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## White Goods industry

### Market structure, Performance, Key players

This report is based on the diagnostic reports of 10 companies which are from white goods industry (suppliers) and industrial kitchen manufacturers. This industry is composed from different company characteristics:

- Designer & manufacturer: multi sector or multi customer suppliers
- Designer and no-brand end-product producers
- Minor design and development but main action is manufacturing: mostly have 1 or 2 dominant OEM
- Industrial kitchen appliances manufacturers

According to place where company dominates, the competitiveness and drives for innovation differs.

Most of the companies are based in Eskişehir region for a long time and has reliable relationships both the OEMs and among the suppliers. Almost all the competitors know each other, and they are supporting each other in terms of industry trends, technical problems.

As a main OEM, Arçelik has created a reliable supply chain. Haier will be a second big player in the region after they finished their investment and as soon as start to manufacture. This new player will help to suppliers to diversify on different products as well. (Arçelik has refrigerator plant and Haier will manufacture dishwasher, washing machine in their plant).

Suppliers to main OEM's are mainly dealing with polymer-based parts, and their derivatives. Most of them are using their full capacity in parallel to increasing number of productions at OEM. These suppliers mostly have their own mold shop as well. These companies are operating highly efficient. Their success in reliability, quality, and other performance index make guarantee for their future business. In addition, if they initiate their development activities and demonstrate their expertise, OEM usually select them as strategic partner and support them in their development activities.

For small lot size production and customized products producers, the main competitive advantage is to be agile and flexible. They need to respond many different expectations of customers. They have to shorten their development time. It might be said that these companies are under cost competition as well. Their export rate is high.

Industrial kitchen appliance producers have big potential for export and value-added products. Their NACE code is same with white goods industry. However, the competition in this market and potential for export are different then the appliance supplier industry players. These manufacturers can transfer knowledge accumulation in white goods industry to industrial kitchens. It makes this industry more competitive in international arena. They have potential for new and innovative products.

### Technical support and technological development tools required by SMEs

According to interviews, it is defined that following technical equipment use are potential for SMEs in this industry:

- 3D printing – metal or polymer- prototyping
- Laser scanner
- Laser cutting



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Wire erosion  
Laser welding (for molds)  
Tube bending (there is no in Eskişehir region)

In addition, there also test capability needs from white goods industries suppliers. Some of the critical ones are;

Transport and carriage tests: especially critical for end-product manufacturers (like industrial kitchen providers, industrial ice machine producer)  
Material characterization laboratory and related tests: most of the SMEs are getting help from OEM. They are currently using OEM's laboratory equipment.  
CE marking and certification tests are the areas that many SMEs get external support. They usually send the products to different cities.  
Hygiene tests for different materials could be another potential area. Because they tend to enter medical sector or food industry as well.

Even engineering analysis tools are not widely used in most of the SMEs, following subjects are potential for SMEs in their higher quality design activities:

Only one company stated that CFD analysis services would be useful. There are no central services in Eskişehir in this area. University academicians might help companies for this analysis.  
For plastic molding and production, material flow in mold analysis is critical. There are several software tools which are Moldex, Moldflow. Especially if the product is complex, these analyses help mold manufacturer to design in a better way which means less scrap and high cycle time.

In addition, following topics are identified as services that might helpful to SMEs in terms of increasing their innovation capacity:

Awareness program and technical services for intellectual property rights management and processes  
Technology radar bulletin and newsletter about new and emerging technologies (SMEs have limited time for technology monitoring)  
An introductory program about Industry 4.0, related technologies and effects on production  
Collaborative research and innovation project management  
Training programs on;  

- Material and processing (plastic, rubber, metal, etc.)
- Alternative manufacturing technologies
- Engineering design and analysis tools
- 6 sigma, DFMEA

## Placing industrial SMEs in Eskişehir's innovation eco-system

In white goods industry, SME's have two major characteristics: They either supported by OEM and as a part of their existence and growth, SMEs invest more on their machinery and more on developments. Through the improvement in their operations and maturity increased, these SMEs start to improve their R&D initiatives. They increase their value chain and looking for alternative customers from different industries. Since automotive and medical industries are more demanding and expecting more knowledge on their product design, only the advanced SMEs are able to be in these industries.



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The other group is producing their own products (cooker – stove – industrial kitchen – industrial ice machine). These companies need to invest more on product development and must get their certifications as well. Most of these companies depend on reverse engineering activities. So, their intellectual property activities are limited. Their patent activities are very limited, almost none of them has any application (national or international). This means that, the originality of new product is low and can easily be copied by a competitor. Their main advantage is to produce in small number of units and in different sizes. They are very customer oriented. Industry and customer drive the SMEs for different products. These companies know how is usually on one type of technological area (such as metal forming or plastic injection) and they can produce different types of products.

They mostly have limited R&D capabilities and systematic approach. Very limited number of SME has dedicated engineering departments. In most of the cases, their engineers are responsible from design, test, and prototyping as well. Engineering analysis, scientific approaches, Design FMEA and similar tools are not employed much. Mostly process FMEA is being used. This is an indicator that SMEs are focusing mostly on manufacturing processes not on product design. Their ambition on creating “first in the market” kind of products are limited. They are inspired by customer needs and competitor products as well.

Eskişehir Chamber of Commerce (organizing training programs), Technopark companies (helping companies especially on digital technologies), OEMs (training and technology radar programs), and other SMEs (getting help on prototyping) are the main partners of SMEs in white good industry. Close collaboration of this network could be supported.

Even there are three technical universities, SMEs and university collaboration is very limited. Even there is a potential for collaboration, they needed to be come together. SMEs need to know the capabilities of university laboratories and academician’s expertise areas. Since they have limited time to spend time for these future projects, an agent (accelerator or transfer office or EDIC) might help to bring these parties together.

The competition within the Eskişehir region SMEs are not stated as an issue. SMEs which collaborates with OEMs, are balanced in terms of turnover and production by the OEM. The ones who re selling to end customers are driven by customer and their competition brings more quality and better designs. Since, they are mostly exporting these products, their competitors are from abroad as well. Their dynamic response and openness to new trials are their potentials for more innovative products and export performance.

## Difficulties experienced by SMEs in R&D and Innovation

The most important difficulty for SME’s is human resources availability, finding highly qualified and experienced personnel in Eskişehir area. There are different complaints stated by different companies. The summary of problems related to human resources are:

Even there are three technical universities in Eskişehir, there is not much applicants and interested young engineers to work in production.

Qualified engineers are selected usually by OEM’s and automotive industries.

The young generation is not eager to work in manufacturing. The turnover is usually high for the young generation. Eskişehir is an attractive hub for students. For selecting their job, these young graduates also look for similar environments.

In some of the areas, like rubber production, there is not many similar industries in Eskişehir region. If the companies are looking for experienced people, it is not easy to attract those people from Bursa or Gebze (mostly they are working for automotive industry).



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As it is stated earlier, there is limited experience on collaboration with universities and institutes. One of the major reasons is not having enough knowledge on academia's capabilities and not having knowledge on how to collaborate with university. There is no clear way of collaboration from SME side. Other difficulty they are face not having experience on how to define R&D projects with universities (i.e. how to define daily problems as R&D project). To search and reach to right academician in the university is another problem related to collaborative R&D projects. It takes a lot of time and effort for SME. One last problem with university collaboration is not having enough expertise on specific subjects in university. For example, enamel processing know-how, rubber processing and rubber formulation subjects are critical for SMEs. However, the companies cannot reach to right people in the university.

Among the difficulties encountered by the SMEs, to reach the specific training program on plastic injection is not easy. Centrally organized training for new talents from experienced people would be helpful.

For end-product manufacturers, one difficulty is to reach alternative component producers in Eskişehir region. They are visiting also Kayseri region to reach alternative sources.

According to SMEs diagnostic studies, the following factors can be defined as difficulties on R&D studies:

They do not have enough R&D and product development systematic approach. It decreases the efficiency of these studies.

Very few of them are monitoring the industry as general and not fully aware about the next generation technologies or disruptions they might face soon.

They are still more oriented in their production technologies.

They have limited independence on product design. If they are supplier of a large company, this large OEM provides all design related information. Thus, SME has to focus only on production not to product focus.

## Summary of Insights and Conclusions

As it is stated in previous sections, the R&D and innovation capacity and experience is not so high. Even the export rate and product variations are high in this industry, the IPR performance is not so high. Possible reasons are; heavily depending on OEMs and reverse engineering driven product development projects.

The SMEs are very responsive, customer oriented (both are critical for innovation performance). Their flexibility brings them new customers and new export opportunities.

They have deep knowledge on their manufacturing processes and in most of the cases, they either have an experienced team or have a documentation system to transfer their know-how.

One of the prospective areas for these SMEs, could transfer their know-how to other industries. For example, medical sector and food industry stated several times for feasibility studies. Their expertise on plastic or metal industry could be a leverage for these SMEs on developing their own products, expanding their know-how on test procedures, and formalizing their R&D initiatives. Even white goods industry has safety market for them, these products can be stated as less value-added products compare to other industries. Cost competitiveness is so important in white goods industry. So, in most of the cases efficiency of the production is much more important than producing new solutions. To employ a new solution, it should be a cost-competitive solution.



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Another critical issue for home appliance industry is having a very large OEM's in Eskişehir. Since they are capable of designing every component and parts, they have limited collaboration on new product development process with their suppliers. Only the selected ones can design together and supported by OEM for further development. SMEs has to change their strategy for investing more on their R&D.

The larger SMEs have invested already for their test and prototyping capabilities. However, their most of the R&D projects are on production related (even mold design related) still.

To establish a common ground with universities is very critical from R&D and innovation perspective. Having one successful collaborative project might help to reach qualified engineers, changing R&D perspective, and to be ready for next generation technologies. EDIC might be an accelerator, coordinator, or meeting point both for university and industry.

In terms of trainings: There needs to be reaching young engineers and technicians for continuous learning. Possible set of training might include; IPR, project management, creativity tools, ergonomics, materials (polymers – metals – new trends and limitations).

Implications for establishing business model for EDIC:

It is recommended that EDIC should be a Centre which has not only the design tools and prototyping equipment but also has knowledgeable people in this centre. These people should be very active in terms of understanding the needs of SMEs and specific industry needs. They might review or provide some assessments for SMEs. Accordingly, they change dynamically their support program.

Another issue related to studies with EDIC and SMEs is considering confidentiality from competition point of view.

This centre might help companies on understanding the new product development process and tools in a better way. As a connection hub, they also might inform each SME about the other industries expectations. So, they might consider to expand their knowledge on different industries.



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