

What Does Model Factory Produce? Just A Productivity Ufuk KAYA

ABSTRACT

The productivity level of industry in Turkey is lower than the EU averages and countries with similar economic size. The "10th" project, which was launched by the Ministry of Industry and Technology in 2015 and focuses on increasing efficiency in production. Another striking result of the approximately 3-year feasibility study conducted within the framework of the "Development Program" is that the productivity difference between main industries (OEMs) and sub-industries is approximately 6.5 times. This being the case, in order to be the supplier of a main industrial enterprise, you must not only deliver at the desired time, in the desired quality and in the desired quantity, but also meet the price targets given to you by your customer. So, how is it possible to achieve this in a world order where input costs (energy, logistics, freight, raw materials, labor, taxes, license fees, etc.) are increasing day by day under destructive competitive conditions?

Ankara Chamber of Industry (ASO) Model Factory, Turkey's first Competence and Digital Transformation Center, is the product of a very valuable 3-year feasibility study. It was decided to establish a new application organization Model Factory for a new application organization that will increase the efficiency of industrial enterprises, especially SMEs, with their competencies, and a feasibility study*** (see the ANNEX about Feasibility Approach end of this article) was made with various funds (Public, EU, German Investment). Bank, Chambers of Industry and Commerce) d Ankara (ASO) Model Factory, Turkey's first Competence and Digital Transformation Center, is the product of this very valuable 3-year feasibility study. In this context, with the cooperation protocol signed with the Ministry of Industry and Technology, Ankara Chamber of Industry, Ankara Chamber of Industry 1st OIZ and UNDP in 2017, the project is located within the ASOSEM (Ankara Chamber of Industry Continuing Education Center) campus in Sincan 1st OIZ. It came to life in its building, which was reconstructed by a unique architect with the contributions of our 1st OIZ.

We know that only 3 out of every 10 industrial enterprises in Turkey conduct efficiency analysis and are concerned about increasing efficiency.

The classic method preferred by companies that are concerned about efficiency is to get consultancy. Whereas;

Costs of consulting services are high

It requires long-term studies,

Difficult to scale in SME concept

Since the work is usually done by consultants, the gains achieved are often not sustainable o The productivity level of industry in Turkey is lower than the EU averages and countries with similar economic size. In addition, the productivity difference between SMEs and Large Companies in Turkey is up to 6 times. In this case, it is inevitable to establish a linear relationship between the main manufacturer's target price performance criteria and the suppliers' ability to reduce their own production costs.

- Recently, exporting companies have been competing in price at a certain level of quality abroad. Productivity increase means new markets and protecting existing markets. In addition, being able to respond quickly to the \ variable demand structure without stocking and therefore shortening delivery times are also important factors that increase competitiveness.
- In this context, actors within our industrial and technological structure; On the one hand, it tries to keep up with the waste-free Lean Production-based digital transformation, and on the other hand, it strives to reach the marginal benefit in the efficiency economy.

- Some companies need to keep up with digitalization, some companies need to improve their capacity to implement efficiency and effectiveness with lean production and other techniques, and some companies need both and not internalized.

The most common way to meet these needs is consultancy. If you have money and time...

- It has been decided to establish a new implementation organization Model Factory for a new project that will meet these needs and increase the competencies and productivity of industrial enterprises, especially SMEs, and a feasibility study (see the Feasibility Approach mentioned at the end of this article) has been made with various funds (Public Public , EU, German Investment Bank, Chambers of Industry and Commerce) were supported.

The "10th" project, which was launched by the Ministry of Industry and Technology in 2015 and focuses on increasing efficiency in production. Another striking result of the approximately 3-year feasibility study conducted within the framework of the "Development Program" is that the productivity difference between main industries (OEMs) and sub-industries is approximately 6.5 times. That being the case, in order to become the supplier of a main industrial enterprise, you need to meet the performance and price targets given to you by your customer. In other words, you need to be ready to sell a piece that you sell for 1 lira today for 90 cents a year later.

So, how is it possible to achieve this in a world order where input costs (energy, logistics, freight, raw materials, labor, taxes, license fees, etc.) are increasing day by day under destructive competitive conditions?

Before the existence of the king customer, which has been in power for about 40 years, it was possible for an entrepreneur or business to calculate the costs and determine the price of the service or product he offered with his own profit margin. Now, every step you take has a response in the global world. So, you cannot decide the price and therefore neither can your profit. At this point, the importance of your operating costs, especially production, becomes evident. The only way to reduce your costs is to eliminate all waste in your business that does not add value to your product and that your customers do not want to pay for.

Ankara (ASO) Model Factory, Turkey's first Competence and Digital Transformation Center, is the product of a very valuable 3-year feasibility study. The main method used by companies with efficiency concerns is to receive consultancy for process improvements. Although the consultancy model is a very good solution for companies with time, financial strength, patience and vision, it is not scalable. However, it is critical for efficient production techniques to become widespread, especially for SMEs. At this point, the Model Factory concept emerges, which will enable them to increase their own competencies and make them sustainable in a shorter time, at much lower costs. It is decided to establish an example of the Model Factory in Ankara, located on the Darmstadt Technical University campus, which is a good example of Model Factories that have been serving successfully in different geographies of the world for about 20 years. In this context, with the cooperation protocol signed with the Ministry of Industry and Technology, Ankara Chamber of Industry, Ankara Chamber of Industry 1st OIZ and UNDP in 2017, the project is located within the ASOSEM (Ankara Chamber of Industry Continuing Education Center) campus in Sincan 1st OIZ. With the contributions of our 1st OIZ, it came to life in its rebuilt building with a unique architect.

So what is Model Factory? If you say, it can be explained in the shortest way as follows;

Model Factories are transformation centers that enable participants to learn the theoretical knowledge and methods they have learned by experiencing them in a real production line designed according to experiential learning principles and in a free environment where there is freedom to make mistakes, and to gain this competence with high recall rates.

Ankara Model Factory uses real machines, work stations, transportation and storage units, KPI Panels, real operators, etc. in the processes from real raw materials to delivery. It does not use the pneumatic cylinder sample product and its 8 different variants or similar ones produced by it for any commercial purposes. Because it has no customers. Thanks to the Model Factory offering this real production line to the participants as a learning area, the competence and recall rates

of the engineer managers and technical staff responsible for the production and production support processes participating in the program increase to 75%. Thus, these trained groups can have the ability to apply the Lean System Approach methods they learned and experienced in the Model Factory on their own in the businesses they work in, to disseminate these practices and to maintain the gains they have gained. This situation summarizes the starting point of Model Factories very well. In other words, "Raising companies' own Lean Leaders". In this context, it would not be wrong to say that ASO Model Factory provides coaching, not consultancy.

ASO Model Factory, which gained its legal entity as an Economic Enterprise affiliated with ASO in 2019, continues its experiential trainings to provide this competence to our industrial enterprises and the Learn and Return Programs that support these trainings with field coaching, continue without slowing down. The word "Coaching" here is one of the important details that distinguishes Model Factories from classical consultancy methods. The slogan "We don't give fish as gifts, we teach them how to fish" describes these centers, which focus on training our own "Lean Leaders" of our businesses, very well. This system approach, which we call Lean Production or also known as Toyota Production System, has been internalized in our companies and these transformation programs (Learn Return Programs), each lasting 4 months, have been implemented in different sectors, different scales and sectors, ensuring that the transformation continues sustainably with their own wishes, will and abilities. The striking results obtained in 87 industrial enterprises and one service institution participating from different maturity levels prove that lean production methods, which teach how to do more with less, are possible by simply changing the perspective on production, without making any new investments or technology transfer.

Some of Learn an Transform Programs results;

SME's profile:

Company Name: Megasan Medikal A?

Location: Eldivan / ÇANKIRI (Türkiye) o Founded 1998, 85 Employee, sector Medical Gas Systems, exports to more than 80 countries

Before the program in pilot area

- Variety in demands
- Supplier requests for large batches and long lead times
- Habit of working on a stock basis
- Insufficiency in production planning and purchasing.
- Unbalanced workload on the montage line
- Wastage due to wait and transport

After the program

- A flexible U-type montage was set up to address 5 different levels of requests by implementing balancing studies.
- Productivity increased from 6.28 man.minutes/unit to 2.90 man.minutes/unit with operational improvements and line balancing studies.
- Competency matrix application was made.
- Work instructions were prepared for 5 different levels of requests.

New KPI 's

Space Gain 243 m2, Productivity + 54 %, Overtime -100 %, Re-process -79%, Model Transition Time -77%, Direct workmanship -50%, Recovery time on investment (Here with investment that's mean only Program and Trainings costs) 2,5 Months

SME's profile:

Company Name: Ertunç Özcan A?

- Location ASO 2-3. OIZ (Türkiye) o Founded 1968 - ANKARA o More than 100 employees o Medical Device Manufacturing o Exports more than 34 countries

Before the program in pilot area

- Used to making mass production.
- High levels of stocks
- There were delivery delays
- The model transition time was high
- Wastage in production was high.
- There were a lot of space usage and long walking distance.
- Performance was not being traced.

After the program

- A flexible U-type montage line was established, and a one-piece flow was initiated.
- Production transition time was shortened, and just-in-time delivery was reached.
- Stocks of semi-finished products were minimized.
- Internal logistic system was established, spiderman application was introduced operator walking distance was reduced by %94.
- Only in workers area, some 590 m2 was gained.

New KPI 's

Productivity Increase 68 %, Space Saved 74 %, Reduction in Model Transfer Time 67 % Recovery time on investment 4 Months

SME's profile:

Company Name: Merih Asansör A?

Location Ba?kent OIZ o 1977, Ankara o 250 Employee o Produces automatic doors, cabins, and complete elevator systems o Exports to 5 different continents and 65 countries

Before the program in pilot area

- There were capacity bottlenecks in the twisting processes.
- Production efficiency was low.
- Machine setup times were high.

After the program

- Capacity bottlenecks were overcome.
- OEE rates increased by 41%.
- Downtime was reduced by 41%.
- As a result of SMED studies, machine set-up times were reduced by more than %60.

New KPI 's

Increase in Daily Production per unit (panel) 47 % Increase in OEE 41 % Reduction in Stands 41 % Recovery time on investment 6 Months

Company profile: (Big Scale)

Company Name: Mita? Endüstri A?

Location Ankara Chamber of Industry 2nd and 3rd OIZ. o Founded 1955 o (Ankara, ?zmir, ?zmit, Iraq) o 1000-5000 employees o Design and production of power transmission line and steel poles o Exports to 5 continents and more than 135 countries.

Before the program in pilot area

- Mass production
- Crane - Forklift Stands
- Job waits

- Machine set-up time was high

After the program

- A FIFO line was constructed to set up 1 marking, 2 grinding, and 1 bending station where products up to 6mm are processed.
- 70% improvement was achieved in the production flow time. Distance was reduced by 40%. Productivity was increased by 76%.

New KPI's

Production Increase 76 % Distance -40% Reduction in unit flow time, 70% Recovery time on investment 8 Months

SME's profile:

Company Name: ??bir Yatak

- Location , Akyurt / Ankara Founded 1999 o Bed, base headboard and medical products Exports to 25 countries

Before the program in pilot area

- There were a lot of handling.
- Wastage was high due to rework.
- Used to working with high levels of buffer stocks.
- There were interruptions in collecting data as to machine downtime and quality.
- There were space congestion.
- Production based on accumulate and wait.

After the program

- One-piece flow or FIFO system was applied in appropriate stations.
- Kaizen studies helped reduce wait/downtimes at stations.
- The right production rate was increased in the first time.
- A new layout was introduced. Material handling was reduced.
- Missing SOPs were completed.

New KPI's

Increase in Daily Production in Average %21, Increase in the correct production rate in the first-time %12, Reduction in material handling distance %36, Recovery time on investment 3 Months

SME's profile:

Company Name: Teknomak A?

Location BA?KENT OIZ o Founded 1997, Ankara o 272 Employee o 39000 m2 in total o Asphalt Plant Manufacturing

- Exports to 3 countries

Before the program in pilot area

- Carried out lot production. No flow, low productivity in production.
- Delays in delivery.
- Stocks of semi-finished products were significantly high.
- Production areas were undefined and confusing.
- There were too much walking and time was wasted in searching for materials.

After the program

- Switched to one-piece flow. Efficiency increased and continuous flow was achieved.
- Just in time delivery was achieved by shortening the production transition time.
- Stocks of semi-finished products were minimized by 60%per cent.
- Area management was provided by defining areas for each work and material.

- Walking distances were shortened by %32

New KPI's

Efficiency Increase 31%, Production Flow Time -60%, Space saved 27% (500m2), Recovery time on investment 2 Months.

The field gains in the pilot field, examples of which are given above, pave the way for sustainability and competitiveness.

In addition to the services he provides to ASO (Ankara Chamber of Industry) Model Factory Industrial Enterprises, he also uses his competence in the Training of Trainers and Technical Installation stages, which he acquired and experienced for high prices along with his own installation, Konya Chamber of Commerce (KTO) Model Factory, Adana Chamber of Industry (ADASO) Model Factory and Qatar Model. It has proven itself with the consultancy services it provides to factories, and has managed to become an exemplary role model for other transformation and innovation centers, aware of the responsibility and heavy burden of being the first. In this context, he continues to mentor the installation of the Eskişehir Chamber of Industry Model Factory with the authorization and assignment of the Ministry of Industry and Technology. During this period, when the Basic Training and Instructor Training work packages have been completed, company diagnostic visits continue for the pilot Learn Return Program. This pilot program, in which 4 companies can take part, aims to achieve ambitious results, examples of which are given above. In this way, motivation and trust environments will be provided for the local stakeholders and focus groups of each Model Factory consulted. In the same context, ASO Model Factory will also act as the installation mentor of Kocaeli Model Factory in 2024.

In addition to all these, ASO Model Factory repeats at every opportunity that increasing productivity in the industry is only possible with a Digital Transformation based on Lean Production foundations. Being aware that it is necessary to benefit from all the blessings of technology, that is, Industry 4.0, in order to keep up with the competitive rules of the developing and rapidly changing world, ASO Model Factory has been continuing Lean Transformation-based Digital Transformation Trainings with its competent and experienced expert staff for the last 1 year. In these trainings, each lasting 2 days, participants have the opportunity to experience, design and develop more than 15 Industry 4.0 scenario applications on a real production line, with practical group work as well as theoretical knowledge. Model Factory Trainers, who are aware that a transformation for the future and for the better, regardless of its scope, can only be achieved at the right time and with the right road map, have received the necessary certificates to measure the Lean and Digital Transformation Maturity levels of industrial enterprises in Turkey, especially SMEs. In a sense, it has landed on the field. Creating road maps for companies that are realistic and free from commercial concerns through level measurements rapidly increases the reliability and recognition of the ASO Model Factory. As a reflection of all these positive developments, the apparent acceleration in the demand for increasing productivity shows without comment how important and the right decision it is to establish Model Factories in Turkey.

ANNEX

*** *Feasibility Approach*

Where Should the Model Factory Be Established?

The following filter approach was used in determining Ankara, which hosted the first Model Factory in Turkey.

A three-stage filtering approach has been developed

In the first filter, 76 provinces were eliminated using regional and provincial industrial statistics.

5 provinces entered the second filter and 3 were eliminated.

2 provinces were included in the final filter and as a result of the evaluations, 1 province was recommended.

Filter 1: Strong industry

Number of manufacturing industry enterprises

Manufacturing industry employment

Manufacturing industry turnover

Filter 2: Hinterland

Structure of the industry

Academy

academic performance

Entrepreneurship and innovation performance

Filter 3: Other strategic elements

Policy framework

Scaling etc.

While analyzing the industrial base of the provinces and their hinterlands, the possible contributions of their universities and other stakeholders for the establishment and operation of the model factory as a repeatable and scalable policy tool were also taken into account and it was decided to establish the first Model Factory in Ankara.

Which Sectors Should Model Factory Target?

Manufacturing industry: Discrete manufacturing, Continuous manufacturing

Services sector

universities

What Type of Services Should the Model Factory Provide?

Service areas

Simple

Quality

Resource efficiency (energy)

Digital

Ways of providing service

Experiential learning

Learn-return programs

Awareness raising

Awareness raising seminars

A large majority of businesses (75%-80%) need awareness-raising seminars.

- Only ~30% of manufacturing industry SMEs in Turkey and ~25% in Ankara measure productivity
- There is a clear need to strengthen awareness and strengthen awareness of the importance of productivity
- Model factory should organize awareness-raising seminars
Experiential trainings Secondary analyzes confirmed that the need for experiential training is very high
- Experiential training forms the basis of model factory intervention logic.
- Interviews conducted within the scope of secondary analyzes (focus group meetings and semi-structured interviews) confirm that experiential training is also necessary for SMEs in Turkey Field-classroom applications (Learn and Transform programs)

It was expressed as the most effective method in focus group meetings and the need was stated to be high - very high.

- The fact that the number of companies performing productivity measurements is quite low indicates that it is difficult for businesses to effectively implement productivity-enhancing projects only by receiving experiential training.
- The low number of engineers working in manufacturing industry enterprises indicates that there will be a need for

learn-return programs in field-classroom format.

Project implementation

It was stated by the university representatives who participated in the interviews and focus groups with the university administrations that there would also be a need for project implementation type services.

- The investigations indicate that the Model Factory will facilitate the implementation of industry-university cooperation projects, especially on efficiency, digital transformation and product development.