 6550 can be used. It is seen that there is not yet an interaction between these infrastructures and OIZs at present. Support provided by the government for a research centre to be established under a collaboration between OIZs and universities can be an important accelerator. In particular, the advantages provided by the employment of highly paid qualified personnel, a sustainable financing model and the performance-based working system have the potential to solve the problems being faced in the current situation. The OIZ where the pilot scheme will be conducted can make an important contribution in creating and leading the demand for this model.

Table 27. Research Infrastructures Model Supported under Law No. 6550



Encouraging the clustering and development of small and medium-scale R&D and engineering companies in the TDZs within OIZs can make an important contribution to the technological transformation of industrial firms.

• **New Generation Technology Development Zone:** Today, the most well-known among the public intervention tools for technology development is Technology Development Zones. The attracting capacity of these structures essentially derives from the tax incentives provided to firms, and the number of TDZs that go beyond developing real estates and provide value added services to firms is very few. Four of the 12 OIZs where the fieldwork was conducted have TDZs (GOIZ, KOI, EOIZ and OSTİM). It is also observed that these TDZs, which were visited during fieldwork, cannot yet fulfill their missions in the desired way. In the light of all these findings, it can be concluded that opening a TDZ in an OIZ under today's conditions and in this paradigm will have a limited contribution to the technological development of firms.

It is important that for a TDZ to be established in the OIZ, it should be constructed in a manner so it can undertake not only the facility management functions, but also the other services addressed within the scope of Model 1. In this context, functions such as TTO, cluster management, and the collaboration development between firms stand out. It is important also for a TDZ within an OIZ to provide the incubation and acceleration services, which have started to be seen in most TDZs today. Incubators and accelerators established within a TDZ in an OIZ can meet an important need and contribute to the development of relations between large firms and start-ups. The establishment of these incubation and acceleration programmes in thematic areas and the selection of these areas among the technological needs of the clusters in the OIZ may lead to an important synergy.

Finally, the industry-oriented R&D and engineering companies existing in most developed countries are in their infancy in Turkey. Encouraging the clustering and development of such small and medium-scale companies in the TDZs within OIZs can make an important contribution to the technological transformation of industrial firms. In fact, the development of this area can make for a more significant contribution than the R&D centres that firms try to establish individually within themselves. While this interaction is supported by tax advantages (e.g. the service to be purchased from these firms being

recognised as an R&D expenditure), it will be important for OIZs to take the role of a host and facilitator in this area.

• **Open Innovation Platform:** Open innovation platforms offer opportunities to develop Turkish companies' R&D competencies and increase the income of researchers earned from their expertise. Open innovation platforms are structures that pair researchers with relevant expertise to companies which have problems that can be solved through R&D or that want to develop new products. Thanks to open innovation platforms, companies' R&D capacities can go beyond the R&D centres that they have. Even companies without R&D personnel find the opportunity to develop R&D competency thanks to open innovation platforms. With each passing year a larger selection of new products is developed through open innovation platforms, by leading global brands. For now, Turkey is not included in the world's two largest open innovation platforms, namely, Nine Sigma and Innocentive. Neither any company nor researcher are involved in these platforms from Turkey.

OIZs can take the role of facilitating the efficient use of open innovation platforms by industrial companies in Turkey. In this context, consideration of two elements is critical.

• **First, a local open innovation platform can be established under the leadership of OIZs.** The R&D personnel of companies operating within OIZs can be classified according to their areas of expertise and can be included in the platform. This information can then be shared with the companies operating within the OIZ. Companies can be taught how to effectively use the platform, when established. Companies that learn how to prepare a single-page RFP (Request for Proposal) can upload the problems that they cannot solve in the platform. They can determine keywords related to their problem. And the system matches companies with expert researchers based on the determined keywords.

• **Second, an agreement can be signed between global open innovation platforms and OIZs.** Personnel can be employed to act as an interface to enable companies to use these platforms within OIZs. These staff can listen to company problems that are pending solutions and turn them into RFPs, to be uploaded to platforms. Later on, these staff

can again step in to ensure healthy progress of the relationship between the company and the researcher who can solve the problem. It is important that the support to be provided to ensure this structure covers the number and wage of personnel, as well as the recruitment of new personnel when needed for ongoing works.

Activating open innovation platforms within OIZs can enable the much more efficient provision of a number of solutions, which firms today expect from local universities, through a national and even international platform.

• **Cluster Management:** OIZs with strong clustering can act as an introducer, facilitator and accelerator in pre-competition R&D collaborations, depending on the identification of common technological needs. The number of firms covered by these services may be around 10-20, or higher. The common feature of the firms to be serviced within the cluster should have the goal of high value added production and global competitiveness. Some other programmes can also be applied to these firms in order to support their marketing processes in parallel with technology development. These may include training and consultancy services, participation in international fairs and meetings, organising meetings with strategic global customers (Cansız, 2011).

Two of the support mechanisms undertaken by the state in this direction are important. The first mechanism is the Clustering Support Programme within MoIT. There is no OIZ that has benefited from this programme yet. If a Cluster Management Structure in the OIZ is accepted in this programme, the support that can be utilised in the innovation category can make a significant contribution to the provision of many services in Model 1. In the beginning, a value chain map where sectoral links are monitored is important. These supports include:

- **Establishment of an applied R&D laboratory**
- **Innovation (product, process, market) support programme**
- **Establishment of sample lines for common use**
- **Establishment of platforms for common use (test, simulation, etc.)**
- **Establishment of technology monitoring, promotion and transfer units**
- **University - Industry Collaboration Programmes**
- **Preparation of applications for various financial support programmes**
- **Programmes to increase design and creativity capacity**

In order for the collaborations and networking between firms to develop, it is necessary to carry out highly effective and focused activities rather than the usual, generic activities.

The second mechanism is the P&D support programme provided by the Ministry of Economy. During the fieldwork, it was observed that only a couple of OIZs undertook or were undertaking an P&D project. Among these are the OSTİM Defense and Aviation Cluster, OSTİM Medical Clustering, DOIZ Home Textile Cluster and BURSA OIZ Textile Cluster which became entitled to be included in the Ministry of Economy's good practice examples.

In order for collaboration and networking between firms to develop, it is necessary to carry out highly effective and focused activities rather than the usual, generic activities. As could be observed in the stakeholder meetings conducted during the fieldwork, organisations such as Technology Development Foundation of Turkey (TTGV), Istanbul Technical University (İTÜ) Arı Technopark, Bilkent Cyberpark gave special importance to this function and gained serious experience from this. The transfer of these experiences to OIZs can contribute to strengthening the network structures in OIZs. In this context, for example, the activities aimed at introducing the small businesses in OIZs to large investors in their sectors and the medium-scale businesses to global research centres in their areas are important. In the design of these activities, the correct identification of the purpose and the target audience will increase the contribution.

Which OIZs can start Model 1?

In order to decide which OIZs will be included in the pilot scheme of Model 1, elements such as the needs and capacity of firms (e.g. the number of R&D centres), the presence and maturity level of dominant clusters, and the financial capacity and vision of OIZ managements should be taken into consideration. From the needs analysis for different services that can be offered under this model, a demand for the provision of most of these services is seen across all OIZs. The first stage, i.e. capacity building, can be put into use in all of the OIZs and, for the second stage, a more selective approach can be embraced (in the establishment of interface structures) and it can be applied in zones where the demand from firms intensifies and where the OIZ management quality is high.

First of all, examples of positive and negative views of firms for the capacity building stage are as follows:

> *"The Chamber of Industry is doing research on foreign companies and gives us information on companies to which we can sell. OIZ is closer to us, so OIZ should be providing such advantages to us. In addition, human resource procurement is also important. A new unit should be opened in the OIZ and provide support for these issues." (Gaziantep OIZ)*

> *"We want to have more access to knowledgeable people, this is a great need for the company's production." (İzmir Atatürk OIZ)*

Below are some participants' opinions regarding the establishment of the second stage, i.e. interface structures, in OIZs.

> *"We need to work in coordination with the university, there needs to be a unit. I cannot employ 3 PhD engineers, the cost would be very high. There needs to be a unit established in the OIZ integrated with the university or a unit just created under the OIZ. These units can employ 10-15 engineers and solve our problems." (Manisa OIZ)*

> *"Instead of a large R&D firm, a smaller but specifically specialised and technical R&D firm would be more advantageous. Specialised small R&D companies also make a great contribution to the economy. These firms should be supported and encouraged." (Gebze OIZ)*

> *"It is very important to protect the autonomous structure within the OIZ. It should be able to profit from the services within itself. It should be able to make investments. It should be able to update itself on an industry scale. Authority and resources should be given for OIZ management to support industrialists on behalf of the state." (Gaziantep OIZ)*

> *"At this point, there are problems in Konya with regards to products which require R&D with high added value. There is a need for a self-confident awareness which will understand the logic behind R&D works. There are too many main problems. There is the sector, there is the potential, but there are also a lot of problems with guidance. There is a need for a structure that will cluster small firms and take them to a higher level. The first model is suitable for Konya." (Konya OIZ)*

"There should be university centres in the OIZ. In particular, the academic staff must pay visits at regular intervals. Time is very precious. If there was an office related to the university, things would operate like clockwork." (TOSB)

"There was a desire towards entering into a collaboration with Fraunhofer, however, companies did not prefer it. Companies need this cooperation. There is no infrastructure in Turkey, there is no industry culture. Industrialists in Turkey progressed by chance." (Bursa Demirtaş OIZ)

On the other hand, besides positive views on the first model, some participants also have negative or hesitant views. These views arise, in particular, because of the failed experiences regarding the previously established structures for similar purposes. This makes the design elements of the first model even more critical.

"The first model is being tested in OIZs, but it is not functional enough. Firms do not take these initiatives seriously and they do not show interest. Attempts to establish new units (first stage) or new structuring (second stage, e.g. SANGEM) were made in Eskişehir, but they didn't provide effective results and was shut off." (Eskişehir OIZ)

"It was tried before for many times, but it couldn't become successful in İzmir. Institutions may not be willing to cooperate, they may say 'Let it be small but mine.'" (İzmir Atatürk OIZ)

"Creating such an effect cannot be accomplished by establishing a unit and employing 2 people there. Time is needed to affect change in firms. It can be useful in small cities of Turkey." (İzmir Atatürk OIZ)

"The higher the number of partners, the higher the indecision. This model is useless." (Gaziantep OIZ)

"This model won't work; if in the OIZ management there was a person who knows about aluminum as much as we do, the firm would employ him anyway, such a team cannot be formed." (Adana Hacı Sabancı OIZ)

During the focus group interview conducted, the participants declared ideas concentrated around Model 1 and they were in an agreement that this model in its current state was more applicable to the OIZs. It was especially stated that it would only be possible for OIZ managements to reach into the firms through awareness-raising work and by offering them various technological infrastructure services. It seems possible to gradually impact the firms by providing internet infrastructures, offering consultancy services and establishing joint test centres.

The success of this model is closely related to the degree of sensitivity of the design and application to the demand. Criteria such as the culture and climate required for innovation, human resources open to innovation, universities, and sustainable dialogue opportunities will also affect the success of the model. Table 28 shows the OIZs hosting firms that demand the services outlined above in this section at the highest level as of today. As mentioned above, the first stage, namely the capacity building process, may start to be implemented in all of the OIZs within the scope of the field or even throughout all the OIZs in Turkey. On the other hand, Manisa OIZ is the OIZ hosting the firms that demand the most all of the six service areas, which can be offered in the second stage (Interface Model) and were asked to the firms within the scope of the fieldwork. The firms in Manisa OIZ gave 4.42 points for these six services on average. MOIZ is followed by ASO 1. OIZ with 4.38 points and Demirtaş OIZ with 4.37 points.

Another noteworthy point is that the services within the scope of the interface model are not offered by any OIZ in an effective manner as of today. The average effectiveness score for all the OIZs was 2.7 when the firms were asked to rate the effectiveness of these services. Among the OIZs, it was Manisa OIZ which offers these services at the most effective level with an effectiveness score of 3.6.

Table 28. OIZs which Demand Services Covered by Model 1 the Most and can Offer Them Most Effectively

	OIZs which Demand the Most (Those scoring above the average of the 12 OIZs)	**Effective OIZs** (Those scoring above 4)
Services that Can Be Offered in the First Stage (Capacity Building)		
Vocational and Technical Education	Demirtaş OIZ (4.8) OSTİM (4.8) Eskişehir OIZ (4.7) Bursa OIZ (4.6) Adana OIZ (4.6) Manisa OIZ (4.6)	Manisa OIZ (4.3) Adana OIZ (4.1)
Digitalization	Manisa OIZ (4.7) Demirtaş OIZ (4.6) Adana OIZ (4.6) Gaziantep OIZ (4.6) Konya OIZ (4.4)	(N/A)
Investment Promotion	Adana OIZ (4.7) ASO 1. OIZ (4.6) Konya OIZ (4.6) Manisa OIZ (4.4)	Manisa OIZ (4.1)
Social Services	ASO 1. OIZ (4.4) Konya OIZ (4.4) Demirtaş OIZ (4.3) Adana OIZ (4.3)	Manisa OIZ (4.6) İzmir Atatürk OIZ (4.1) Demirtaş OIZ (4.0)

	OIZs which Demand the Most (Those scoring above the average of the 12 OIZs)	**Effective OIZs** (Those scoring above 4)
Services that Can Be Offered in the Second Stage (Interface Model)		
Industry-university collaboration, TTO	Demirtaş OIZ (4.7) Konya OIZ (4.7) Bursa OIZ (4.6) Manisa OIZ (4.5) Gaziantep OIZ (4.5)	(N/A)
Technology Development Zone	Demirtaş OIZ (4.7) Konya OIZ (4.7) Bursa OIZ (4.6) Manisa OIZ (4.5) Gaziantep OIZ (4.5)	(N/A)
New market development, internationalisation	Bursa OIZ (4.6) Gaziantep (4.5)	(N/A)
Increasing collaboration between firms	ASO 1. OIZ (4.6) Manisa OIZ (4.5) OSTİM (4.5) Gaziantep (4.4) Eskişehir OIZ (4.4) Bursa OIZ (4.4)	(N/A)
Incubator and accelerator, to provide support for newly established firms	ASO 1. OIZ (4.6) Manisa OIZ (4.4) Konya OIZ (4.4) Gaziantep OIZ (4.3) Bursa OIZ (4.3) Adana OIZ (4.3)	(N/A)
Pairing with mentors	Manisa OIZ (4.3) Gaziantep OIZ (4.2) Demirtaş OIZ (4.1)	(N/A)

Which Groups of Firms Can Be the Target Audience for Model 1?

It is of critical importance to build this model in a way that creates the most demand and to enable the pilot scheme accordingly. What lies at the core of this model is to have OIZs provide services to the firms recognized as "leading" or "candidates to lead" in terms of technology and to further accelerate them. For this reason, a clear definition of the target audience of different service groups is a prerequisite for the provision of value-added services.

The results of the fieldwork help identify the groups of firms that systematically demand more of the service areas related to Model 1. These findings summarized in the following table should be considered only as a starting point, and these groups of firms should be defined more clearly in the in-depth needs analyses that will be carried out exclusively in each service area.

Table 29. Primary Target and Beneficiary Audience of Services Covered by Model 1

Priority Target and Beneficiary Audience (Groups of firms that demand more than the other groups of)	
Services that Can Be Offered in the First Stage (Capacity Building)	
Vocational and Technical Education	All Firms
Digitalization, E-Export	Medium and large-scale firms Textile, White Goods and Automotive sectors Firms with high export rates Firms monitoring productivity (ERP) Family companies
Investment Promotion	SMEs Automotive, Machinery, Electronics, Plastics sectors Firms that have low export rates and do not monitor productivity
Social Services	All Firms

Priority Target and Beneficiary Audience (Groups of firms that demand more than the other groups of firms)	
Services that Can Be Offered in the Second Stage (Interface Model)	
Industry-university collaboration, TTO	All firms, all sectors SMEs with high rates of white collars and high added values, and large-scale firms Firms with high export rates Family companies
Technology Development Zone	All firms, especially SMEs Electronics, Metal, Plastics, Automotive, Mechanical, Textile sectors Firms with low export rates
New market development, internationalization	All firms, especially SMEs Electronics, Mechanical, Defense, Metal, Plastics sectors Family companies
Increasing collaboration between firms	SMEs Large-scale firms with high added value Electronics and White Goods sectors Family companies
Incubator and accelerator, to provide support for newly established firms	SMEs White collar dense large-scale firms Firms monitoring productivity
Pairing with mentors	SMEs Firms with low export rates Firms not monitoring productivity

Fundamental Design Principles for the Pilot Scheme of Model 1

First stage: Capacity building

The realization of this model should be regarded as a corporate capacity building process in OIZs. The programme should be designed and supported in a manner sensitive to the demand. During the capacity building stage, it will be appropriate to consider the following principles:

• **Needs analysis:** During the design stage, a comprehensive needs analysis should be performed for the service areas, firstly.

• **Collaborations and complementarity:** For collaborations to be established during the implementation, priority should be given to the principle of being complementary to organisations such as Chambers of Industry, Exporters Unions, KOSGEB, TTOs, and private service providers in the market, etc. On the other hand, the areas where these institutions cannot fully provide services to the firms in OIZs should be determined and these areas should be focused.

• **Key Personnel Features:** It is important to establish an effective team of the right people for the model's success. Instead of a long list of qualifications, it is recommended to select a set of criteria that consists of simpler yet the most important minimum qualifications. Two main features can be emphasized in this regard: The first one is experience. The condition of either having been responsible for the provision of similar services in similar organisations abroad (Private Economic Zones, Multinational Companies, etc.) or having coordinated similar services within the large companies in Turkey may be desired. The second one is social skills. Social skills are just as important as technical experience.

• **Monitoring and evaluation mechanism:** MoIT should evaluate the success of the units over time through descriptive performance indicators and an independent evaluation mechanism and decide whether the programme will be abandoned, continued or expanded.

Second stage: Interface Structures

The success of the pilot scheme is crucial for the dissemination of the model. From this point of view, it would be appropriate to start the services related to Model 1 from the OIZ where both the demand and the effectiveness level of these services are the highest.

Step One: Deciding on the Priority Service Group

It is necessary to decide exactly which service group to focus on within the pilot scheme. In this section, 5 main options are underlined under Model 1. All of these or the appropriate one can be fulfilled by structures similar to an innovation centre.

- Technology Transfer Office
- Research, Application and Competency Centre
- New Generation Technology Development Zone
- Open Innovation Platform
- Cluster Management Unit

For example, the findings from the fieldwork indicate that the options of TTO and/or Research and Application Centre can be considered in case of a decision to start the pilot scheme in Manisa OIZ. However, the final decision on this matter should be given according to the preference of the relevant OIZ management and local stakeholders.

Step Two: Defining the Role of OIZ

There are three options as to what exactly the role of OIZs should be in the process of realising Model 1:

• **Sole owner:** The OIZ being the sole owner of the structure to be established, and the other relevant institutions being used only for consultation.

• **Partner and stakeholder:** The OIZ entering into partnerships with other institutions and being either the shareholder or the stakeholder of the structure.

• **Host and stakeholder:** The OIZ assuming the role of a hosting provider/a host, transferring the structure management to other institutions, but taking part in the process as a stakeholder.

All three options have their advantages and disadvantages. So, at this point, it is important to develop the right solution by considering the local dynamics. For example, the beneficiaries of BUTEKOM, which is located in Demirtaş OIZ in Bursa, are largely the DOIZ firms. However, the legal entity of DOIZ does not have any shares in BUTEKOM; 50% of the shares in the partnership structure belong to Bursa Chamber of Commerce and Industry, 37.5% to Uludağ Textile Exporters' Association and 12.5% to Uludağ Apparel and Clothing Exporters' Association. The Gebze OIZ legal entity has a 49 percent of shares in GOIZ Technopark.

Step Three: Determination of Fundamental Implementation Principles and Rules

A detailed needs analysis and feasibility study should be done to realize the pilot scheme, with a business plan to be prepared in line with the findings. In this process, the fundamental implementation principles and rules will need to be clarified. The following suggestions can be taken into account when designing these elements.

• **Human resource profile - Forming the right team:** Forming the right team to manage the structure to be established is more important than the details of the model. It is seen, from the models such as Fraunhofer and ITRI, that the management levels of the institutions have managers who have proven themselves in the industry. It will particularly be harder to find people with the qualifications required by this Model in small Anatolian cities compared to other provinces. Therefore, the sustainability of the model will be better in OIZs that are close to large cities with high quality of life. And as for the human resource profile, particular emphasis should be placed on establishing a multi-disciplinary structure. It is critical that the team manager has experience in operations such as R&D, supplier development programmes, and TTOs, and even experience in similar successful overseas operations (Catapult, Fraunhofer, ITRI, etc.). Even if such a profile cannot be found, the team involved can be encouraged to receive training or gain experience in these institutions for a while through a mutual exchange agreement. It is important to create a team, which understands both industrialists and academics and can thus communicate effectively with these people and can be easily involved in overseas research network structures.

While determining the focus of technology, the focal point should not only be the needs of the local firms; their compliance with national policy objectives should be considered as well.

• **OIZ capacity building and interfaces support programme design:** In the case that it is decided to generalise the pilot scheme, the MoIT can build a support programme. The OIZs applying for this programme should be expected to submit a comprehensive needs analysis and business plan. It is important to indicate in the application that the services stipulated to be offered by the OIZ are solutions aimed at common problems. The OIZs whose applications are accepted can benefit from the financial support to be provided by the MoIT. Within the scope of this support, it could be considered that some portion of key personnel salaries that will be employed in the newly established (or strengthened) OIZ structures can be covered by the Ministry for a temporary period of time.

• **Compliance with national technology and export priorities:** While determining the focus of technology, the focal point should not only be the needs of the local firms; their compliance with the national policy objectives should be considered as well. The structures to be shaped within this model should basically be built as the implementers of the national industry policy at the local level. Both the use of public resources in the establishment of the model, and the possibility of delivering some public support and incentives to firms through these structures during the operation stage, make compliance with national strategies mandatory. It should be remembered that what lies behind the success of the countries with high competitive capacity is the national-local harmony, which is attempted to be recommended here (Block and Keller, 2015). Today, while most OIZ managers position themselves as local actors by the nature of their job descriptions, the positioning of the managers in the interface structures as persons pursuing national, strategic and technologic objectives, in addition to the locality, will increase the success and importance of the model for Turkey.

• **Establishing a structure which will not seek profit but will be the most effective:** The new structure to be built under this model should not aim profit maximisation. In today's structure, the most flexible structures which can tolerate risk, are companies. This flexibility can be guaranteed in the company's articles of association. The company can be assigned with the mission of meeting its expenses in a sustainable manner instead of seeking profit.

• **Establishment of a financing/income model:** Successful implementation cases from around the world point out the importance of a trilateral financing frame in such structures. In similar structures, 1/3 of the income can be provided from the companies in return for the service offered, 1/3 from the competitively won state projects (TÜBİTAK, Development Agencies, MoIT Cluster Support Programme, Ministry of Economy Ur-Ge Programme, etc.), and 1/3 directly from the capital budget and/or OIZ budget. The creation of such a trilateral financing model can contribute to stability in the institutions (preservation of the core team) and the absence of stagnancy. It becomes possible through this frame for the structures to both offer value-added services to the firms and be creative so as to "win" projects.

• **Placing special emphasis also on the governance structure in addition to the partnership structure:** The success of the structure to be established also depends on the type of the balance to be provided between the boards of directors and guidance. In this context, large global corporations (OEMs) that have the characteristics to guide SMEs can be considered to be involved in management. Likewise, it would also be beneficial for people who have worked in similar structures abroad to be on the management or advisory boards.

• **Establishing effectively working network structures between the OIZs that are on the same corridor:** Another common feature of the Fraunhofer and Catapult structures discussed in ANNEX 4 is that they operate in the form of an effective network consisting of local service providers. Ensuring a similar synergy in the construction of Model 1 can be targeted in the context of the Technology Development Corridors. For example, the structures to be established in Manisa OIZ and Demirtaş OIZ within the scope of Model 1 should be encouraged to operate in close interaction with each other and even to jointly run some programmes. This approach can contribute both a more effective use of limited resources, and to the transformation of the motorway backbone into a technology corridor. While some technology-specific activities may only have 5-10 participants in one single OIZ, commonising these activities around corridors would both reduce costs and increase synergy. For example, for a meeting to be held with a global robot manufacturer, the relevant firms from Eskişehir-Konya-Ankara OIZs can meet in Ankara as the middle point. Likewise, in İzmir-Manisa-Bursa-Gebze corridor, some joint meetings can be held in Bursa, which is the middle point.

Today's OIZ model was built to be workplaces where the proportion of white-collar employees would be about 5 to 10 percent and the proportion of bluecollar employees would be 90 percent.

4.2. Model 2: Construction and Management of Multifunctional New Generation Zones (Industry and Technology City Model)

Today, OIZs act as structures which are predominantly engaged in manufacturing where other functions such as logistics, education, social facilities, arts, culture and living spaces are quite limited. The international success of examples in the technology development field on the other hand, indicate high performance of zones that do not only focus on the function of production but also include the other above-mentioned functions. Behind this phenomenon are the facts that manufacturing is gradually becoming an activity with the lowest added value within the stages of the value chain and that the significance of activities such as design, R&D, and marketing increases in creating value. With the impact of the digital transformation in the industry, it is envisaged that smaller and more agile factories, which operate within the network structure and are able to adapt their production to specific consumer demands, will replace large-scale industrial plants in the near future.

The automation trends in the industry are increasing the need for highly qualified workforces while reducing the need for a blue-collar workforce. It is observed that the proportion of whitecollar employees carrying out these activities rises in companies with high added value and even nears 100% in some industrial companies with advanced technology or high added value.

Today's OIZ model was built to be workplaces where the proportion of white-collar employees would be about 5 to 10 percent and the proportion of blue-collar employees would be 90 percent. In addition, while the authorities and the impact area of OIZs increased, there also had been a separation from the municipalities; in most places, OIZs' access to urban services and facilities provided outside their own area remained limited, particularly when considering public transportation services. The most important common problem encountered in 11 of the 12 OIZs where the fieldwork was conducted, is

the lack of public transport and high service costs, reflecting the fact that OIZs develop disjointly from cities. Beyond that, many firms claim that the qualified workforce tends to prefer OIZs less and less with each passing day. For example, some of the high-tech firms in Ankara prefer to rent offices in the TDZs close to the city centre despite their ability to establish R&D centres within the OIZ, as OIZs do not offer an attractive environment for qualified workforce. This leads to the problem of production and R&D becoming distant from each other.

Today it is also seen that some OIZs are in search of establishing multifunctional industrial zones. Among them are Bursa TEKNOSAB, Ankara Aerospace Industrial Zone and OSTİM 2 projects. Although some of these projects focus on sectoral clustering and technological development, some potential participants do not find them attractive enough as they are located very far away from the city centre. It was also seen that some OIZs take proactive roles in establishing residential areas near the zone. These include the Satellite City Project of Konya OIZ, the Happy City Project of GOIZ and the OIZ City Project of Manisa OIZ. Information about these projects is provided in the Boxes 3 and 4 below.

Box 3: New OIZ Projects with Advanced Technology Targets

Bursa Technology OIZ (TEKNOSAB) Project (Bursa)

The TEKNOSAB Project is being developed under the collaboration of Bursa Chamber of Commerce and Industry (BCCI), Bursa Governorship, Bursa Metropolitan Municipality and Karacabey Municipality. The project components include an organised trade centre, R&D and excellence centres, BCCI Technology University, a strong fiber optic structure and a fully integrated logistics village. The project aims for an average export level of 8 USD per kilogram by bringing together technology, innovation, logistics and sustainable energy.

It was built as a model based on leasing and REIT. It is noteworthy that it includes most of the features stipulated in Model 2. It is stated that most of the firms which felt stuck in Bursa's OIZ, wanted to take part in this project.

Ankara Aerospace Industrial Zone (HAB) Project (Ankara)

It was established with the participation of Presidency of Defense Industries, Ankara Chamber of Industry and Defense and Aerospace Industry Manufacturers Association,

as well as the Ankara Governorship upon 730 hectares near the campus of Turkish Aircraft Industries Corporation (TAI) within the borders of the Kahramankazan district. The purpose in establishing the zone is to support domestic industry in the fields of space and aviation, to provide synergy by bringing domestic and foreign companies together, to produce high value-added products and to increase exports.

It is stated that there will be a technopark, space and aviation excellence centre, innovation centre, R&D centres and incubation centres in the zone. It is also envisaged that elements such as rapid prototype production centres, aircraft test centres, laboratories, sectoral vocational training institutions, Turkish Aerospace and Aviation Authority will be located in the zone.

The HAB Project includes most of the service areas covered in Models 1 and 2 thanks to the elements it incorporates for technology development.

The project advertisement brochure emphasizes the ease of access to the HAB and states that it is located next to the Ankara-Istanbul highway and the new railway station to be established. OSTİM, which is seeking to reach international standards in terms of physical conditions, has developed the OSTİM 2 Project as there is no chance to expand in its Ankara headquarters, however the project is still pending due to the problems experienced in site selection. The elements in the design of the project are in parallel to Model 2 and to the management model regarding being run by a Managing Company considering the role of OSTİM Investment A.Ş.

Within the scope of the project envisaged to include firms that use high technology and produce products with high added value, it aims to establish facilities for innovation and R&D centres, university - industry collaboration centres, technical design centres, technoparks, joint laboratories and test centres, technical and vocational schools, design and engineering departments of universities.

While today the largest parcel in OSTİM has an approximate size of 1000 m2, the firms which have declared their request to switch to OSTİM 2 have demanded an industrial land of 10,000 m2 on average. It is estimated that the new zone will have 300 firms, 1.5 billion TL of resources for expropriation, employment for 45,000 persons, and 1.5 billion USD of exportation.

Box 4: OIZ City Project (Manisa)

In order to meet the increasing workforce need of Manisa OIZ, it was aimed to develop a project to solve the housing problem. Manisa OIZ has been involved as a stakeholder in the ongoing construction of mass housing projects in the western part of the province under the collaboration of the Prime Ministry Housing Development Administration and the Yunusemre Municipality. In the first stage 2000 houses are to be built for a complex that will be composed of houses that firms operating in the OIZ or their employees can purchase. It is stated that the project has been designed differently from the concept of "workers' housing" which is frequently seen in the other industrial areas of our country. The project is expected to be completed in 2019 and the 3+1 houses is estimated to cost approximately 120,000 TL. The demand of the firm employees interviewed in Manisa OIZ within the scope of the fieldwork is that this project should become a "satellite city" consisting of not only houses but also social facilities such as education and health.

Despite all these efforts, there is still the need to design a planned economic zone model that would be able to host highly value added firms, which are needed by Turkey, that use and develop advanced technology - as well as their employees - in a manner that involves production areas with a high number of white-collar employees whilst being in line with their needs and expectations.

A joint synthesis of the findings obtained from the field and the successful international implementation cases indicates that there will be a need to make a change also in the management model in the case where OIZs assume a new role regarding technology. Under the current situation, the most important function of an OIZ regional directorate, as per its job definition stipulated in the law, is to ensure the total compliance in 35 different regulations. The current management model does not allow for OIZs to "share the problems" of its incorporated firms stemming from the fields of technology and innovativeness and to offer innovative services in this area by adopting more experimental approaches and taking risks when necessary.

Within the definition of the new generation zone proposed under Model 2, it is thought that such a zone can include rentable and scalable/modular production areas, research centres, test centres for high-tech companies, while the immediate or close surrounding areas of such a zone can have houses where white-collar employees can reside, with local primary and secondary schools providing high quality education, hospitals, as well as social, cultural and recreational areas.

An example of a multifunctional and planned technology zone holding many of the elements discussed in Model 2 today is the Bilkent region in the western part of Ankara. Bilkent, an abbreviation for "Bilim Kenti" (Science City), was named after the founding of Bilkent University as the first private university in 1984. Bilkent was, at first, a region that was considered outside of Ankara, but by the course of time it became a part of the city with the initiatives of Bilkent Holding and Tepe Construction, both are part of the university assets, that helped to start developing projects in 1993 to transform the lands around the university into residences, shopping malls and workplaces. The fact that Bilkent Holding transferred its profit to the university is also a feature that should be examined in detail in terms of the governance structure of the model. Some of the functions that the region undertakes besides the university are outlined below:

- **Living spaces:** Bilkent was transformed into a residential area of 3,500 residences following the 1st, 2nd and 3rd stages of the project built in 1993, 1995 and 1998, respectively.

- **Business centres:** With Bilkent Plaza, the region also became a commercial centre hosting many workplaces. Bilkent is also home to the general directorates of the Petroleum Pipeline Corporation (BOTAŞ) and Radio and Television Supreme Council (RTÜK), the campuses of the Competition Authority, the Higher Education Council (YÖK) and the Measuring, Selection and Placement Centre (ÖSYM).

- **Research Centres:** The area hosts the leading research centres of Turkey with the influence of the university. These include the Nanotechnology Research Centre (NANOTAM), the National Nanotechnology Research Centre (UNAM), the Centre of Advanced Studies (CAS), the Communication and Spectrum Management Research Centre (ISYAM), the National Magnetic Resonance Research Centre (UMRAM) and the Acoustics and Underwater Technologies Research Centre (BASTA).

• **Technology Development Zone:** Operating under Bilkent University, Cyberpark is one of the largest technoparks in Turkey in terms of business volume and provides employment for 2,500 people under TDZ status.

• **Industrial production facilities with high added value:** "Aselsan Bilkent Mikro Nano Teknolojileri Sanayi ve Ticaret AŞ" was founded under the leadership of Bilkent NANOTAM and under the partnership of Bilkent Holding and Aselsan, and started its production activity in 2017 to produce semiconductors for the defense and telecommunication sectors. It is predicted that the sales price of a product to be produced at this facility will be 10 million USD per kilogram.

• **Entertainment and attraction centre:** The region started to become an attraction centre with the opening of the Bilkent Centre shopping mall in 1997 and this feature was strengthened with the Bilkent Station which opened in 2015.

• **High-quality international primary and secondary school:** Opened in 1993 and known as BUPS, Ankara Private Bilkent Laboratory Schools and International School (now called BLIS) provides an educational opportunity at global standards to the children of the qualified human capital attracted to the region from both overseas and within Turkey.

• **Bilkent Ankara City Hospital:** Bilkent was chosen for the location of the Ankara City Hospital. It is the world's largest hospital built under a single contract. It has 3800 beds and 735 polyclinics.

• **Bilkent Symphony Orchestra (BSO):** Founded in 1993 and incorporating artists from 12 countries, BSO is Turkey's first private, academic and international art community. With more than 50 events organised every year, it contributes to Bilkent's feature of being a centre of attraction.

• **Bilkent Holding Companies and Subsidiaries:** Bilkent Holding operates in construction, furniture production, retail, printing, defense industry, security, sports centres, insurance, tourism, energy, real estate and service sectors and is involved in operating airports and sea buses with its subsidiaries. 99 percent of Bilkent Holding's capital is owned by Bilkent University.

Which Functions Can Be Undertaken by Model 2?

In line with the needs detected in the field, it can be said that three main features come to the forefront for the firms with high added value and a high proportion of white-collar employees.

• **Variety of leasing options:** Flexible, modular structures designed according to the manufacturing requirements (e.g. options from 500 m2 up to 10,000 m2) can be available in the region. These structures can be offered to participants with long-term leasing opportunities. There should also be a possibility to provide some strategic investors with free or discounted leasing options for a certain amount of time, provided that they create value chains and clusters around them.

• **Clustering and technology centres:** It is important that a sectoral mix that will be available in the region is constructed with the perspective of strengthening the ecosystem and supporting selected clusters. In this context, it should be designed as places with a cluster of industrial companies that are focused on clean production, use advanced technology, have a supply chain relationship with each other or can cooperate in multidisciplinary projects. It should be kept in mind that the fields such as medicine, defense and electronics may have their own unique needs in the design stage and should be regarded as places where R&D and production are in contact with each other. It is critical that service areas that are supportive of all these activities and covered in Model 1 (Research and Testing Centres, TTO, TDZ, Cluster Management Units, etc.) are in the region.

• **Urban relations and other critical functions:** As the zone moves away from the city centre, it becomes an indispensable requirement to have a metro connection. In addition, proximity to the city and integration with living spaces are vital. Especially the existence of high-quality schools at international standards; variety of areas such as health, university, logistics, life, culture, entertainment, and tourism; the construction of spaces where the working and living people will be comfortable and happy will determine the region's technology production capacity.

Opinions compiled from the field for Model 2 confirm the need for this model. This option is predominantly stated by more innovative firms with high added value and a high white-collar rate. The common concerns of these firms include OIZs gradually breaking off from city life due to their single-function structures and the reduction of attracting highly qualified and creative class due to this issue. Some of the opinions that may shed light on the design process of the new generation zone are summarized below.

"If I was the one building it, I would design it as a place like a campus. I would like to see creative people working there, like the Silicon Valley, it should be like a new city where you can have people with such qualities. People working there will need to work happily and comfortably. If we aim to find bright ideas, you need to build a place to make those people happy, instead of dealing with donkey work. Actually, business life and family life are not very different, it would work if you think of an isolated and comfortable place here." (Manisa OIZ)

"Transportation should be considered as priority. Shuttles must be removed. A rail system can be considered for carrying the loads. A more technological industry with a focus on renewable energy can be considered." (Bursa OIZ)

"Bilkent is an established model which is very nice. What we need here is that kind of a model too. There is a need for a housing area where the middle class can live. We do it with shuttles, which is a cost. Things must be internalized when it comes to urban and regional planning. A vehicle like a tram should start serving for the Zone." (Gaziantep OIZ)

"Bilkent Model will be the most appropriate one. However, it could be troublesome to introduce housing into this model. Especially for Eskişehir, there is no need for a housing-OIZ integration within the OIZ. Since Eskişehir is an Anatolian city, people don't tend to abandon the existing order." (Eskişehir OIZ)

"I think this option makes great sense. In doing so, of course the culture and social factors of that region should also be considered in addition to the technical aspects. Mental transformation must be ensured by also considering the cultural factors. Everything depends on the mental transformation." (Konya OIZ)

While the participants highlight the improvement of the social spaces within the industry area, they also emphasize not only the development of the industrial zone but also the holistic development which covers the region including the industrial zone.

"When it is considered with its surrounding environment, it can result in a structure that provides greater outputs and is closer to the designated goals. But it is not an easily attainable thing." (İzmir Atatürk OIZ)

"It is necessary to reshape the living spaces rather than moving the OIZs. This model can be successful to prevent employees from frequently changing jobs, in other words, to avoid human circulation. It can be tried in the successful zones." (Gebze OIZ)

Although the opinions concentrated around Model 1 during the focus group interview, the participants also insisted on some recommendations among which they stated that social spaces should be developed within OIZs and underlined the importance of location. While the participants highlight the improvement of the social spaces within the industry area, they also emphasize not only the development of the industrial zone but also the holistic development which covers the region including the industrial zone.

Design Principles of Model 2

The design principles that are important in the conceptual framework of Model 2 are presented below::

• **Governance Structure:** It is important to have a mind that considers the whole city and cares about public interest in the planning stage; especially the role of the metropolitan municipalities is critical in this respect. The success of a project at this scale depends on ensuring that the political ownership is at the highest degree in both national and local levels. The distribution of roles between the Regulatory Body, the Developer Company and the Managing Company should be clearly defined in terms of the use of public authorities and making investments. Apart from this, the public-private-international collaborations to be established is important both for financing and attracting investors.

• **Site Selection and Design:** Compared to other OIZ projects, the cost of expropriation of a project featuring the aspects stipulated in this model will be high. The reason for this is the need for proximity to urban centres. In order to solve this problem two options can

be proposed to be included in the agenda. To this end, the transformation processes of the small industrial sites in the city (OSTİM, Bursa OIZ, İzmir Atatürk OIZ, Maslak- Şişli Line) can be addressed from the perspective of technology as the first option. As the second option, some large-scale lands belonging to the state in the city (such as military facilities that can be moved out of the city) can be transformed in accordance with high technology purposes.

• **Firm Selection Criteria:**Should every firm paying rent be included in such a project for which the state will allocate its resources? Or should firms be chosen according to some criteria? A comprehensive benefit-loss analysis is important to answer these questions. However, attracting manufacturing firms which have high added value, use advanced technology and engage in clean production to these zones should be the main priority. Despite kilogram value being a very important indicator it should not be the only criterion; criteria such as domestic content ratio, total export amount and qualified employment number should also be used. The selection should be made among firms which are in the sectors that support and complement each other by their nature.

• **Management Model:** In order for the current management model of OIZs to be more supportive in terms of technology, some OIZ managements can be supported to become incorporated and achieve more flexible structures. The success of this model depends on the construction of a "non-profit oriented" yet a sustainable and effective structure by also considering the local dynamics. This topic is detailed in the next section.

Management of Industrial Zones by a "Managing Company" Instead of a Private Legal Entity

In designing a new generation industrial zone as outlined above, the way how this zone will be managed is the most important among the issues that need to be addressed extensively. In this context, in addition to giving more authority to OIZs' existing management structures, another option that needs to be discussed is the "Managing Company" structure seen in many examples abroad. This structure can be evaluated in three different aspects: the management of the interfaces discussed in Model 1; the transformation of the management structures of some of the existing OIZs and their incorporation; and the management style of the zones to be newly established.

Being managed by a "Managing Company" instead of a private legal entity can solve the two main problems that OIZs are facing today.

The first problem is that OIZs are natural monopolies in their ecosystems and that there is no competitive mentality in the system except for the general assembly elections held in every four years. This problem is driving some OIZs to become slack, reducing the capacity to provide innovative services due to the inertia that occurs. Secondly, the fact that OIZs are managed under one common legislation despite having quite different local, sectoral and managerial dynamics causes difficulties in some cases. OIZ regional directorates can sometimes abstain from realizing an activity that is not defined in the legislation. The main logic behind becoming incorporated is to switch to a performance-based management and gain flexibility in the activities carried out.

The fact that the main function of OIZ managements is facility management raises the issue of profitability. Yet apartment building/facility managements are not expected to make a profit. On the other hand, the "non-profit" company model does not have a place in our national economic life, particularly due to the concerns about informality. Nevertheless, some "non-profit oriented" company models exist as a result of the vision of their partners. In Turkey there are two examples of structures that provide similar services to OIZs as a managing company. The first example is the Free Zones, and the second is the Technology Development Zones. While most of these operate by focusing on profitability, some of them focus on the provision of services with high added value in a sustainable manner without the motivation of profit as required by the mission assigned to the company by the founding partners.

This option can be implemented in some OIZs which will be established in developed regions and will be able to allocate parcels only through leasing/real estate investment trust (REIT) or which do not have the opportunity to expand and have reached hundred percent occupancy rate. It is important that the company that will manage the OIZ makes a concession agreement with the Ministry and that the performance criteria is defined according to this agreement. Performance criteria may include aspects such as export increase, kilogram sales price increase, number of patents, and the amount of R&D, and the Managing Company may be expected to put forward its creativity and effectiveness in the services it will offer in order to achieve these results.

In the current OIZ Law, there are two critical elements that may bring OIZs close to a company structure. The first element is about providing the OIZs with the opportunity to establish real estate investment trusts with the amendment made within the scope of the Production Reform Package in 2017 June. The second element is the definition of a private organised industrial zone that cannot use public authority. Both of these items, which have the potential to shed light on the future OIZ model, are as follows:

• **Real Estate Investment Trust:** OIZs can establish real estate investment trusts, provided that the management and share majority belong to the OIZ legal entity and that they operate exclusively in OIZs according to Articles 48 and 49 of the Capital Market Law dated 6/12/2012 and numbered 6362. Real estate investment trusts to be established by OIZs have participant rights and obligations. However, they are exempt from producing and committing to produce, as per the restrictions stated in Article 18 of this Law. The Ministry is authorised to determine the maximum prices or principles for the parcel selling and leasing with or without superstructure, as well as for establishing the right of construction regarding the real estate investment trusts to be built by OIZs, and it is also authorised to designate the sectors which will be granted selling, leasing and constructing rights. The articles of association, partnership structure, operation, activities and other matters related to the real estate investment trusts to be established by OIZs are regulated by legislation.

• **Private Organised Industrial Zones:** Article 26 - OIZs may also be established by private legal entities and real persons in places determined in accordance with the procedures stipulated in this Law. However, those who will establish private OIZs cannot expropriate. A request for the establishment of an OIZ is submitted to the Ministry after the approval of the provincial governorship where the OIZ will be established. The location selection process for the OIZ is carried out in accordance with the procedure stipulated in Article 4 upon the request made to the Ministry. Expenditures related to land acquisition, OIZ planning, project planning and infrastructure construction are covered by real and legal persons who will establish the zone. The plans and projects related to OIZ are subject to the consent and approval of the Ministry, in addition to the institutions and organisations authorised in this subject. The land in the OIZ may be sold or leased in parcels or by building operational buildings on it.

It is beneficial to answer some important questions in the design of the model. Firstly, there is the problem of unearned income which is a fundamental issue especially for the OIZs near metropolitan areas and there is the question of how to use the income obtained from the increases in land value. As OIZs cannot make or distribute profits under the current situation, they either keep earnings in their accounts or channel them to investment. For the solution to this problem, it is important to define the company's mission and its available tools.

Finally, in case the interface structures proposed in Model 1 are to be established as a company, the question; what kind of a relationship will be established with the OIZ's Managing Company will stand out as an important issue to be analyzed.

The positive and negative points indicated by the participants during the fieldwork with regards to the issue of incorporation are summarized below. While the firms which stated negative views about this option represent the majority among most OIZs, it is noteworthy that there was only 1 negative view compared to 9 positive views in Bursa OIZ. Most firms do not lean towards this model because of the risk of not being able to use public authorities in case of the incorporation of OIZs.

> *"We also want to channel the management towards the incorporation approach. A professional structure but not in the nature of a joint stock company. It makes money, it has sub-companies, just like a holding. It can even produce its own electricity, if wishes so. It should not seek profit." (ASO 1. OIZ)*

> *"It will seek to make profit if it's a joint stock company. And when it makes profit, it will want to make more profit. The more profit there is, the more successful a company is. Ambition to make profit downgrades the performance of the industrialist. All of the services should be considered as supportive to the industrialist. No profit should be sought." (Gaziantep OIZ)*

> *"Incorporation increases the competition. It gets rid of the power of one person. The current region is not within the mission of the directors anyway. There should be a structure like a technopark." (Adana OIZ)*

> *"Becoming a corporation is the most important need. Accountability needs to be increased. The state cannot hold someone to account unless there is a complaint, and the firms have to pay money if they want to carry out their own investigation. There should be a more professional structure that is not composed of industrialists." (Bursa OIZ)*

"The state should build the infrastructure of the OIZ and not request rent if necessary. Performance should be measured, added value should be monitored, OIZ's economic performance should be measured, targets must be set, efficiency of resources should be measured." (Bursa OIZ)

"It should be passed on to a private company, and the corporate structure needs to be well established. Not all authority should be given. Too much of an initiative should not be granted. It needs to be designed correctly. The state should restrict authorities in certain fields and must keep certain initiatives in its own hands." (Demirtaş OIZ)

"There must be transparent supervision. It should be opened to the stock market. Industrialists should focus on technology and making a difference. Incorporation may be preferred, but the company must go public." (Gebze OIZ)

"OIZ would work better if it is managed as a company." (Manisa OIZ)

The advantages and disadvantages of the option of incorporation are summarized in Table 30 below.

Table 30. Advantages and Disadvantages of the Incorporation Option

Advantages and Opportunities	Disadvantages and Risks
Providing more creative solutions; incentive systems for good performance in that direction	Difficulties in using public authority and applying sanctions (expropriation, licensing and permitting, penalties)
Being subject to commercial law, company structure is the most wellknown business model	OIZ managements subject to taxation
Easier dispute settlement processes compared to private legal entities	The probability that OIZs focused on profitmaking can increase subscriptions and service cost burdens on participating firms
Successful OIZ "Operating Companies" operating other OIZs at home and abroad	A decrease in the possibility of allocating resources to investments that will give long term results, such as vocational education

CONCLUSION AND RECOMMEN-DATIONS

The aim of this research is to contribute to the process of determining the models which will help OIZs take on a more effective role in the fields of entrepreneurship, innovation and technology development in Turkey. In this research, field studies were carried out using questionnaires and interview techniques following the preparatory works, and the frameworks for the new generation OIZ models were prepared by analyzing the qualitative and quantitative data collected and performing impact assessment and needs analysis for OIZs.

PHOTO 9. GOIZ TECHNOPARK

OIZs, which are one of the most important policy tools in Turkey's industrialization and urbanization history, were adopted as the most appropriate investment places also from the perspective of an industrialist, in order for the industrial activities to be carried out, and they managed to solve industrialists' problems in the past.

The need for transformation required by the innovation-based economy and digitalization brings the need for a revision also in OIZ practices, which have been ongoing for about 60 years. To this end, it became necessary to switch to a new generation OIZ model to meet the needs of the country, regions and the real sector.

As part of the study, data regarding every OIZ in Turkey was compiled from MoIT's database and from other public institutions. A shortlist of 23 OIZs was created, taking into account the data, inputs, sizes and technology-innovation indicators which was reduced to 12 OIZs. Also taken into account was the OIZs' performance indicators, regional diversity, sectoral and scale distribution in order to carry out the fieldwork. These OIZs were considered as 3 regions through the economic zone approach: Gebze-Bursa-Manisa-İzmir Corridor, Ankara-Eskişehir-Konya Triangle and Adana-Gaziantep Corridor. These regions, which may include OIZs and other actors in the technology ecosystem, will also act as a guide for future studies when it comes to grouping. When the corridor perspective is in question, the issue of incentive zones for OIZs also comes to the agenda. While it may be considered to allocate the incentives based on sectors according to these corridors, it may also be required to exhibit from what aspects the incentives affect the competitiveness of the regions.

According to the findings from the field studies, it can be concluded that OIZs have a positive effect on the productivity of firms, there is a general satisfaction regarding the OIZs as an investment place, and they lead with a high prestige effect. On the other hand, it is not yet possible to say that OIZs effectively contribute to the clustering and the innovativeness of firms.

It can be concluded that OIZs have a positive effect on the productivity of firms, there is a general satisfaction regarding the OIZs as an investment place, and they lead to a high prestige effect.

It is not yet possible to say that OIZs effectively contribute to the clustering and the innovativeness of firms. Even though there is an expectation by the firms also for the functions directly and indirectly related to technology, OIZs cannot meet these needs.

Even though there is an expectation by the firms also for the functions directly and indirectly related to technology, OIZs cannot meet these needs. As this study determines the firms' needs related to technology, it can be regarded as an important contribution to the design of the next generation OIZs.

Firms operating in OIZs struggle with many problems. The main problems are investment, input and land costs. Transportation is again seen as one of the most important problems for the industrialists. It was seen from the qualitative data that the participants were facing problems in the transportation of employees to the OIZ due to the traffic during the entrance and exit hours, as well as problems in freight shipments. Considering these problems while designing the new generation OIZs will increase the success of OIZs.

The educational curricula and education policies of vocational and technical high schools, which are expected to provide personnel to the industry, as well as weak relationships with the universities, and the fact that academicians and industrialists have different perspectives are among the problems related to education. The curricula of vocational and technical high schools which can generate solutions to the industrialists' problems should be regulated in the new models in a manner to find solutions to the current problems, and to solve the workforce problem both in general terms and in terms of finding qualified personnel. Another need is to conduct "reputation management" for vocational high schools. It will be beneficial to carry out works aimed at parents, teachers and students, as is the case with the social responsibility projects recently initiated through private sector initiatives for this purpose. The establishment of a structure that can strengthen university-industry relations should also be considered in the new models as this is again an important need.

Another expectation of the firms from the OIZs is the provision of services that will support the technology development processes which include elements such as a joint laboratory, technopark activities, etc. In addition to providing these services, it would be beneficial to develop policies to help industrialists achieve compliance with Industry 4.0 considering the quickly changing and aging nature of technology, and it would also be useful to assign OIZs with roles in this framework.

There are two recommended models arising from all these studies carried out to create solutions to the firms' problems, to help them produce products with more added value and ensure that OIZs have a greater place in the technology ecosystem. The applicable capacities of the recommended models are different from each other. While the first model can be applied in some OIZs to be selected, the second model can be applied in the regions that have the highest potential to make products with high added value and the highest quality of urban life, considering the resources and the target audience stipulated by this second model.

In the light of the mentioned problems, two different models have been developed in order to increase the success of OIZs and their contribution to business competitiveness.

The first recommended model can be considered a two-stage model. Capacity building, which is the first stage, is about creating capacities within the OIZ management to support the usage of technology in OIZs' firms. This stage can be realised in most of the OIZs in Turkey. In this context, it is important that unit or units to be established within the OIZ Regional Directorate focus on the service areas that are considered to be the common needs in the OIZ. For this, creating a qualified team should be a priority. The interface structure, which is the second stage of this model, means the establishment of specialized new interface structures in order to provide services that will support the firms' technology usage in OIZs. OIZs, where there is a demand for the technology-related services that cannot be responded to even by OIZ units, can collaborate with institutions that have expertise and experience in the areas needed by the firms operating in the OIZ and create new structures to be able to meet the important need in this area. Starting the implementation of this model in the 12 OIZs within the fieldwork or in other developed OIZs will be useful towards creating success stories. The process design for Model 1 is summarized in Table 31.

The first stage of the first recommended model is about creating capacities within the OIZ management to support the firms' technology usage in OIZs.

The second stage is the establishment of specialized new interface structures to provide services that will support the firms' technology usage in OIZs.

Table 31. Process Design for Model 1

MODEL 1 PROCESS DESIGN		
FIRST STAGE: Designing of the Capacity Building Process	**Target OIZ**	**Target Firm**
Service Areas' Needs Analysis	Selected OIZs whose vision, as well as financial and management capacity are above a certain level	All Firms
Meeting with Relevant Stakeholders and Receiving Suggestions		
Receiving OIZ BoD Opinions and Budget Approvals		
Signing the Service Procurement Contracts and Protocols		
Planning Approach and Method, Required Analyses, Methodology and Outline Designation		
Governance Plan Design/Stakeholder Analysis		
Determining Possible Collaborations with Chambers of Industry, Exporters' Unions, KOSGEB, and TTOs, and their Complementary Functions		
Clarifying the Approach and Method for the Detection of Deficiencies with Relevant Institutions regarding the Services Offered to Firms		
Deciding on Projections, Performance Indicators and Objectives related to the Programme		
Establishing Information-Communication Infrastructure		
Determining and Selecting the Key Personnel Competence Criteria, and Preparing the Orientation Programme		
Establishing Monitoring and Evaluation Mechanism		

MODEL 1 PROCESS DESIGN

SECOND STAGE: Interface Structures	Target OIZ	Target Firm
Organising a workshop to decide which service group to focus on • Technology Transfer Office • Research, Application and Competency Centre • New Generation Technology Development Zone • Open Innovation Platform • Cluster Management Unit Determination of the Stakeholder List/Working Groups/Stakeholder Analysis Defining the OIZ's Role / • Sole owner: The OIZ being the sole owner of the structure to be established, and the other relevant institutions used only for consultation. • Partner and stakeholder: The OIZ entering into partnerships with other institutions and being either the shareholder or the stakeholder of the structure. • Host and stakeholder: The OIZ assuming the role of a hosting provider/a host, transferring the management of the structure to other institutions, but taking part in the process as a stakeholder.	The OIZs where the demand for the relevant services and the effectiveness of these services are at the highest level.	All Firms

THIRD STAGE: Determination of Fundamental Implementation Principles and Rules

- Needs Analysis
- Feasibility Study/Sectoral Links
- Business Plan
- Recruitment of Team Leader and Team
- Preparation of the Orientation Programme/Domestic-Overseas Education Programmes
- OIZ Capacity Building and Interfaces Support Programme Design by MoIT
- Integration of Strategic Priorities related to Regional, National and International Technology Usage and Production into the Model
- Determination of Financing and Income Model
- Establishment of Partnership Structure
- •Establishment of Governance Mechanism
- Establishment of Effective Network Structures Between OIZs that are on the Same Corridor
- Risk Analysis

The second model is the construction and management of multifunctional new generation zones in Turkey. The high-tech zones, where firms with a high white-collar employee ratio will operate, need to be designed in line with the needs and expectations of these employees. These needs and expectations can be listed as rentable and scalable production areas, and research and testing centres for high-tech companies, as well as housing, high-quality educational institutions, health and care services, and social spaces for employees. It is important that such services are found within or close to the zone to be designed, and this should be taken into consideration during the building process. The process design for this model is shown in Table 32.

Table 32. Process Design for Model 2

MODEL 2 PROCESS DESIGN		
New Generation Zone Design	**Target OIZ**	**Target Firm**
Field selection (accessibility) Legal status Plan changes and expropriation Project design/designing a living space (housing, business centres, trade centre, research centres, university, TDZ, social facilities, sports facilities, schools, hospital, culture and art centres, strong fiber optic structure, prototype production centres, technical design centres, technoparks, joint laboratory and test centres, sectoral vocational training institutions) Firm/sector/value chain selection Leasing Clustering and technology centres Determination of the fundamental functions that will provide the relation with the city Public-private-international collaborations Public relations management	Selected OIZs whose vision, as well as financial and management capacity are above a certain level	High technology user and producer, corporate, exporter firms

MODEL 2 PROCESS DESIGN

Interface Structures Installation	Target OIZ	Target Firm
Technology Transfer Office Research, application and competency centre New generation technology development zone Open innovation platform Cluster management unit	Selected OIZs whose vision, as well as financial and management capacity are above a certain level	

Others

Business Plan

Conducting Legislative Studies regarding the Legal Nature of a Non-Profit Company

Determination of Financing and Income Model

Establishment of Partnership Structure

Establishment of Governance Mechanism

Establishment of Effective Network Structures Between OIZs that are on the Same Corridor

Risk Analysis

The alternative regarding the management of industrial zones by a "Managing Company" instead of a private legal entity is also one of the matters addressed under this study. This management form has its advantages and limitations. However, the main logic behind becoming incorporated is to switch to a performance-based management and to gain flexibility in the activities carried out. As OIZs cannot make or distribute profits, they either keep earnings in their accounts or direct them for investments. For the solution of this problem, it is required to define the company's mission and its available tools.

In conclusion, this study not only conducts an impact analysis of OIZs at the sample level but also offers policy suggestions within the framework of two models, where qualitative and quantitative analyses are compiled with the aim of shaping the future agenda of OIZs towards Turkey's transformation into an innovativeness-based economy.

This study is regarded as an opportunity for OIZs. It is thought that OIZs that will develop more projects in subjects such as innovation, clustering and digitalization in the upcoming period will be an opportunity for the transformation of firms.

This process includes a joint effort by the OIZs, the institutions supporting them and the firms.

PHOTO 10

METU
TECHNOPARK

PHOTO 11

ITU ARI
TECHNOPARK

ANNEX

ANNEX 1: Focus Group Report

Model Development Project for Improvement of Technology Usage in OIZs
Focus Group Meeting Report

Model Development Project for Improvement of Technology Usage in OIZs
Focus Group Meeting Findings

Part of the focus group meeting participants were selected from among the OIZs interviewed within the scope of the main research. The outputs of the research were shared with the participants, and the findings were re-evaluated at the focus group meeting. At the focus group meeting, three topics came to the forefront. These include new functions for OIZs, important constraints to be faced with when performing these functions, and the relevant recommendations.

New Functions

As a result of the questionnaires and meetings held in the main fieldwork, the subjects of (i) Technology Development Zone, (ii) Training in digitalization, Industry 4.0, establishing and operating a model factory/competency centre, (iii) Industry-university collaboration, technology transfer office were identified as the three items where the need-effectiveness spread is the largest, considering the need for OIZ services and the effectiveness of these services in OIZs. (see Table 15). In addition, educational activities, consultancy services and technological services were also among the important issues raised by the participants.

The competencies of OIZ managements in meeting the firms' needs are as important as the needs stated by the firms, being the beneficiaries of OIZs. For this reason, the question of what kinds of functions can OIZs undertake to meet these firms' needs was directed to the participants at the focus group meeting. This question was discussed in the framework of the models.

In this context, it was seen that the new functions that OIZs will assume were addressed by the participants in the framework of Model 1. Model 1 has been built on the basis

of the establishment of specialized interface structures to provide indirect or direct technological services that the firms need. Accordingly, as can be seen in Figure I, the participants mentioned 3 new functions for OIZs.

The awareness-raising activities that OIZs will provide to the firms about technology can be mentioned as the first function. The participants assessed the awareness-raising activities under three headings. These include awareness-raising, seminars, meetings, and finally, conducting works that will bring students closer to the industry.

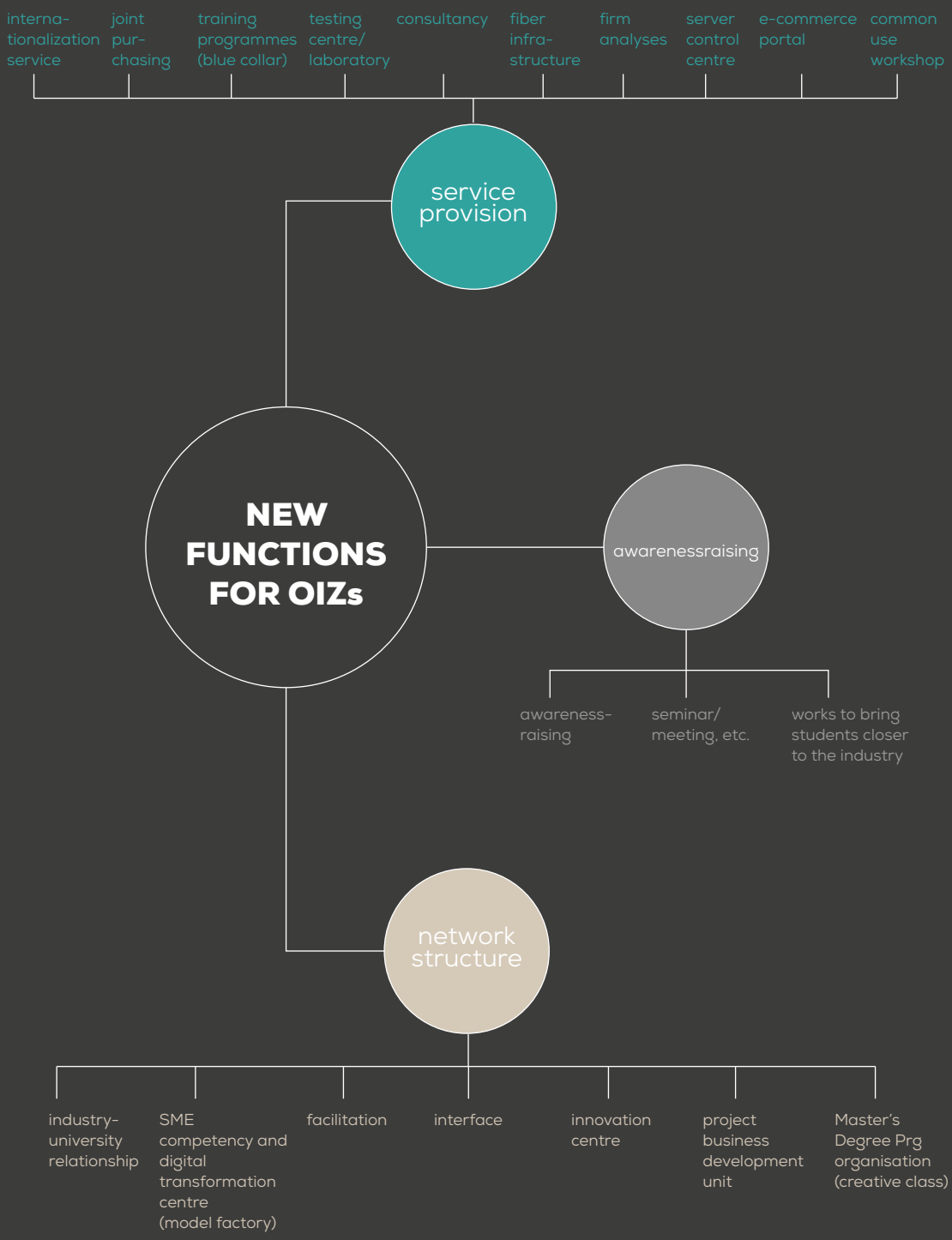
When examining the figure (see Figure 11) showing the participant opinions obtained from the main results of the research on the problematic issues in the zone, it is seen that participants consider the disinterest of OIZ managements against the firms as an internal problem. And when examining the figure (see Figure 12) showing the participant opinions on the issues regarding the external problems, it is seen that the participants stated that there was no appropriate mental adaptation for technological development. To this end, OIZ managements emphasize the importance of awareness-raising activities for the firms in these two very important subjects. However, even the OIZ managements accept that such awareness-raising activities will not yield results immediately. Regarding this, one participant stated the following:

> *"I think this needs to be continued insistently and, even though there is no demand right now, some works should also be done to create that demand." (FGP7)*

> *"Some of such firms in our zone - which would not exceed 20% - have already progressed in digitalization by themselves. There is a big gap with the others. The others do not even have much of an intention, they do not even think it will bring them much advantage. Those need to understand. When they understand, things will change." (FGP1)*

The function that awareness-raising activities take place in action emerges in the form of organising seminars and meetings. OIZ managements express that seminars and meetings for firms are important in awareness-raising activities and that they should be conducted and continued.

Figure 1. Possible New Functions for OIZs



In addition, the participants emphasized the importance of works which will change the perception of the students that are studying in vocational high schools, vocational schools of higher education or in relevant departments of universities to get them closer to this field. Yet, the inability to find people to employ both in general terms and in terms of hiring qualified personnel is one of the most important problems of the industry. One of the main reasons for this is the fact that people with the potential to work in the industry turn to other professions instead (see Figure 11 and Figure 12). The participants also presented solution suggestions regarding this important problem. Statements of some participants are as follows:

> *"There are five days of school a week under the Vocational Education in Collaboration with Industrialists project. A problem with this is when the child started to go to school 5 days a week, he forgot that he was actually there to work, and we began to encourage him to come to the factories during the weekday lunch times. We said that he should come to the factory during lunch, we said that he should come here to eat, and they started to get closer to each other." (FGP1)*

The participants also stated that OIZs could take on the role of providing services to firms in their activities on technology usage. Among the service provision activities discussed were e-commerce portal, consultancy, training programmes, fiber infrastructure, company analyses, common use workshop, joint procurement, server control centre and internationalization services. Among these services, consultancy and training programmes were the ones more frequently mentioned.

> *"They will be able to buy consultancy services. That is to say, they will be able to develop products with us. Because one or two engineers work with them. They do not have enough power to hire a third engineer or they think that even if they hire a third engineer they will not be able to make him work full time anyway. In this case, we need to support them in some way." (FGP6)*

"There would be an office there, but experts need to be able to take an x-ray of firms individually. They should visit and listen to the firm, enter into it, get to know it." (FGP8)

It was also stated that any consultancy services to be offered to the firms should be carried out with close relations and should include a follow-up phase after the conclusion of the consultancy service. It was mentioned that otherwise, it will not be possible to help industrialists exceed their capacity and to break any possible resistance.

Among these services, those directly related to technology usage include e-commerce portal, fiber infrastructure, server control centre, and testing centre.

Finally, participants' recognition of the network structure as a new function for OIZs supports the Model 1 structuring, reached as a result of the main field meetings.

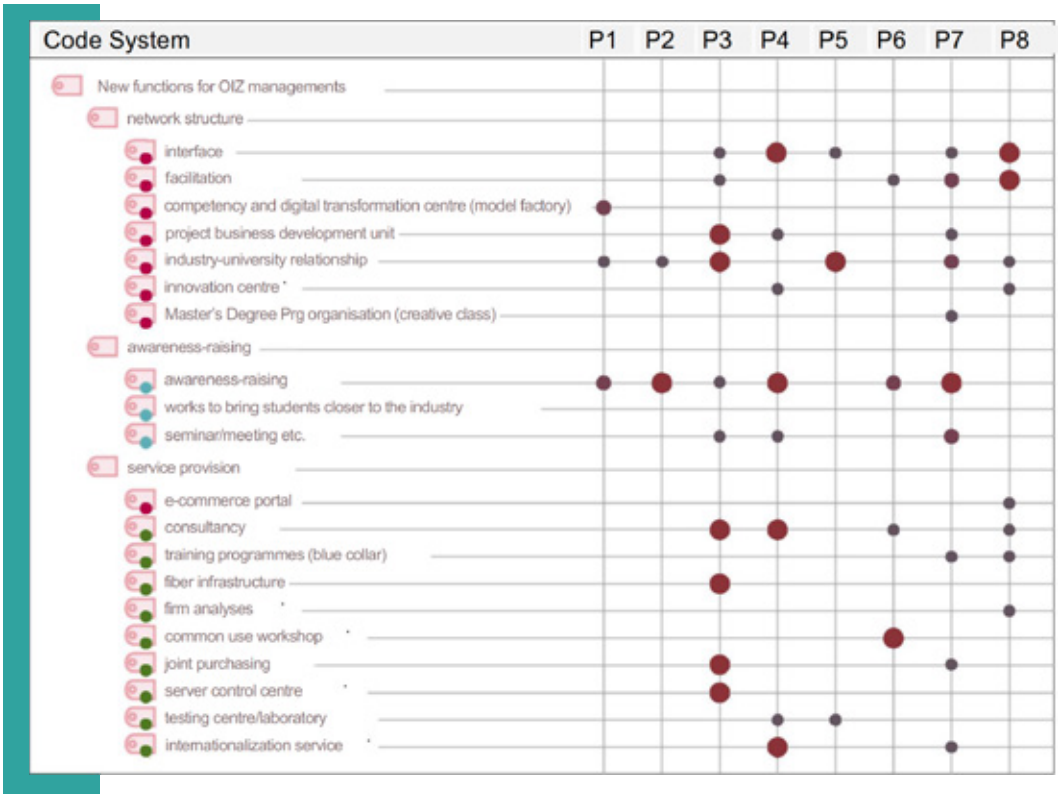
The network structure stated by the participants covers interfacing, facilitation, model factory, project business development unit, industry-university relationships, innovation centre and organisation of master's degree programmes for the creative class working in the firms. Regarding this, the participants stated the following:

"For example, OIZs interested in benefiting from P&D support or any other support by the state can be a good interface in organised industrial zones." (FGP8)

"If we want to achieve technological transformation in OIZs, we need to make them more integrated with micro enterprises, start-ups. In other words, rather than waiting for Vestel to make an innovation, we need to find how we can bring them together with small companies making innovations." (FGP6)

However, what is important here is which functions were jointly expressed by the participants. Table 1 shows the participant opinions on this matter.

Table 1. Participant Opinions on the Possible New Functions of OIZs



When examining Table 1, it can be seen that more than half of the focus group participants expressed interface, facilitation and the establishment of university-industry relationship for the OIZs' network structure functions. Therefore, they can be considered the important functions agreed upon.

Awareness-raising of the firms' technology usage under consciousness-raising activities, and consultancy and training programmes under the heading of providing services for firms were the featured functions discussed.

Given that the focus group meeting participants are predominantly composed of OIZ managements, it can be deduced that OIZs have the ability to perform these prominent functions.

Constraints

It was mentioned during the focus group meeting that there were some constraints in determining new activity areas for OIZs. OIZs will be able to effectively impact the firms in terms of technology usage and dissemination only if these constraints are eliminated.

These constraints can be examined under five headings, as shown in Figure 2. The constraint regarding industrial workers is the one that can be considered the most macro-scale constraint among these constraints. Because the issues mentioned here cover a large-scale area that ranges from general education policies to job and professional choices of employees and that can only be addressed in the long term. In particular, the problem of not being able to find people to employ, both in general terms and in terms of hiring qualified personnel in industrial sectors clearly stood out in the main fieldwork. Statements of some of the focus group participants in this regard are as follows:

> *"Firms are operating with approximately 10% at the moment. The font sizes of the job advertisements are about this big now, and in front of some factory buildings there are advertisements with this size of fonts calling for employees, as if they are saying 'Come, come, whoever you are.'" (FGP1)*

> *"I hear that a Mardin industrialist moved his factory from Istanbul to Mardin to take advantage of this support, and now he has 100 workers. The man posted a job advertisement; he needs 50 more workers. But he can't get those workers. He was on the media. He says if he cannot find these 50 workers he will move the factory back or go to another place. Now, of course, the main issue is that no one works in the industry with minimum wage." (FGP2)*

The weakness of the education infrastructure and the quality of the new generation of employees are also seen here as a constraint.

Ecosystem-related constraints can be counted as the second constraint. When the figure is examined, it is seen that the technology development zones are not suitable structures for OIZs and that the R&D centres are also closed structures which create a constraint on the firms' access and use of technology. The fact that software companies are present in the Technology Development Zones rather than the firms operating within OIZs indicates that TDZs transformed into a structure which does not serve the firms in OIZs. One participant stated the following with regard to this:

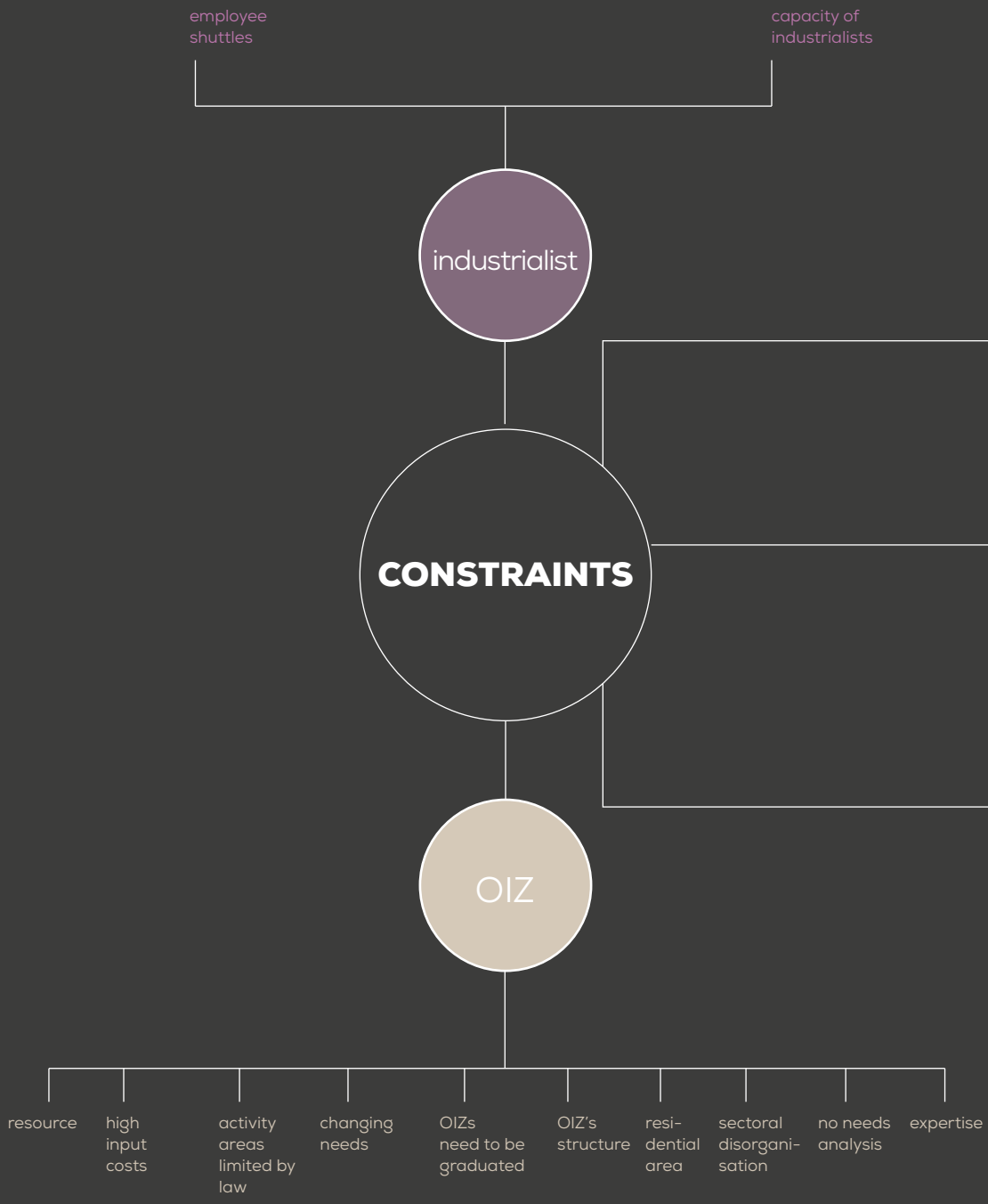
> *"There are no firms in TDZs from the OIZ. There are a few of them, 1, 2, or 3... There are software developers, there are technology development companies, the hope is not the firm in the OIZ, but I think the information developed there in the TDZ should be beneficial for the industrialist. Whether or not the industrialist opens a workplace there, but in the end it should be beneficial for the industrialist. Is there such a hope; yes there is, but I still cannot see a very clear benefit for the OIZ, I cannot see the benefit of TDZs in the OIZ." (FGP7)*

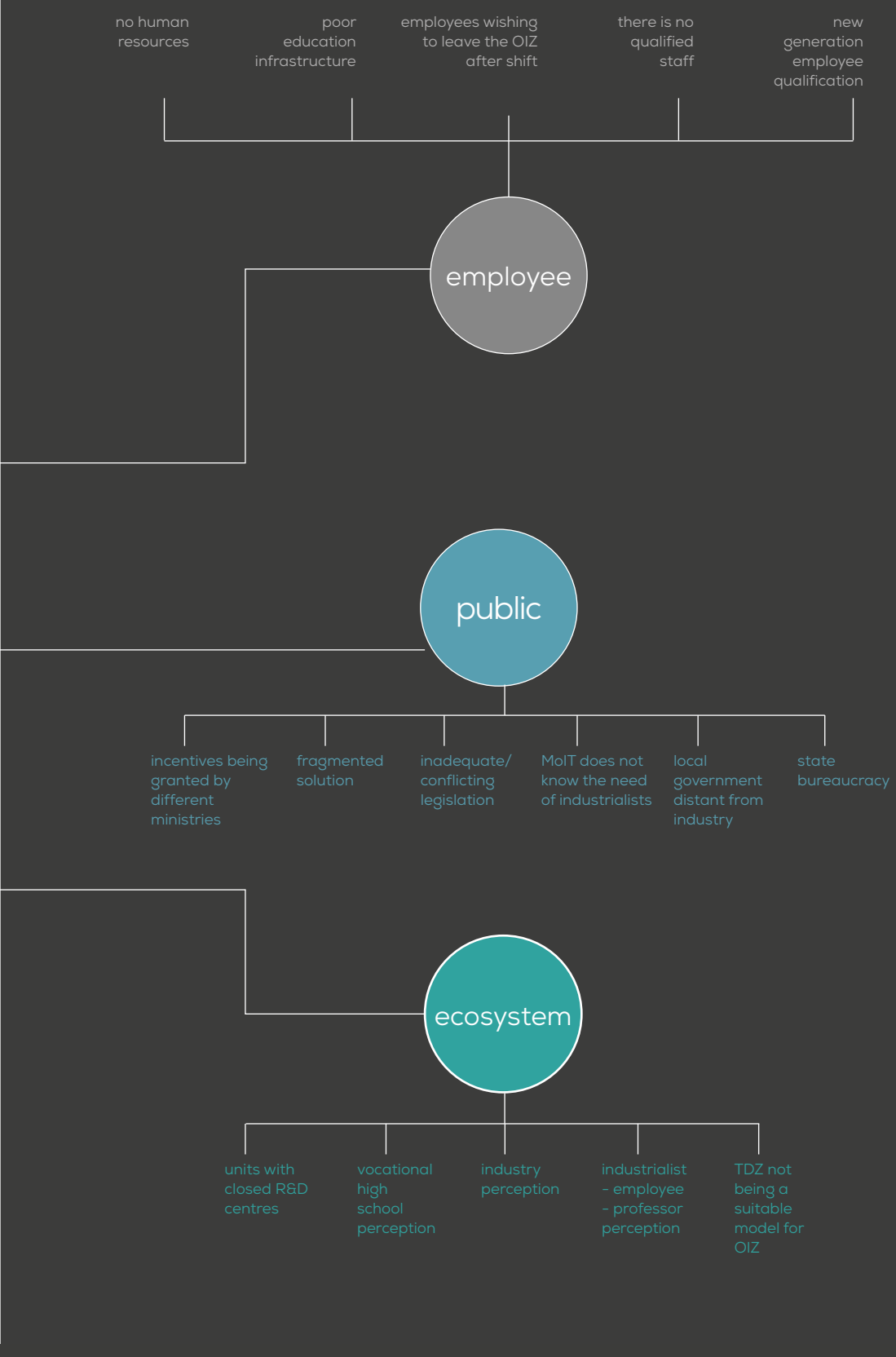
Another constraint that concerns the ecosystem is related to perception. Parents and individuals in society having a negative perception about vocational high schools, employees having the perception that the industry does not provide a very positive working environment and, finally, the perceptions of industrialist, employee and professor for each other being negative are seen as important constraints. Some of the participants used the following statements regarding this issue:

> *"The students, which we think we have convinced in the school, do not register after the neighbours say to the parents 'Hmmm... so you are registering your child to a vocational high school.' Actually, the student and the parent want it, but they change their minds as they don't want to see anyone associating them with vocational high schools." (FGP7)*

PHOTO 12. MANİSA OIZ

Figure 2. Constraints on Increasing Technology Use in OIZs Expressed by Participants




no human resources
poor education infrastructure
employees wishing to leave the OIZ after shift
there is no qualified staff
new generation employee qualification
employee
public
incentives being granted by different ministries
fragmented solution
inadequate/ conflicting legislation
MoIT does not know the need of industrialists
local government distant from industry
state bureaucracy
ecosystem
units with closed R&D centres
vocational high school perception
industry perception
industrialist - employee - professor perception
TDZ not being a suitable model for OIZ

"Unfortunately, people from the university look at the industry in terms of money. Another thinks that he should receive a consultancy, for a different viewpoint, the industrialist transfers his own knowledge and experience. A right relationship just couldn't have been established in this matter." (FGP5)

When the constraints are examined, another important matter insistently and repeatedly stated by the participants stands out, which is the capacity of the industrialist. The use of technology in OIZs will become widespread only when OIZ beneficiary firms start to use this technology. However, industrialist capacity is not the same for all industrialists and for all OIZs. Therefore, taking the necessary steps by considering this constraint and giving priority to the development of the capacity of industrialists who are the main beneficiaries will make the future works more successful. In this regard, some of the focus group meeting participants stated the following:

"Industrialists are not used to this. Once an industrialist comes and starts working with us, he sees that there really is knowledge in here and that it can provide benefit. On the other hand, it's so hard to lure the industrialists who are not interested in coming here. Because he thinks that an organised industrial zone is an establishment which carries out the works of a municipality. He thinks that even if he consults this establishment he cannot get sufficient information. We here try to go and prove ourselves to them so as to attract them." (FGP3)

"There is no money, no language, no opportunities." (FGP4)

Another heading related to the constraints is the section that concerns OIZs. OIZs have significant constraints in fulfilling the new functions to be given to them on issues such as what specialization they have, what resources are available on hand, activity areas are limited by law, the structure of OIZ and sectoral disorganisation. Regarding this, the participants stated the following:

"I think it's kind of out of question for us to make a contribution that would perfectly cover all of these services you are talking about and lead to the transformation of a firm. In the end, every institution has its own field of expertise, time, resources, etc.There are many dimensions in

vocational education regarding issues including exportation, technological transformation, technology usage, internationalization and, apart from the technology or taking and using the technology, the process of becoming able to produce the technology. We cannot say that we can offer the best service in all of these." (FGP7)

"I think that we should first decide what we will become, in terms of service according to the member profile of each OIZ, their own development level. In other words, we should decide where the OIZ and the industrialists within the OIZs will stand in their life. Will we become an awareness-raising agency, will we become an interface, or will we become a service provider?" (FGP7)

"I would like to add the sectoral disorganisation. We have 24 different NACE codes with two digits because of the sectoral disorganisation. So, if all of these services will require a certain sectoral knowledge and experience, then that is a separate problem." (FGP7)

As can be seen, OIZs have their own constraints in ensuring the technological transformation. Sectoral disorganisation, resources and areas of expertise are the important factors that limit OIZs while they are offering services and trying to impact firms.

The last constraint is about the governmental area which directly affects all other areas. The public authorities have a very important place in the transformation of the industry in terms of legislation, incentives and bureaucracy. In the light of the fact that public authorities are influential in the transformation of OIZs, the first important constraint expressed by the participants is about the legislation being inadequate and the existing legislation being of a conflicting nature. The participants expressed the following in this regard:

"The second one is about the conflicting legislation. While I'm doing something here the public authorities do not care really, maybe ministries and relevant departments are working, for example, they tell the OIZ that they did something good for the technopark or that they support R&D centres. They decrease it from 50 to 30, from 30 to 15, and while doing such things they unknowingly demolishing the technopark. Without dealing with ... so there is conflicting legislation and this is not calculated very well." (FGP2)

"Leave aside the more sophisticated legislative conflict, the OIZs are exempt from tax. We have 70 cases regarding tax exemption; with the issue of having to pay corporate tax and then trying to ensure its refund. I mean, in the end, this is something that occupies the courts. And, of course, there is the conflicts between the Ministry of Finance legislation and the Ministry of Industry legislation." (FGP7)

It was also stated that fragmentary solutions offered by the state are important constraints for sustainable activities.

Table 2. Constraints Expressed by Participants faced in Increasing Technology Usage in OIZs, and the Density of Participant Opinions

Constraints that the focus group participants agreed upon and constraints expressed more individually can be seen from Table 2.

Accordingly, the most important constraint expressed by most of the participants is regarding the capacity of industrialists. The capacity of industrialists is the first and the main factor that will affect the process of ensuring technological transformation. Moreover, the legislative limitations, resource problems of OIZs, employee background, and human resources problems were again jointly expressed by half of the participants.

The findings regarding the constraints in ensuring technological transformation in OIZs are very important in determining the necessary policy. Because no solution can be reached before overcoming the problems.

Recommendations

During the focus group meeting, the participants made a series of recommendations about the activities to be undertaken. These recommendations can be examined under four headings. The recommendations can be found in detail in Figure 3.

First of all, as for the recommendations regarding the zone, the improvement of social spaces and the development of living spaces in the region stand out as a frequently mentioned issue. This finding is also one of the main findings of the main field research. However, on one hand the participants highlighted the improvement of social spaces within the industrial area and on the other hand, they emphasised the fact that not only the industrial zone but also the region covering the industrial zone should be developed and improved in a holistic manner. This situation brings the issue of urban investment to the agenda. Nevertheless, before trying to adapt any functions that proved successful in one OIZ to another OIZ or region, it is necessary to take into account the characteristics of that region and the regional differentiations and determine the relevant social expectations and needs. Regarding these recommendations, some of the participants stated the following:

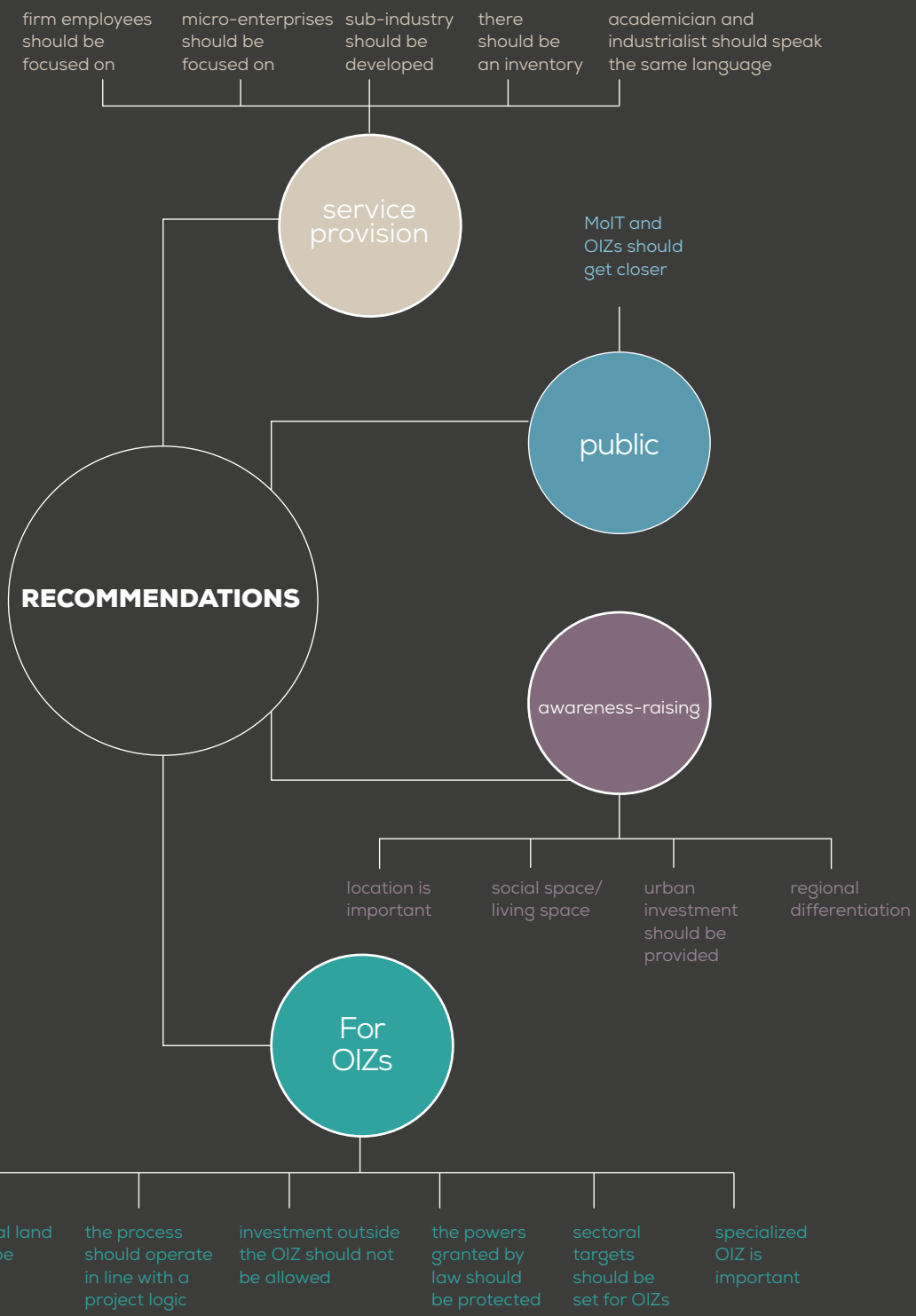
"The model to be built or the arrangements in the legislation should be different for the west of Turkey, and the metropolitan areas, and the remaining parts of the Anatolia. I mean, I think that spatial and regional differentiation is essential." (FGP2)

"When you enact legislation, when you apply the same thing to all OIZs as a standard, a need for a differentiation certainly arises in this respect. I mean such a system would be something that won't work as it does in a TTO, it may only cause us to fool ourselves." (FGP2)

"We are constantly talking about how to keep our qualified personnel; actually it is pretty obvious how to keep those personnel. The new generation, the subgeneration of this generation, now demands completely different things. The children are in the company, this is the common problem of all companies, you need to provide comfort to them within the company, you need to provide flexibility, you need to give autonomy, you need to grant authority. We must absolutely create social spaces. Currently, all the OIZs in this area have social spaces. You have to create an environment where people can have a coffee, relax and even rest for an hour. Otherwise, you cannot have qualified technological production made in OIZs or any industrial plant." (FGP3)

PHOTO 13
METU
TECHHNOPARK

Figure 3. Participant Recommendations on the Development of Technology Usage in OIZs



Yet another recommendation heading is related to the industrialist. The participants state that if there is a desire to develop the industrialists, this attempt should start from developing the subindustry. It was also mentioned that if transforming OIZs is through the development of firms, then developing a firm can be ensured by determining the functions focused on the firm employees. The necessity of conducting inventories in OIZs and having a common language between the academician and the industrialist is among the important recommendations. Regarding these recommendations, the participants stated the following:

> *"You know we say that we will improve the industrialist; this industrialist is not a mass or an object or an individual person. Usually people think of the owner of a firm when one uses the word industrialist. There is a tendency to think that it is the owner that we are going to improve, but it is not actually. What makes a firm a firm is the people working there. If we want a firm to develop, we need to improve the employees of that firm." (FGP1)*

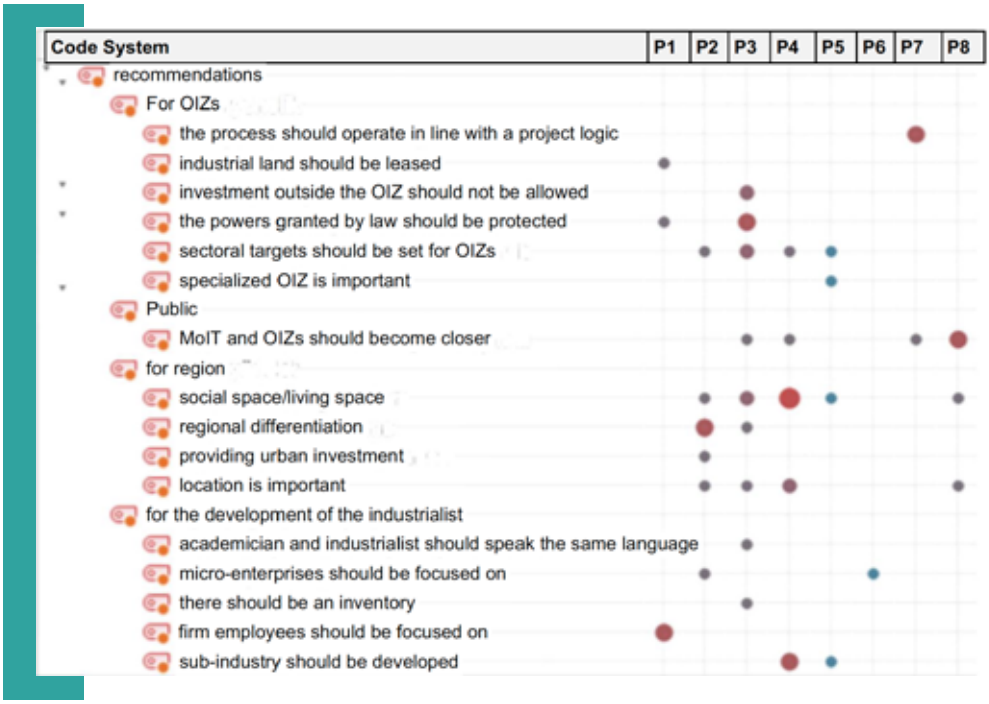
> *"Say there is a firm with 100 workers and say we brought Steve Jobs to manage the R&D centre. Who will he work with? He will work with the employees of that firm, it's not like he will do things alone. What we need to do is to enhance the place completely." (FGP1)*

The last recommendation theme expressed by the participants is about OIZs. The most important recommendation that draws attention here is about the importance of setting sectoral targets for OIZs and structuring specialised OIZs. The participants' statements in this regard are as follows:

> *"Technology development zones must certainly be given an industrial target. Especially to the technoparks established within OIZs. There is an informatics valley near us. The goal of the informatics valley is totally different. See, we have a technopark. There is one in Kocaeli University, and there is the Istanbul Technopark. Now, there is the newly established GTU technopark. I mean there are 5 technoparks each having just 200 metres*

between them.And, as far as I can see, there is competition between them although we do not have such a thing. I mean, it is not due to graduating but all have the same target. If there are 5 people of the same qualifications who run for the same target, none of those 5 can reach anywhere. Rather than different grades, there should be different industrial targets." (FGP3)

Table 3. Density of Participant Recommendations on the Development of Technology Usage in OIZs



When Table 3 is examined, the recommendations of which the participants have an agreement upon, are seen more clearly. Accordingly, the recommendations that the participants insist on include the necessity of setting targets for OIZs, the necessity of developing social spaces in OIZs and the importance of the location, as well as the requirement of a closer relationship between MoIT and OIZs.

Focus Group Study Results

The aim of this focus group meeting is to discuss the findings obtained from the fieldwork, and to determine the functions, constraints and recommendations regarding the offered models.

It is observed that the participants declared ideas concentrated around Model 1 and they were in an agreement that this model in its current state was more applicable to the OIZs. Especially, it was seen that it would only be possible for OIZ managements to influence the firms through awareness-raising activities and by offering them various technological infrastructure services. It seems possible to gradually influence the firms by providing internet infrastructure, offering consultancy services and establishing joint test centres.

In addition to this, if OIZs undertake the facilitation mission for the firms, firms can quickly access both the technological knowledge, and the institutions and people that will bring them together with technology better. It is through this way that the transformation can gain momentum.

The world is changing and rapidly becoming digitalized. The fact that activity areas determined by law for OIZs are limited with infrastructure pressures the Turkish industry into the understanding of productivity. The way to transform productivity into innovation is through the transformation of the functions assigned to OIZs by law. But this transformation must take place in a way that also takes into account the research findings, rather than imposing a top-down approach. This is due to the target realisation potential is as important as the targets themselves. At this point, the capacities of OIZs to create resources, the number of specialized staff and the region and the internal structure of OIZs are very important factors.

ANNEX 2: Fieldwork Forms

ANNEX 2A: Firm Survey

Developing a Model to Improve Technology Use in OIZs Project
Questionnaire for Firms in the OIZ

This questionnaire has been prepared for the firms operating in the OIZ within the scope of the Developing a Model to Improve Technology Use in OIZs Project carried out under the collaboration of the Turkish Ministry of Industry and Technology (MoIT) and United Nations Development Programme (UNDP). Your responses for the questions will provide input for the process to identify how OIZs will contribute to Turkey's technology development ecosystem in the fields of entrepreneurship, innovativeness and technology and assess how to institutionalize this contribution.

Approximately 300 people will participate in this research, including you. Participation in this project is voluntary, and the information you provide will be used in accordance with the purpose of the research. Your personal details will be kept confidential.

We thank you for taking the time to contribute to such important work for the Organised Industry Zones and our country.

Name of the Firm
Name-Surname of the Person Filling the Questionnaire
Title
Telephone
Email

1. What is your firm's main activity field? (Please print)

_____

2. Are there any other facilities where you produce in Turkey? If yes, please specify (the largest 3 facilities)

	province		Location (Other OIZ, TDZ, Free Zone, Others)
a)	_____	/	_____
b)	_____	/	_____
c)	_____	/	_____

3. Who owns the land where production activities are undertaken?

a. The Firm

b. Owner of the Firm

c. Rented

4. What is the total area of where your firm produces? (Within the OIZ)

Total area: _____

Closed area: _____

5. What is your firm's capacity utilization rate for 2016? (Please specify)

Percent _____

6. What is your product's value per kg/length/volume/area? (in TL, USD or Euro / Please print)

_____

7. What are your sales proportions of domestic markets and foreign markets?

a. Domestic market: Percent _____

b. Foreign market: Percent_____

8. Which three cities do you sell to the most in the domestic market, and which three countries do you sell to the most in the foreign market?

1. City: _____	1. Country: _____
2. City:_____	2. Country: _____
3. City:_____	3. Country: _____

9. How many people work in your firm?

Total Number of Employees: _____

Total Number of Female Employees:_____

10. How is the employment distribution of people working in your firm?

a. Number of white-collar employees: _____

b. Number of engineers: _____

c. Number of female engineers: _____

d. Number of engineers working in the R&D department: _____

11. What is the share allocated to R&D activities within your turnover? (Please specify): _____

12. Has your firm collaborated with any university or research centre to undertake research and development activities in the last three years?

a. No

b. Yes: Which university/universities (Please specify):

1. _____
2. _____
3. _____
4. _____
5. _____

13. Has your firm received any direct or indirect government grants in the last two years? If yes, from which institution?

a. No

b. Yes: 1- TÜBİTAK

2- KOSGEB

3- Development Agency

4- Ministry of Economy Incentives

5- Ministry of Industry and Technology-SANTEZ

6- Others (Please specify): _____

14. How would you rate the effectiveness of the services provided by the OIZ on a scale from 1 to 5?

	No Services Offered	How effective are these services?				
		1	2	3	4	5
		Not Effective At All	Not Effective	Neither Effective Nor Ineffective	Effective	Very Effective
Conventional services						
Infrastructure (connection, sales, operation)						
One Stop Office (licenses and permits)						
Supervision						
Superstructure services (energy management, cleaning, weighbridge)						
Emergency services (fire, security)						
Social Services (Restaurants, shopping malls, sports)						
Other services						
Vocational and technical training						
Kindergarten						
Logistics Centre						
Technology Development Zone						
Investment promotion, attracting new investors						
Networking - increasing collaboration between firms						
Incubator and accelerator - to provide support for newly-established firms						
Support for new market development, internationalisation						
Industry - university collaboration, technology transfer office						
Pairing with mentors						
Training on digitalization, Industry 4.0, establishing and operating a model factory/competency centre						
Living areas in the zone (housing, entertainment, education, health)						
Others (Please specify) ...						

15. How necessary are these services provided by the OIZ?

	How necessary are these services?				
	1	2	3	4	5
	Not Necessary At All	Not Necessary	Neither Necessary Nor Unnecessary	Necessary	Very Necessary
Conventional functions					
Infrastructure (connection, sales, operation)					
One Stop Office (licenses and permits)					
Supervision					
Superstructure services (energy management, cleaning, weighbridge)					
Emergency services (fire, security)					
Social Services (Restaurants, shopping malls, sports)					
Other functions					
Vocational and technical training					
Kindergarten					
Logistics Centre					
Technology Development Zone					
Investment promotion, attracting new investors					
Networking - increasing collaboration between firms					
Incubator and accelerator - to provide support for newly-established firms					
Support for new market development, internationalization					
Industry - university collaboration, technology transfer office					
Pairing with mentors					
Training on digitalization, Industry 4.0, establishing and operating a model factory/competency centre					
Living areas in the zone (housing, entertainment, education, health)					
Others (Please specify) ...					

PHOTO 14. İZMİR ATATÜRK OIZ

ANNEX 2B: Company Interview Form

Developing a Model to Improve Technology Use in OIZs Project

Interview Form for Firms in OIZ

This interview form has been prepared for the OIZs' firms within the scope of the Developing a Model to Improve Technology Use in OIZs Project undertaken by the collaboration of the Turkish Ministry of Industry and Technology (MoIT) and United Nations Development Programme (UNDP). Your responses from the interview will provide input for the process to identify how OIZs will contribute to Turkey's technology development ecosystem in the fields of entrepreneurship, innovativeness and technology, and assess how to institutionalize this contribution.

You are asked to devote approximately 60 minutes of your time for this interview. Approximately 300 people will participate in the research, including you. Participation in this project is voluntary, and the information you provide will be used in accordance with the purpose of the research. Your personal details will be kept confidential.

We thank you for offering your time to take this interview to contribute to such important work for the Organised Industrial Zones and our country.

Name of Firm
Name-Surname of the Interviewee
Title
Telephone
Email

Interview Flow and Headings:

1. Firm's Establishment Process and General Information
2. Firm's Relations with OIZ and its Evaluations on OIZ
3. Firm's Relations with the City/Region it is located in and Evaluations on the City/Region
4. Firm's Strategy, Productivity and Innovativeness Agenda
5. Its Future Agenda, Problems and Solution Suggestions

1. Firm's Establishment Process and General Information

1.1. Establishment story and selection of location in the OIZ

1.1.1. Could you please tell us about the establishment process of your firm?
In which year did it start operating?
Why did you choose here?

1.1.2. Where were you operating before moving to this OIZ?

1.1.3. Do you have a simultaneous production activity in another location?

1.2. Firm management

1.2.1. What is your firm's partnership structure? (options: public company, company with less than 5 partners, family company, public partnership, private equity, company established and managed by the entrepreneur, company owned by managers)

1.2.2. If it is a family company, has there been a task transfer from the founding generation to the new generation? What kinds of effects did it have on the firm? What kinds of differences are there between the generations? What are their levels of education?

1.2.3. Is the general manager from the founding family? Is the general manager an externally sourced professional (from outside)?

2. Firm's Relations with OIZ and its Evaluations on OIZ

2.1. OIZ's power to attract

2.1.1. What is your reason for investing in the OIZ?

2.1.2. What kinds of incentives and advantages did you have for operating in the OIZ? (What kinds of advantages are there compared to firms outside the OIZ?)

2.1.3. Would you make this investment decision in this OIZ again, if you were going to make the same investment decision today? What would change your decision on choice of location?

2.2. Impact of OIZ

2.2.1. How does being in an OIZ affect the firm's productivity?

2.2.2. How does being in an OIZ affect the firm's innovativeness?

2.2.3. Does your firm have commercial relations with other firms operating in the OIZ? Does being in the OIZ provide an opportunity for these commercial relations to develop over time?

2.2.4. What kind of an additional impact does the OIZ have?

2.2.5. If you are producing in another location as well, what are the advantages and disadvantages of the OIZ compared to the other location?

2.3. Evaluation of the services provided by OIZ

2.3.1. How would you evaluate the OIZ services?

2.3.2. Has there been a change in the management? If yes, and if you remember that process, has there been a change in the service quality?

2.4. OIZ Management - Firm relations

2.4.1. What is your communication frequency and agenda with the OIZ management?

2.4.2. Would you like to take part in the OIZ management? Why?/Why Not?

2.4.3. What are your expectations from the OIZ management? List your 3 most important expectations.

2.5. Expectations and Requests from the OIZ

2.5.1. What do you think the OIZ management can do to strengthen collaboration and competitiveness?

2.5.2. In which of your activities do you need the support of the OIZ?

2.6. Land value in OIZ

2.6.1. Does the ownership of the land belong to the firm, to the shareholder, or to someone else?

2.6.2. How much has land value increased since you bought it? What is the current land value?

2.6.3. How does this value increase affect the strategy of your firm or the entrepreneur? Did you take a bank loan by using the land and the building as collateral?

2.6.4. Are there any areas that you think are problematic in the land allocations? How can these problems be solved?

3. Firm's Relations with the City/Region and Evaluations

3.1. An overview of the region

3.1.1. How would you describe the region where you are located and with which you are in a daily interaction? (e.g. district borders, provincial borders, neighbouring province)

3.1.2. Would you tell us about the changes that have occurred in the province/region after the establishment of the OIZ? (In terms of added value, employment, foreign trade and investment costs)

3.2. Quality of life in the region

3.2.1. Do you think that the OIZ is an attractive working area in terms of workforce procurement?

3.2.2. Are there quality housing, health, education and entertainment facilities near the zone for the personnel? Are they necessary? Are they needed?

3.3. Evaluations on the ecosystem in the zone

3.3.1. Could you please tell us about your status of collaboration with the universities in your province?

4. Firm's Strategy, Productivity and Innovativeness Agenda

4.1. Competition

4.1.1. What areas do you have an advantage in compared to your competitors? (quality, cost, timely delivery)

4.1.2. In what areas or skills do you feel disadvantaged in?

4.2. Firm Management Quality

4.2.1. Do you use ERP? When did you first establish the system?

4.2.2. Do you have a quality certification? When did you get it?

4.2.3. What kinds of applications do you have in order to attract, develop, and keep human resources? Do you provide performance-based wage increases and bonuses? Do you set goals?

4.3. Technology and Innovativeness

4.3.1. How would you evaluate the technological level of your machinery? Is it possible to switch to a higher technology? What is the reason for not being able to upgrade?

4.3.2. Did your firm launch any new or significantly improved products or services in the last three years? Did it develop any methods?

4.3.3. Do you have any idea about Industry 4.0 (digitalization, smart systems)? If yes, do you have any preparations and visions?

5. Its Future Agenda, Problems and Solution Suggestions

5.1. Future agenda

5.1.1. Does your firm have any plans to grow and make new investments? If yes, is it going to be in this OIZ or in another location?

5.1.2. If all the authority was given to you and you were asked to establish a new OIZ, what activities would you prioritise and what kind of a structure would you design?

5.2. Opinions about possible models

5.2.1. Given your firm's goal of improving productivity and innovativeness performances, can we learn your views on the following options for the future of OIZs?

ANNEX 2C: OIZ Management Interview Form

Developing a Model to Improve Technology Use in OIZs Project Interview Form for OIZ Managements

This interview form has been prepared for the Organised Industrial Zone managements within the scope of the Developing a Model to Improve Technology Use in OIZs Project undertaken by the collaboration of the Turkish Ministry of Industry and Technology (MoIT) and United Nations Development Programme (UNDP). Your responses from the interview will provide input for the process to identify how OIZs will contribute to Turkey's technology development ecosystem in the fields of entrepreneurship, innovativeness and technology, and assess how to institutionalize this contribution.

You are asked to devote approximately 60 minutes of your time for this interview. Approximately 300 people will participate in the research, including you. Participation in this project is voluntary, and the information you provide will be used in accordance with the purpose of the research. Your personal details will be kept confidential.

We thank you for offering your time to take this interview to contribute to such important work for the Organised Industrial Zones and our country.

Name of OIZ
Name-Surname of the Interviewee
Title
Telephone
Email

Interview Flow and Headings:

1. OIZ's Establishment Process and General Information
2. OIZ's Management Capacity and Services Offered
3. OIZ's Impacts on the Firms Operating Within Them and OIZ's Relations with Firms
4. OIZ's Impacts on its City/Region and its Relations with that City/Region
5. OIZ's Current Priorities and Future Agenda

1. OIZ's Establishment Process and General Information

1.1. Establishment story and the present situation

1.1.1. Could you please tell us a little about the establishment processes of the OIZ? What were the challenges you faced in this process?
a. Which institutions were involved in the founding enterprise committee?
b. In which year did the infrastructure investment begin and in which year did it conclude?
c. How much of the investment was financed by a Ministry loan, and how much of it was financed by the contributions of the participating institutions?
d. How is the structure of the enterprise committee?
e.Who were the first industrial firms?
f. Is there a process for the zone's border expansion and are there any objectives?

1.2. Occupancy rate and demand

1.2.1. Could you please tell us about the occupancy rate of the OIZ?
a. In which year did the occupancy rate reach 50 percent?
b. What is the current occupancy rate?
c. If the occupancy rate is low, what are the reasons?
d. If the occupancy rate is high, what are the reasons?
e. How is the leasing/transferring/purchasing density of the parcels?

1.3. Location selection

1.3.1. What do you think about the location selected as the OIZ's place of establishment? How would you evaluate the location of the OIZ in terms of proximity to raw material, market, energy resources and transportation connections?
1.3.2. Would you establish the OIZ in the same location, if you were to establish it today?

1.4. Business model

1.4.1. What are the main elements that differentiate your OIZ from the other OIZs?
1.4.2. SDo you have a strategic plan? Could you please tell us about your vision and mission?
1.4.3. Are there one or more OIZs that you use as examples to improve?

1.4.4. Are there any foreign OIZ practices that you follow? Which industrial zones did you visit abroad?

1.4.5. Where do you position/see yourself among other OIZs?

2. OIZ's Management Capacity and Services Offered

2.1. OIZ Management structure and decision-making processes

2.2.1.1. How is the OIZ managed? How is the public-private sector balance within the enterprise committee?

2.1.2. Did the OIZ switch to a General Assembly structure? When?

2.1.3. Did any decision-making processes, or the effectiveness and quality of the decisions change after the OIZ switched to a General Assembly structure? How?

2.1.4. How often do the Chairpersons of the Board of Directors and the Regional Director change?

2.2. OIZ Regional Directorate

2.2.1. For how many years has the OIZ Regional Director been in this position? Do you know any previous positions they have held?

2.2.2. What do you think about the competence and qualification of the OIZ Regional Directorate personnel?

2.2.3. How would you evaluate the level of institutionalisation of the OIZ Regional Directorate? Are the business processes defined and effective?

2.2.4. Is the technological infrastructure of the OIZ Regional Directorate sufficient?

2.3. Financial structure of OIZ

2.3.1. How much of your income is coming from subscription fees and how much from service provision?

2.3.2. Do you think your financial structure is strong? If you were going to make a new investment, would you finance it with equity or a bank loan?

2.3.3. If the legislation had given you the opportunity to make profit, could the OIZ management make profit from the services it offers?

2.4. Services offered in the OIZ

2.4.1. Which services do you offer in the OIZ? See OIZ service (function) evaluation chart

2.4.2. Which of these are the most critical to you in terms of firms' productivity?

2.4.3. Have any of the services gained importance recently?

2.4.4. Which unit has been the fastest growing in the Regional Directorate in the recent period?

2.5. Service delivery performance

2.5.1. What do you think about your service delivery quality?

2.5.2. Do you conduct a satisfaction survey? How often? How would you evaluate the results?

2.5.3. In which services do you consider your management approach can set an example for other OIZs?

2.5.4. What are the main obstacles you face in service delivery? (legislation, financial, political, etc.)

2.5.5. How many firms have you fined up until today?

3.OIZ's Impacts on the Firms Operating Within and Relations with the Firms

3.1. Differences between being inside and outside of the OIZ

3.1.1. What is the average selling price of an industrial parcel today? (TL/m^2)

3.1.2. Is there any difference between land prices in the OIZ and the land prices just outside the OIZ for the same type of industrial land? If yes, how much is the average price of m^2 for an industrial land in the OIZ and just outside the OIZ?

3.1.3. What kinds of advantages do you think are there compared to firms outside the OIZ? Do you think that the firms in the OIZ gain the advantages of lower costs, higher profits, more competitive structuring by benefiting from the OIZ facilities?

3.2. OIZ Regional Directorate's relationship with firms

3.2.1. Could you give information about the features of the industrialists/entrepreneurs in the OIZ?

3.2.2. What do you think are the expectations of the firms from the OIZ Regional Directorate?

3.2.3. How are the relations between the Regional Directorate and the industrialists?

3.2.4. Have you seen any trends of development/change in these subjects recently?

3.2.5. What differences do you see between the new generation industrialists and the old generation industrialists?

3.3. Collaboration between firms

3.3.1. How would you evaluate the collaboration level among firms in the zone and their tendency towards joint action?

3.3.2. What do you think the OIZ management can do to strengthen this collaboration?

3.3.3. Have you engaged in any activities to improve firm collaboration in the OIZ? What was the level of interest, participation and utilisation of the firms regarding these?

3.4. Productivity and Innovativeness

3.4.1. How would you evaluate the firms' tendency in the OIZ towards increasing their productivity?

3.4.2. How would you evaluate the innovativeness capacity of the firms in the OIZ?

3.4.3. Is the OIZ management Regional Director/Directorate interested in the technology inclination (productivity & innovativeness) of the firms?

3.4.4. What kinds of services do you have to support the production/marketing/R&D activities aimed at firms in the zone?

3.5. Investment promotion

3.5.1. What kinds of firms does the OIZ aim to attract?

3.5.2. Are there any positive discriminations for certain types of firms (foreign, high-tech, large-scale, buyers or suppliers of products in the zone, etc.)?

3.6. Impact of the OIZ on firms

3.6.1. How do you think the effects of the OIZ have been on the innovativeness capacity of the firms until today?

3.6.2. How do you think the effects of the OIZ have been on the productivity increases of the firms until today?

3.6.3. How and in what way does the OIZ contribute to the firms in strengthening the productivity and innovation? Does it make any contribution? Or do you have any plans about this?

3.7. Environmental Impacts of the OIZ

3.7.1. What do you do to minimize the environmental impacts of the OIZ?

3.7.2. Do you have the quality of the air regularly measured?

3.7.3. Do you have a treatment plant? Where and how is the waste water discharged?

4. OIZ's Impacts on its City/Region and its Relations with that City/Region

4.1. The impacts of the OIZ on its city and regional area

4.1.1. How would you describe the region where you are located and which you are in a daily interaction with? (e.g. district borders, provincial borders, neighbouring province)

4.1.2. What contributions were considered to be offered to the region by the OIZ when being established?

4.1.3. Would you tell us about the changes that have occurred in the province/region after the establishment of the OIZ? (In terms of added value, employment, foreign trade and investment costs)

4.1.4. What kind of a relation do you see between the development/transformation process of the city and the development process of the OIZ?

4.2. Vision and collaboration in the zone

4.2.1. Which institutions and groups do you see as the most important stakeholders of the OIZ?

4.2.2. Is a common vision being developed with stakeholders? What is the vision of the zone?

4.2.3. What is the greatest obstacle that limits the potential for economic growth in the region?

4.2.4. How, on which platforms, how often, on what agenda do the public administrators, local managers, entrepreneurs, etc. meet? Do they meet?

4.2.5. What role does the OIZ play in these relationships? How would you position the OIZ?

4.3. Relations with local stakeholders

4.3.1. Do you think your collaboration with the Local Authority (Governorate and Municipality) and the Ministry is sufficient?

Which issues are you having trouble with and on which issues are you looking for support?

4.3.2. Could you please tell us about your collaboration status with the universities in your province?

4.3.3. What other institutions stand out in terms of industrial development in the zone?

4.3.4. How is the relationship between the OIZ and the big firms in the region (outside the OIZ)? How can it be strengthened?

5. OIZ's Current and Future Agenda

5.1. Today's priorities

5.1.1. Which articles would you like to see being added to or removed from the OIZ act?

5.1.2. What is the top priority issue for the Enterprise Committee in your opinion?

5.1.3. What is the top priority issue for the firms in the OIZ?

5.1.4. What is the top priority issue for the Board of Directors?

5.1.5. What is the top priority issue for the Regional Director?

5.2. Tomorrow's agenda

5.2.1. What are your future goals and projects?

5.2.2. If all the authority was given to you and you were asked to establish a new OIZ, what activities would you prioritize and what kind of a structure would you design?

5.2.3. What kind of an agenda should there be for a transition towards more productive sectors?

5.2.4. Do you think the OIZs can play a part in transition to Industry 4.0? What can be the role of OIZ BMs?

5.2.5. What kind of a relationship do you think there is between the OIZ and the region's life quality, qualified workforce, university infrastructure, industry capacity and technology production infrastructure?

5.3. Opinions about possible models

Given the OIZ firms' goal of improving productivity and innovativeness performances, can we learn your views on the following options?

ANNEX 2D: Ecosystem Stakeholder Interview Form

Developing a Model to Improve Technology Use in OIZs Project Interview Form for National/Regional Stakeholders

This interview form has been prepared for the managements of Stakeholder Institutions for OIZs within the scope of the Developing a Model to Improve Technology Use in OIZs Project undertaken by the collaboration of the Turkish Ministry of Industry and Technology (MoIT) and United Nations Development Programme (UNDP). Your responses from the interview will provide input for the process to identify how OIZs will contribute to Turkey's technology development ecosystem in the fields of entrepreneurship, innovativeness and technology, and assess how to institutionalize this contribution.

You are asked to devote approximately 60 minutes of your time for this interview. Approximately 300 people will participate in the research, including you. Participation in this project is voluntary, and the information you provide will be used in accordance with the purpose of the research. Your personal details will be kept confidential.

We thank you for offering your time to take this interview to contribute to such important work for the
Organised Industrial Zones and our country.
Name of Stakeholder Institution
Name-Surname of the Interviewee
Title
Telephone

Email
Interview Flow and Headings:
1. Evaluation of the Region's Industry
2. Evaluations Regarding the Relations Between the OIZ and its City/Region
3. Its Future Agenda, Problems and Solution Suggestions

1. Evaluation of the Region's Industry

1.1. The Region's Industry

1.1.1. What are your opinions about the region's industry?

1.1.2. How would you evaluate the industrialists of the region? (in terms of their origins, social-cultural capitals and future potentials)

1.1.3. What are the region's/city's strategic sectors, sectors with potential for clustering, and sectors where entrepreneurship needs to be supported and promoted?

1.1.4. How do you see the entrepreneurial capacity of the region/city?

1.1.5. Is the innovation ecosystem sufficient in this region/city? Do you think that this potential is sufficiently utilized?

1.1.6. How would you evaluate the policies and practices aimed at organising the industry? (Legislation?, Regulation?, Law? Others?)

1.1.7. What are the things that you want but cannot do in the region/city? (Legislation? Law? Regulation? Others?)

1.2. Regional Collaboration

1.2.1. How would you evaluate the relationship and collaboration between the stakeholders present within the OIZ ecosystem in this region/city?

1.2.2. What kind of an interaction/communication is there between the OIZs in this region and your institution? Do you think that this interaction is sufficient?

1.2.3. What kind of an interaction/communication is there between the OIZs in this region and the public institutions (provincial directorates, etc.)? Do you think that this interaction is sufficient?

1.2.4. How would you evaluate the collaboration among the firms in OIZs?

2. Evaluations Regarding Relations Between the OIZ and its City/Region

2.1. An overview of the region

2.1.1. How would you describe the region where you are located and with which you are in a daily interaction? (e.g. district borders, city borders, neighbouring cities)

2.1.2. Would you tell us about the changes that have occurred in the city/region as a result of the existence of the OIZ? (In terms of added value, employment, foreign trade and investment costs)

2.1.3. What kind of a relationship do you think there is between the OIZ and the region's life quality, qualified workforce, university infrastructure, industry capacity and technology production infrastructure?

2.2. Impact of the OIZ on the Region

2.2.1. How does the OIZ affect the region's productivity in your opinion?

2.2.2. How does the OIZ affect the region's innovativeness in your opinion?

2.2.3. How would you evaluate the effects of the activities aimed at increasing the region's R&D, innovation and technological capacity on the OIZ firms? (Number of universities, establishment of TTOs and İŞGEMs (business development centres), etc.)

2.2.4. If there were no OIZs in the region, how do you think would the region's industry be?

2.3. OIZ Services

2.3.1. What services should OIZs offer to increase technology and innovativeness?

2.3.2. Do the firms operating in OIZs have privileges compared to those which are not in OIZs?

3. Future Agenda, Problems and Solution Suggestions

3.1. Future agenda

3.1.1. Is there a need to establish a new OIZ in the region/city?

3.1.2. What should be done to increase the competitiveness of the OIZs available in the region/city?

3.1.3. If all the authority was given to you and you were asked to establish a new OIZ, what activities would you prioritize and what kind of a structure would you design?

3.1.4. What can be done to make OIZs more attractive?

3.2. Opinions about possible models

3.2.1. Can we learn your views about the following options regarding the future of OIZs?

ANNEX 3: Basic Data for the First 23 Shortlisted OIZs

OIZ Name	City	District	Foundation Year	Inputs			Technology, Innovativeness Indicators				Sizes (Employment, Number of Firms, Export)				Performance (Scale, Productivity, Innovativeness)			
				Electricity Consumption	Gas Consumption	Number of Patent Applications	Number of R&D Centres	Ongoing R&D Projects	TEYDEB	ISO TOP 500	Employment (2016)	Number of Firms (2016)	Export (Million USD, 2016)	Employees per Firm	Export per Employee	Patent per 1000 Employees	Entrepreneur - Number of Innovative Universities
Bursa OIZ	Bursa	Nilufer	1961	High	High	55	2	2	88	10	39850	242	5000	165	125	1.38	0
Manisa OIZ	Manisa	Merkez	1964	High	High	30	4		54	12	45700	222	4300	206	94	0.66	2
Eskişehir Chamber of Industry OIZ	Eskişehir	Odunpazarı	1969	Medium	High	44	1		48	5	36000	477	2300	75	64	1.22	1
Gaziantep OIZ	Gaziantep	Şehitkamil	1969	High	High	63	3		48	22	130000	950	6500	137	50	0.48	1
Adana Hacı Sabancı	Adana	Sarıçam	1973	High	Medium	15			14	9	35000	460	1000	88	29	0.43	0
Tekirdağ Çerkezköy OIZ	Tekirdağ	Çerkezköy	1976	High	High	15	1		27	11	65000	284	7000	229	108	0.23	0
İzmir Atatürk OIZ	İzmir	Çiğli	1976	Medium	Low	39	3		85	14	37000	572	2500	65	68	1.05	2
Konya OIZ	Konya	Selçuklu	1976	Medium	Low	68			68	7	30000	473	1400	63	47	2.27	1
Kayseri OIZ	Kayseri	Melikgazi	1976	Low	High	74	2	1	33	13	65000	1156	1400	56	22	1.14	0
Ankara Chamber of Industry Sincan OIZ-1	Ankara	Sincan	1977	Medium	Low	40	1	1	57	6	35000	270	2000	130	57	1.14	6
İstanbul Deri OIZ	İstanbul	Tuzla	1982	Medium	Low	20	2		38	4	40000	1000	4300	40	108	0.50	3
Gebze OIZ	Kocaeli	Gebze	1986	Medium	Low	49	2		59	9	22500	224	6500	100	289	2.18	3
Bursa Demirtaş OIZ	Bursa	Osmangazi	1990	High	High	29	2	1	31	5	41000	428	4000	96	93	0.71	0
Gebze TAYSAD OIZ	Kocaeli	Çayırova	1992	Low	Low	14	1		29	10	16500	95	1500	174	91	0.85	3
İstanbul Dudullu OIZ	İstanbul	Ümraniye	1995	Low	Low	28			48	14	55000	2400	2000	21	43	0.56	2
Ankara Ostim	Ankara	Yenimahalle	1997	Low	Low	13		1	42	1	65000	5208	0	12	0	0.22	6
İstanbul Tuzla OIZ	İstanbul	Tuzla	2000	Low	Low	8			17	1	9000	96	1000	62	200	1.60	3
İstanbul-Tuzla Chemical Industrialists OIZ	İstanbul	Tuzla	2001	Low	Low	6			26		9000	159	500	31	100	1.20	3
Bursa Nilufer OIZ	Bursa	Nilufer	2001	Low	Low	23	1		43		26000	317	650	82	23	0.88	0
İstanbul Beylik OIZ	İstanbul	Büyükçekmece	2001	Medium	Low	111			111	10	220000	35000	5000	7	23	0.50	5
Ankara-Sincik OIZ	Ankara	Yenimahalle	2001	Low	Low	76			66		107000	7000	450	15	4	0.71	6
Kocaeli Gebze Dilovası OIZ	Kocaeli	Dilovası	2002	Low	Medium	6	1		18	6	15000	213	1000	70	100	0.40	3
İzmir Kemalpaşa OIZ	İzmir	Kemalpaşa	2001	Low	High	9	3		32	4	26000	398	2900	65	112	0.35	2

ANNEX 4: International Models

Germany Fraunhofer Institute

The Fraunhofer Institute is an applied research institution founded in 1949. There are 67 different institutes in and outside of Germany within the body of the institution. The structure of the institution which has an independent (autonomous) governance is regulated by law and its ownership is shared between the federal and local governments (Fraunhofer, 2015).

Administrative Structure

The general assembly of the institute is composed of board members, honorary members, senate members, and the representatives of public institutions who pay membership fees. The General Assembly convenes once a year and gives top level strategic decisions on issues such as senate memberships, approval of the annual activity report, assignment and replacement of the executive board.

The institute senate is made up of 18 members elected from among the leading representatives of the science and business circles, as well as the government. The federal and state governments appoint 7 out of 18 members, and 3 members are designated by the science and technical committee which operates as the advisory board. The senate determines the institution's president, executive board, and research and development policies. This senate decides on the establishment, system inclusion or closing of the research organisations that will be newly included in the body of the institute.

The executive board determines Fraunhofer's general policies, organises financial affairs and carries out the planning, operations and external relations of the institution. The board deals with sourcing funds from outside and distributing to the institutes operating within the institution. The directors of 67 different institutes operating within the institution are appointed by this executive board. The board consists of 4 full-time members, one of whom is chief executive. Two of the members come from the science and technology community, one from the private sector and the other from the government.

The science and technical committee has the nature of an advisory board, and its members are the research and administrative personnel within the institution. The main function of the board is to support and advise the institutes within the organisation on the issues related to R&D, commercialization and general management.

Institutes, on the other hand, are primarily responsible for conducting research works. Generally, these institutes do not have separate legal personalities, they carry out their daily activities independently under the supervision of the executive board. They can conduct small-scale and short-term research projects without resorting to the approval of the executive board. However, long-term and high-level research projects are subject to the approval of the executive board. Institute directors focus on the day-to-day functioning of the institution, research and businessoriented activities, the organisation of research projects, and the procurement of external funds.

The centralization of administrative functions under Fraunhofer allows the local centres to focus on research, which is their primary task, and in practice this also contributes to the establishment of standards.

The institutes operating within the institution may form groups and associations among themselves on a project basis. Today there are seven different active groups; information and communication technologies, life sciences, micro-electronics, light and surfaces, production, materials, defense and security (Fraunhofer, 2015).

Financing

Fraunhofer switched from a model entirely funded by the state to a mixed model as per the Federal Government's decision in 1973. In the mixed model, funds coming from the state are supported by the income generated by the institute from its own activities. These income sources include items such as research grants from public institutions and

funding in return for a contract from the private sector. As of today, 70% of the general budget of Fraunhofer and 90% of the research budget of 2.1 billion euros result from the self-generated income of the institution. A large part of the remaining 30% of the general budget is funded by the federal government. These "unconditional" sources from the government are generally used for independent research for future technologies, while funds from the private sector focus on projects with commercialization purposes (Fraunhofer, 2015).

Fraunhofer institutes ensure the development of innovative clustering in their regions, making a significant contribution to the local competitiveness. The institutes operate on the subjects peculiar to the characteristics of the city/region that they are established in. For example, the Fraunhofer Institute in the city Jena, which has a strong optical industry and is home to Zeiss, one of the world's leading lens makers, focuses on the research studies in the field of optics (Mauroner, 2015). The Fraunhofer Institutes ensure that the academic institutions and firms located in their regions use their R&D capacities more efficiently and strengthen the clustering networks by bringing them together. In this respect Fraunhofer contributes to the cluster development goal, which is part of the German Federal Government's high-tech strategy (World Economic Forum, 2018).

The transitivity between the private sector and Fraunhofer is also remarkable. It is observed that many experts who worked at Fraunhofer switched to managerial positions in the leading firms of the manufacturing industry in the later stages of their careers. These firms include the world's leading manufacturers such as Audi and Porsche. It is also known that there are many start-ups founded by those who worked at Fraunhofer. Fraunhofer employees are encouraged to commercialize their research studies conducted within the institution and to leave the institution to establish their own companies.

There are also some constraints of the Fraunhofer model (The National Academies Press, 2013). The most important of these is that the Fraunhofer Institutes have conventionally focused on meeting the R&D needs of existing industries. The financial and administrative structure of the institutes is not suitable for the risky and costly R&D projects that will lead to the emergence of new business models that can provide great productivity gains. The short-term and low-risk projects-based structure of the institutes is not in the nature of being able to meet the needs of the sectors, such as the biotechnology sector, which have R&D projects that may be risky but result in great yields. Finally, in order to see positive network impacts of the research institutions such as Fraunhofer in their regions, it is necessary to have in these regions an advanced industry and research clustering in the relevant sectors (Beise and Stahl, t.y.).

United Kingdom Catapult Programme

The Catapult Programme is the nation-wide network of technology centres which was launched in 2010 by Innovate UK, the state innovation organisation, and designed to change the country's abilities to innovate in certain areas, increase productivity and drive economic growth. The fact that United Kingdom cannot make full commercial use of science, technology and research bases across the world in different fields and the deficiencies in commercialization despite the successes achieved in inventions and production have played an important role in the creation of the Catapult Programme. Also, Dr. Hermann Hauser's review report which points out that the critical gap between universities (academy) and the industry must be closed for business oriented capacity and competence that does not link research and technology commercialization is one of the sources that the Catapult Programme is inspired from (Hauser, 2010).

Catapult's vision is to close the gap between the United Kingdom's innovative enterprises that wish to grow and the expertise of world class research communities. It has established over 3,000 academic and industrial collaborations so far and has become an important partner to progress the industrial strategy along with Innovate UK. It supports new products, processes, new business opportunities, skills and investments

by researching innovative technologies. In addition, by working in cooperation with regulatory authorities, it supports the adaptation of innovations with regards to new business models, the recognition of innovativeness by the consumer, and new market mechanism services. It cooperates without discriminating between start-ups, small- and large-scale companies, academia and public sector and enables the startups to leave their organisation and grow thanks to the support it gives to them (Catapult, 2016).

Catapult has been a structure that provides solutions to problems with technical support and consultancy and plays an effective role in the development of innovation. Its expert employees work in partnership with academia and companies and play an active role in the process. Through its facilities which are open to public and are not large capital investments, it facilitates the processes such as testing, prototype and development and scales the new generation products and processes.

Catapult centres provide the actors in the market with areas where they can work, meet, display their products and collaborate. In addition, the secure sharing of personal data and the sharing of closed and licensed data make technological development more accessible.

Catapult aims to accelerate the possibility of companies surviving in the commercial life and to improve innovativeness by researching new concepts. It contributes to companies in reaching global markets through its grants, investment financing, information on markets, investment promotions and financing solutions. In addition, it extends the supplier network for different sectors and gives recommendations on market access, business plans and market opportunities.

There are 18 Catapult centres operating in 10 different areas in the United Kingdom. Each Catapult Centre is specialized in a different field of technology and is in the status of "company limited by guarantee" (CLG), a separate legal entity from Innovate UK. Executive teams, designated for each Catapult Centre, which are responsible for the day-to-day management of their centres are controlled by their own board of directors.

The centres are specialized in cell and gene therapy, compound semiconductors applications, digital systems, energy systems, cities of the future, high value manufacturing, medication invention, underground renewable energy, satellite systems and applications, as well as transportation systems.

The centres obtain their funds both from competitively earned commercial financing and from Innovate UK direct investment. The financing model is diversified according to life-long technology and innovativeness centres and follows the three-in-one model (based on financing equally from three sources). Financing according to this model is based on R&D contracts (obtained competitively) financed by the enterprise; R&D projects (obtained competitively) financed jointly by the public and private sectors and implemented in cooperation; and main public funding for long-term investments for developing infrastructure, expertise and skills. Catapult units work within a decentralized structure, and the services and activities offered by these units are assessed according to their economic and social impacts (technological developments, high economic growth and social benefit).

The Catapult network proves to be an important programme, considering the position it reached as of today. In the United Kingdom it operates facilities worth £850 million (GBP), providing open access to the most advanced equipment and resources for researchers and businesses of all levels. In its first 4 years, it delivered more than 2,400 projects. It continues its active projects and support in 24 countries. 636 academic collaboration projects, 2,851 SME support projects and 2,473 industry collaboration projects were supported. 900 apprentices were trained in these projects in 2016 (Catapult, 2016).

Taiwan's Industrial Technology Research Institute (ITRI)

Taiwan's Industrial Technology Research Institute (ITRI) is an R&D interface organisation that is partly managed and financed by the Department of Industrial Technology of the Ministry of Economy. Founded in 1973, the organisation aims to transfer advanced technologies to the local industry in order to contribute to economic growth with the goal

of "industrial technology R&D" and help industries remain competitive and sustainable. Since its foundation, ITRI has played important roles in transforming Taiwan's labour-intensive industry into an innovation-based industry. To this end, it has made significant contributions to the development of the country by carrying out the R&D activities of the industry and it still carries out various projects with both the labour market and the SMEs (ITRI Overview, 2018).

The organisation which does not have direct financial support (credits, grants, etc.) undertakes roles such as testing, engaging in pilot schemes and prototyping when it comes to producing new products, services and technologies and aims to ensure the validity of technologies. In addition to conducting technology R&D activities with direct implementations, ITRI also provides start-up firms in the field of high technology with "incubation" services. ITRI has focused its works on smart life, quality health and sustainable environment.

ITRI receives half of its budget from Taiwan's Ministry of Economy and the other half from the enterprises it serves. Its involvement in public financing leads it to be subjected to external supervision according to its annual goals and objectives. In addition, the Ministry of Economy officials take part in the regulatory board of the institution and help in shaping the research agenda. Thus, more than 60% of the given budget can be allocated to jointly designated projects and programmes. On the other hand, the fact that the budget it obtains from the private sector is independent allows it to carry out its own projects and determine the risk threshold itself. The fact that it depends on annual performance in public financing and that it obtains income independent from the private sector take this model to an exemplary position.

ITRI is composed of interconnected centres. Of the total 6001 employees, 1393 are PhD graduates, 3422 have master's degree and 1186 have bachelor's degree. The employee profile is mostly engineer-based. There are two big campuses in addition to the central campus, and most of the employees are in the central campus.

This campus houses "Core Labs" and research centres that develop new technologies, ITRI Academy, in-house think tank and technology transfer office. Apart from the large campuses, it establishes small offices at strategic locations (Silicon Valley, Berlin, Eindhoven, Moscow and Tokyo), strengthening bilateral relations between Taiwan start-ups, researchers and international stakeholders (ITRI Overview, 2018).

ITRI's focus on commercialization activities in recent years has ensured that outputs and findings are measurable. The organisation has more than 23,100 patents and contributed to the establishment of 260 new companies. In 2014, the annual budget amounted to 625 million USD, 14 new start-ups were developed in the fields of healthcare, system services and advanced materials and production, 626 technology transfers were made to various companies and more than 15,000 consultancy services were offered. It obtained 1,573 patents (1,544 new patents, 28 utility model patents) in 2016 alone. The total revenue for 2016 increased compared to the previous year with 21,364 million New Taiwan dollars. A large part of this revenue came from technology projects with 10,405 million New Taiwan dollars and industrial service contracts with 9,515 million New Taiwan dollars. The total expense for 2016 amounted to 21,358 million New Taiwan dollars, with 10,389 million spent on technology projects and 8,860 million on industrial service contracts (ITRI Overview, 2018).

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Assoc. Prof. Dr. Mehmet Cansız

Mehmet Cansız, who assumed responsibilities such as a Specialist, Undersecretary and Advisor to the Minister at State Planning Organisation, State Supervisory Council of the Presidency, Ministry of Development and Ministry of Industry and Technology since 2001, has become a specialist on policies, implementation programmes and projects for R&D, innovativeness, entrepreneurship, SMEs, and industrial policies. Cansız's academic studies and associate professorship expertise also concentrate on these areas. Cansız, who has numerous published books and articles, has been carrying out works with international institutions such as World Bank, OECD and the UN and still works as a Strategy and Budget Specialist at the Presidential Strategy and Budget Directorate. The author also lectures in entrepreneurship and technology management at Hacettepe University and Social Sciences University of Ankara.

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NOTES

THE TRANSFORMATION OF ORGANISED INDUSTRIAL ZONES

A significant capacity improvement has been achieved in the last 17 years when it comes to OIZs which provide site allocation and infrastructure facilities for entrepreneurs. This research has been designed to seek answers to the question "In addition to the infrastructure facilities they have been offering, how can OIZs contribute to the firms operating within them to become more innovative and digitalized?" Following the preliminary works and the field research, it has been shown through data that OIZs can contribute more to the competitiveness of firms. This publication presents model suggestions that will trigger the transformation of OIZs into a new structure which will assume an interface mission to increase the innovativeness, productivity and digital capacities of the firms operating in their regions.

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