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Performance-Based Automation System for Kitchen Interior Design

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Abstract
The objective of the study has been determined as development of a holistic process management model considering the features of companies producing and marketing kitchen equipment and aiming to improve the kitchen design performance. In line with this defined objective the consecutive/simultaneous steps taken as the methodology are: determination of the measurement evaluation approaches and methods used in practice of the company (which has 60 national and international dealers) considered as an example model; identification and verification of issues affecting the design performance of the company which occurs/may occur at every stage of the current project service process; making works to eliminate such problems and ensuring the integration of results obtained from such works with the current existing project service processes of the company; developing the process management model in conceptual dimension on the basis of this integration; verification of the conceptual model; development of a prototype of the conceptual model in objective size and testing the functionality of the model. The relationship between features of all entities in the design and production process and usage process performance prior to design/during design process/and subsequent to design of the project can be questioned and measured quickly by virtue of the model developed within the study. What's more, all stakeholders in the company are ensured to benefit from the experience of each other through provision of a feedback mechanism by virtue of a dealer network. Furthermore, configuration of customer satisfaction data needed by the R&D departments and development of strategies in managerial level through analytical work based on these data are also possible.

Keywords: Kitchen interior design, performance-based design, designer performance, competition by design, innovation by design.

INTRODUCTION
Complex cognitive activities on the basis of the design have led the people to question a parameter such as "success". "Success," is a phenomenon which can be measured by a western origin word namely "performance". According to which criteria and at which level of success a target has been achieved is as important as achieving the target [1]. To this end, numerous studies in which methods to increase the performance of design are researched and in which various models and approaches are suggested have been carried out through both academics and practitioners [2; 3]. For example; how the collaborative design work performance will be measured and the impact thereof on outcome of in design have been evaluated in the study of Yin et al.[4]. A design performance measurement matrix has been created to this end. This matrix based on 25 measurable criteria determines the strengths and weaknesses of the design

team and helps improve design performance by proposing appropriate responsive actions. On the other hand, Shi [5] draws attention that the design performance can be measured quantitatively by virtue of simulation technology. Designers and implementers are able to analyze performance during the workflow process using computer-aided optimization techniques and form the design by performance-based/driven criteria thanks to these technologies. Taticchi et al.[6] underline that integration of performance system, costing system, feasibility evaluation system and benchmarking system is required in configuration of construction performance measurement and management system of success. Haponava and Al-Jibouri [7] have emphasized that performance of the sub-processes should be controlled to control the design process in the study conducted thereby for improving performance of design. Furthermore, key success indicators to be used to control the design sub-processes and a model describing the relation thereof with the project objectives are recommended in the same study. Similarly, Budawara [8] also states that design activities have to be controlled with the lower components thereof in order to measure the design performance and puts forward a model serving this purpose. Hertenstein and Platt [9] question the interaction between the design performance and financial performance of the designer companies. Strong evidences revealing the fact that increase of the design performance improves business performance and growth of companies in this study carried out for 5 years with a total of 51 companies. Bibby et al.[10] discuss 25 different factors to overcome the barriers affecting the success of the design management practices. 10 different factors affecting design and practice of team-based performance measurement systems are described in the study of Mendibil and MacBryde [11] and it is proven that each factor is associated with other factor and reducing the impact of one factor could lead to the disappearance of the effect of another factor completely. It is examined in which rate the expected results can be achieved by using the performance-based design system in the study of Stone [12]. Presence of studies performed through different institutions and organizations on the same subject in addition to the numerous scientific studies conducted except the ones mentioned hereinabove by many scholars in order to improve the design performance once again reveals the importance of design performance. For example, the Design Quality Indicator (DQI), developed by Construction Industry Council in the UK is used as a measurement tool for evaluating the design performance [13]. In this way, it is possible to meet user needs at the optimum level and produce high-quality projects [14].

When the subject of measuring and increasing success was evaluated on the scale of interior design which is one of the basic design fields, it was observed that kitchen design is the most studied subject. The reason for this is that high success is expected from the kitchen compared to other spaces in terms of numerous criteria such as functionality, durability and hygiene. It was determined in the researches conducted that 30% of the works performed in a house in average consists of food preparation and actions associated with this [15; 16]. 360 actions different from each other are performed in the kitchen in average during a day and a kitchen is used for 20 years. In this case, 2.6 million actions independent from each other are performed in the same kitchen during the usage period thereof [17]. Moreover, the space which is most desired to be renewed in a house has been found to be the kitchen with the rate of 34% as a result of a survey conducted in 2009 [18; 19]. In addition to all these, kitchen is the area for a designer which has to be resolved almost in all projects. As such, different than other places, researches made for increasing the kitchen interior design performance dates back to much earlier times such as the 18th and 19th centuries. For example, in a research made in 1850 by the U.S. Department of Agriculture it has been revealed that adapting the bench height according to ergonomic measurements of each user can improve the design performance of kitchen. In 1912, Christine Fredericks conducted a research named "string study" related to the placement of kitchen cabinets and devices. This study is a model which reveals the unnecessary walking lines in the kitchen and defining the working processes and right and wrong templates belonging to this process [20; 21]. Child in 1914 and architect Schneck in 1927 developed proposals that can improve the design performance related to storage areas in the kitchen [22; 23]. The Frankfurt kitchen proposed by Margarete Schütte-Lihotzky in 1926 became an architectural standard both in the U.S. and Europe due to its having high design performance after the Second World War [20]. "Activity triangle" idea brought forward by the University of Illinois School of Architecture in 1940 was developed to maximize the functionality of the kitchen taking into account Taylorist principles as regards time-motion studies [24; 25]. Disabled users were taken as the focus group in words conducted in 1975for increasing kitchen design performance by House Planning Department of Chalmers University of Technology in collaboration with the Handicap Research Department of University of Gothenburg [26].

When the scientific studies carried out on performance of kitchen design were examined, it was found that these studies dealt with many different design components such as culture, multimedia, computer technologies and etc. For example, it was observed that [27] addressed the issue of oven-range cooker technology design in rural residential kitchens in order to increase the kitchen performance in different cultures and living standards. Rymala's study [28] is as to comfortable and efficient use of the cooking action space for Indian users. Yang and Liang [29] have questioned that what should be the optimum countertop height for increasing the performance of the kitchen used in China. On the other hand, Demirkan and Olguntürk [30] have identified the design criteria for adults, elderly, disabled and for those with vision problems in order to project certain areas and kitchen within the house in terms of design performance for adults more correctly. Cline [31] has examined the impact of design criteria defined for disabled users on the kitchen's performance. Hrovatin et al.[32], Taha and Sulaiman [33] and Wada et al. [34] Studies have discussed the subject of improving kitchen design performance for elder users. Rivet 's study [35] is as to the performance of kitchen ventilation systems. Mak and Francis [36] discussed the issue of thermal comfort and natural ventilation performance of the kitchen. Panwar [37] has evaluated the kitchen design performance regarding the effective use of gas in the stoves. Similarly, Lamkins [38] has examined the performance of the kitchen sink systems. Leung et al. [39], O'Heir [40], Spurling [41], Srivastava et al.[42], Ficocelli and Nejat [43], Cheng et al.[44], Morishita et al.[45], Bonanni and Lee [46], Stander et al.[47] have proven in their studies that products equipped with digital technologies ensure the design of more functional kitchens which are more activated bu the user's perception and information systems. Lyon et al. [48] have evaluated the way of cooking depending on the user's age and examined the design performance of the kitchens within this context. It was seen that Demirkan and Olguntürk [30], Afacan and Demirkan [49;50] and 2020 Design [51] developed models by virtue of which measurement and evaluation can be made about the kitchen design performance in their studies. When the studies of Asensio and Ubach [52], Baden-Powell [53], Beamish et al. [54], Beazley [55], Bouknight [56], Cerver [57], Conran [58], David [59], Edic and Edic [60], Jankowski [61], King [62], Lester and McGuerty [63], Lovett [64], Roney [65], Maney [66], Mielke [67], Rand and Perchuk [68], Sweet [69], Taylor (1997) [70] are analyzed it is observed that they describe the basic design principles of the projecting process for increasing the kitchen design performance [71; 72].

As a result of the entire literature survey conducted within the purview of the study, it has been determined that although there are scientific studies to increase the performance of the kitchen design in general a study or a model to measure and evaluate specifically the performance of the design services performed by companies producing and marketing kitchen systems and the whole design process (prior to design/design process/subsequent to design) could not be detected. On the other hand, as a result of the preliminary interviews conducted with companies producing and marketing kitchen systems in the sector it was observed that there was a high demand of the companies on the subject. In this regard, an approach of identifying all problems of companies producing and marketing kitchen systems that can affect the design performance, evaluating them and bringing solutions will be able to bring competitive advantage at the level of the business, support management decisions at tactical level and increase productivity at the operational level and minimize losses and conflicts. Current information technology and an information system that is structured on it and creation of a company memory containing these experiences will be an inevitable necessity. As a result, the issue discussed within the purview of the study is the lack of an integrated process management model currently which will ensure the realization of all of these which takes into consideration the features of the company and aims to increase the performance of the kitchen design.

PURPOSE AND METHODOLOGY

A company producing and marketing kitchen systems with 60 domestic and international dealers was taken as a role model in order to solve the problems discussed within the scope of the study. In this context, the targets for the solution of such problems are determined as the development of a conceptual model and a practical software model based on this conceptual model for:

10. development of a holistic and integrated process management model for solution of the problems affecting the design performance in line with the features of the company taken as a role model;
11. ensuring all stakeholders to benefit from the experiences of each other by virtue of a feedback mechanism to be provided through the dealer network as a part of the process management model; and
12. configuration of data related to customer satisfaction needed by the R&D departments and development of strategies based on these data through analytical works as a part of the process management model.

The consecutive/simultaneous steps (goals/objectives during) needed to be taken to achieve these goals are listed as follows:

- Identification of the problems affecting the design performance which occur/may occur at all stages of the current project services of the company taken as role model process,
- Carrying out works to overcome the problems affecting the design performance,
- Ensuring the integration of results obtained from works conducted to overcome the problems affecting the design performance and the current project service processes of the company,
- Development and validation of the model conceptually in line with the detections obtained and system analysis works,
- Development of a prototype of the conceptual model practically as a software model and testing the functionality thereof.

Identification of issues affecting the design performance of the company taken as a role model which occur/may occur at every stage of the current project service process

The process of interior design services, basically consists of 5 stages, regardless of the size and scope of the project [73; 74]. These are listed as follows:

Stage I: User requests and requirements are determined at this stage, the space is measured, analysis is made and plans and sections are drawn [73].

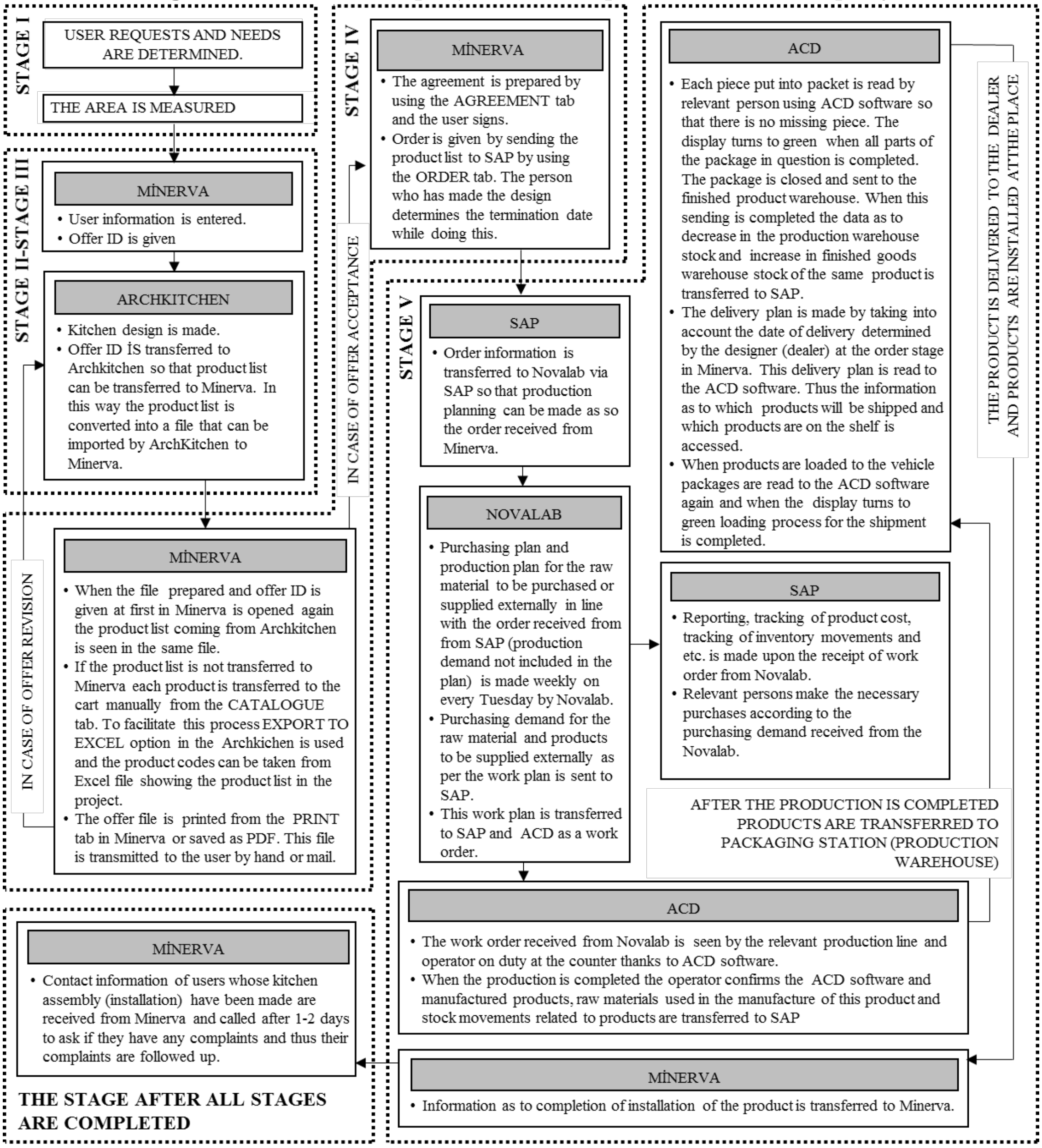
Stage II: The designer prepares sketches and takes the basic decisions as to the project at this stage. These sketches, roughly show the circulation areas, activity areas and placement of the equipment. Schematic design is also supported by drawing aids describing the design of concept such as bubble diagrams, matrices and charts [73; 75].

Stage III: All decisions related to the project are given during the development stage of the design. These decisions are described by drawings as to details of plans, sections and implementation. Lighting, heating, ventilation, clean and dirty water systems and other mechanical drawings are completed. Furthermore, quotation for the entire project is determined [73; 76].

Stage IV: At this stage drawings of the project, agreement including all details as to the project and job descriptions, work schedule, quotation files and etc. is approved by the user. Furthermore, agreements are concluded with subcontractors and official permissions are received from required places. If necessary, experts like engineers and architects are appointed as advisers [73; 74].

Stage V: The design is performed by making production and application in accordance with the project and the work program at this stage [73]. The current project service process of the company taken as a role model has been examined in a detailed way by taking into consideration the five basic steps defined hereinabove and the main structure of this process has been described as shown in Figure 1.

Figure 1. The current project service process of the company



Web-based survey works, in which participation of design teams working for all domestic and international dealers was ensured, were performed by analyzing current project service process defined in Figure 1 with a view to identify issues affecting the design performance of the company taken as a role model which occur/may occur at every stage of the current project service process. Furthermore, in-depth interviews were conducted simultaneously with people in the company. Subsequently, the data obtained from these works were evaluated systematically and problems as to all stages of the project service process were submitted to the company's design teams and management units as a detailed report. The accuracy of problems has been confirmed by company officials in the feedbacks made related to the cited report. The said problems are presented in brief under main headings in Table 1.

Table 1. Problems identified as to the stages of the project service process

Stages of the project service process	Problems
I	1. The lack of a standard form and a recording system as to determining the user requests and needs
	2. Insufficiency of the data collected for determining the user requests and needs
	3. The lack of a standard form and a recording system as to the stages of taking measure of the kitchen area and making analysis
	4. Insufficiency of the data collected for analysis of the space
II-III	5. The designers' not knowing a significant part of the kitchen design criteria and lack of a system for the inspection thereof
IV	6. The lack of a standard form and a recording system used by the team carrying out the installation of the kitchen
After all stages are completed	7. The lack of a comprehensive evaluation system for measurement of user satisfaction

MAKING EFFORTS TO OVERCOME THE PROBLEMS AFFECTING THE DESIGN PERFORMANCE

Sources of literature and application were first investigated in order to eliminate the problems affecting the design performance of the company taken as a role model which occur/may occur at every stage of the current project service process. Subsequently, web-based survey works with design teams working for all dealers of the company was performed. In addition, public interviews were carried out with relevant people by utilization of focus group approach. Then, the data obtained was compiled and proposals for the solution of the problems were developed. At the final stage these developed proposals were submitted to the view of the design teams and governing bodies of the company by virtue of web-based surveys. Moreover, forms and recording systems, a part of this proposal, have been tested in a practical manner within the company. All these works are summarized in headlines as shown in Table 2.

Table 2. Works carried out for elimination of the problems

Stages of the project service process	Problems	Works carried out for elimination of the problems
I	1. The lack of a standard form and a recording system as to determining the user requests and needs 2. Insufficiency of the data collected for determining the user requests and needs	Sources of literature and application were investigated in order to identify the questions the designers utilize as to user requests and requirements and 83 different questions were obtained in this way.
		As a result of interviews conducted with company design teams it has been determined that negotiations with users should be completed within a certain time period and it is not possible to ask 83 questions to users in practice. In this context, a web-based survey was conducted with design teams with a view to determine the average duration of preliminary talks between designers and users and it was observed that this time in average was 53 minutes.
		A web-based survey was conducted in line with the obtained time information in which company designers were asked to score 83 questions between 1 and 5 according to level of importance. A form and registration system was created in line with all these data obtained by taking into account questions receiving 20 points and over to be used by company employees for determining user needs and requirements.
		First version of the form and registration system was presented to the company's design teams and management units in a web-based form. Furthermore, it was also tested within the company in an applied manner. Form and registration system were revised in accordance with all of the feedback obtained from these studies and its final form was created under the name of "Form 1: Interview form with the user".
		Literature research was made to determine the questions and format as to form and registration system to be created as to taking the measurement of the kitchen area and making to analysis thereof.

	3. The lack of a standard form and a recording system as to the stages of taking measure of the kitchen area and making analysis 4. Insufficiency of the data collected for analysis of the space	A standard form and registration system was created in line with the data obtained from the literature search.
		First version of the form and registration system was presented to the company's design teams and management units. Furthermore, it was also tested within the company in an applied manner. Form and registration system were revised in accordance with all of the feedback obtained from these studies and its final form was created under the name of "Form 2: Form for taking measurements and analysis of space.
II-III	5. The designers' not knowing a significant part of the kitchen design criteria and lack of a system for the inspection thereof	A systematic has been created by conducting a literature search to describe how kitchen design performance measurement criteria will be classified.
		A literature search has been conducted to determine what kitchen design performance measurement criteria are and 130 different criteria have been obtained in this way.
		Distribution of each criterion according to kitchen design performance measurement criteria classification system has been determined.
		Focus group approach, one of the tools used to obtain statistical data, has been utilized to determine the impact of each criterion on the kitchen design performance. All the design criteria were scored from 1 to 10 in this way.
IV	6. The lack of a standard form and a recording system used by the team carrying out the installation of the kitchen	Interviews were made with the concerned persons of the relevant company as to how standard forms and record system to be used by the kitchen installation team should be structured.
		Resources as to literature and application were investigated to determine the questions to be used in the forms and the recording system .
		First version of the form and registration system was presented to the company's design teams and management units. Furthermore, it was also tested within the company in an applied manner. Form and registration system were revised in accordance with all of the feedback obtained from these studies and its final form was created under the name of "Form 3: Installation team control form ".
Once all stages are completed	7. The lack of a comprehensive evaluation system for measurement of user satisfaction	Sources of literature and application were investigated in order to identify the questions to be included in the evaluation for measuring user satisfaction.
		A form and recording system has been created in accordance with all the data obtained from literature and practical application sources.
		First version of the form and registration system was presented to the company's design teams and management units. Furthermore, it was also tested within the company in an applied manner. Form and registration system were revised in accordance with all of the feedback obtained from these studies and its final form was created under the name of "Form 4: User satisfaction measurement form".

Ensuring the integration of results obtained from works conducted to overcome the problems affecting the design performance and the current project service processes of the company Works made to eliminate the problems affecting the design performance of the company taken as a role model which occur/may occur at every stage of the current project service process and listed in Table 2 under main headings and operation manner and information flow system of the process management model ensuring integration of the current project service processes (Figure 1) were described with all the details thereof and presented as a report to the company's management group. Subsequently, the model has been revised in line with the feedback received through this report. Structure of the said process management model will be described in summary below by discussing all stages of the service process:

Stage I

"Form 1: Interview form with the user" which is the first step of the project service processes and which has been structured in the process management model during face to face interviews conducted with users is filled by the designer in a web-based manner under the project code defined individually for each project (Project ID). In this way, all information such as the contact information of the user, scope of the products and/or the service planned to be submitted thereto, why the user needs a new kitchen, the user's budget, the user's special expectations regarding the planning of the user's kitchen, and etc. are processed in the database of the process management model.

In the next step, the place where installation will be made is visited to take the measure of and make analysis of the kitchen area. At this stage, "Form 2: Form for taking measurements and analysis of space" which has been structured in the process management model is filled again by the designer in a web-based manner under the same Project Code. In this way, all measurements of the kitchen area, current status of the installation, relation of the kitchen with other areas and outside, whether there is a non-standard case or not, brands and models of the equipment used or planned to be purchased, whether they are solo/built in or not, amount of the kitchen equipment, the furniture desired to be kept and all the features thereof, even whether there is car entry to the street where the residence is, parking and lift status and etc. are processed in the database. Furthermore, photographs of the place taken are stored under the same Project Code. All of this information is transferred automatically to the ArchKitchen which is a computer-aided kitchen, design and order automation software to be used at Stage II and Stage III of the project service process by the process management model.

Stage II and Stage III

Stage II and Stage III of the current project service process of the company taken as a role model takes place in an intertwined manner as seen in Figure 1. Therefore, these stages were taken as a whole while creating the structure of the process management model. In this context the operation of the model and information flow system for Stage II and Stage III of the project service process are as follows:

The designer models the kitchen project in three dimensions using the ArchKitchen software. The designer reaches all the information he needs within the scope of "Form 1: Interview form with the user" and "Form 2: Form for taking measurements and analysis of space" from the ArchKitchen software by entering the Project Code while doing this.

The project's products list is automatically generated by virtue of ArchKitchen software after the completion of the kitchen design in three dimensions. Furthermore, a report showing the performance of the kitchen project is produced by the ArchKitchen software thanks to the process management model. This report includes data such as which kitchen design rules the designer was in compliance with and which kitchen design rules the designer was not in compliance and the performance score the designer received from the design rules the designer was in compliance with in the society. When these are completed, success of report of the project design, product list and all drawing files are saved to the database of the process management model under the same Project Code.

Stage IV

At this stage, the product list of the kitchen project created by ArchKitchen products is opened in the Minerva software and automatically converted into tender dossier. This tender dossier is presented to the user by face to face interviews or mail. If the user requires revision of the project the designer performs Stages II and III again. In case of approval of the tender dossier the sales contract is prepared by the Minerva software and the user signs it. Additionally, product list of the project is sent to SAP software by the Minerva software and an order is given for production. The designer determines an end date for manufacturing and assembly while this is being done. The tender dossier and all documents related to the sales contract are saved automatically to the database of the process management model under the same Project Code at this point.

Stage V

At this stage, the order information is transferred to Novalab software from SAP software to create a production plan for the project. Transactions as to raw materials needed to be supplied as per the order, purchasing plan of the products, production plans and etc. are performed by virtue of Novalab software and automatically converted into work orders.

This work order is opened in the SAP software and transactions such as reporting, tracking of product cost, tracking of inventory movements and etc. are carried out. The same work order is seen by the operator working at the production line and the counter by virtue of ACD software. When production is completed, the operator gives confirmation to the ACD software and when this stage is completed production is performed and products are transferred to the packaging station. Each packed piece is read by using the ACD software in order that there is no missing piece in the packing station and when all parts are completed the package is closed and sent to the finished product warehouse. Subsequently the delivery plan is made by taking into account the end date determined by the designer and the products are taken from the finished product warehouse in accordance with this plan and delivered to the relevant dealer of the company.

Installation of kitchen is carried out by the installation team on the installation date. At this stage the web-based "Form 3: Installation team control form "structured in the process management model under the Project Code is filled by the installation team. When the form filling process is completed the information that the installation took place is entered automatically in the process management model database.

The stage after completion of all stages of the project services process

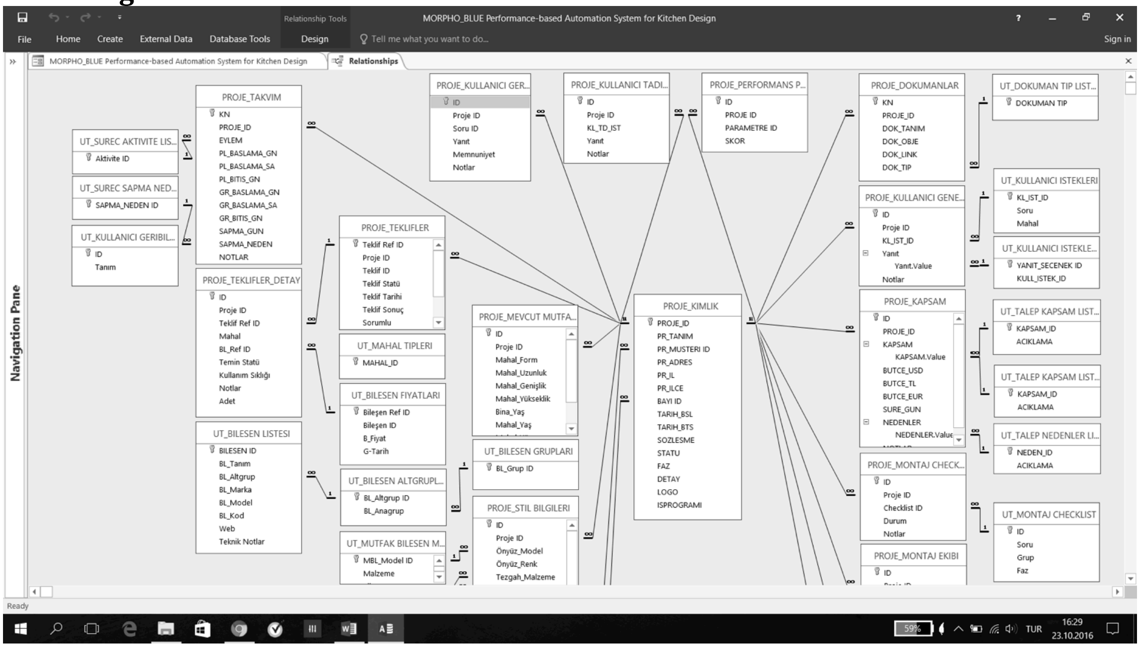
Three months after the date of filing of the web-based "Form 3: Installation team control form "in the process management model by the installation team, the web-based "Form 4: User satisfaction measurement form" structured in the process management model under the same Project Code is filled by the concerned person in the company by interviewing with users face to face. The data obtained in this way are transferred automatically to database of the process management model.

When all project services process is completed data in Form 1, Form 2, Form 3 and Form 4 of the kitchen projects, performance report measuring the success of the designer and documents constituting the tender dossier become saved under a single Project Code in process management model database.

Development and validation of the model conceptually in line with the detections obtained and system analysis works

System analysis works done in the earlier parts of the study have been used in development of the conceptual model forming the next stage.

Figure 2. The tables in database models and the relation between them



This structure and relationships were mainly taken in development of the database and the automation model to be developed in the Microsoft ACCESS platform practically and Table type objects forming the relational database architecture and the structure including the relationships between them are in Figure 2. The main components that are included in the conceptual model and definition of one-to-one/one-to-many type relationships between Tables developed on the basis of system analysis works is represented on this screen snapshot.

In addition to statements concerning the basic data groups, tables as to support data and classification codes were created and added to the model naming it by the "UT: Utility" prefix. The basic data were identified to be of two main modules as Project Info and Project Performance Evaluation.

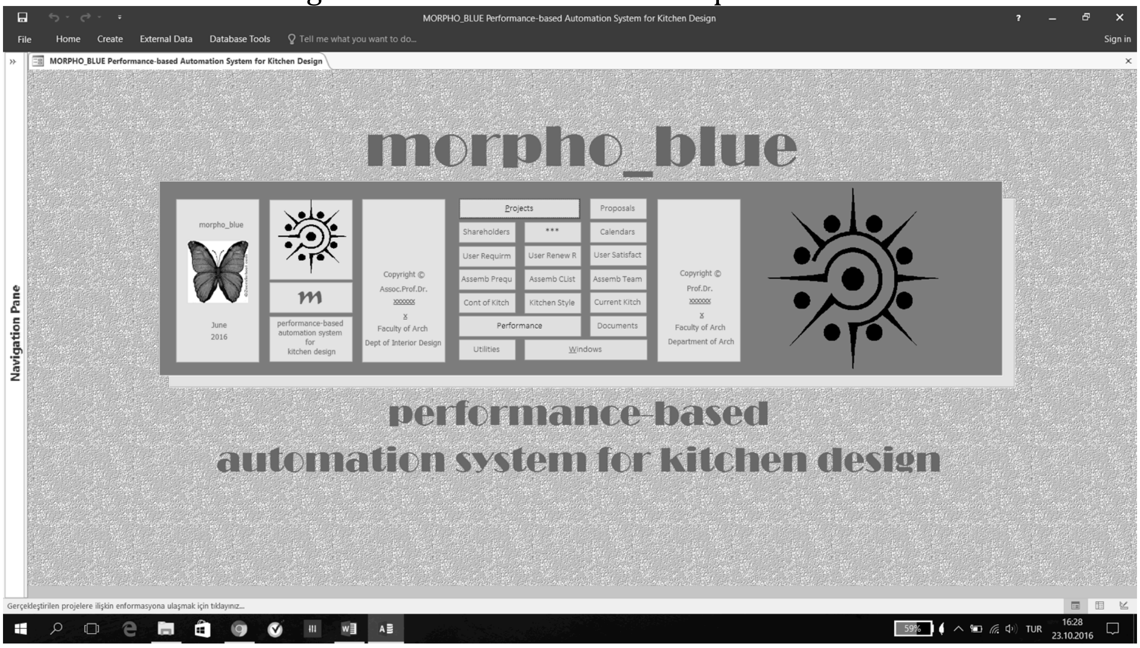
Data of each project are recorded in the main tables basing on the project code. After the projects are identified in the Project Credentials table, data with various features of each project are structured in the following tables:

1. Project scope and budget,
2. General requests of the project user,
3. Style information of the kitchen project,
4. Space analysis and building survey information of the project,
5. Renovation requests of the user,
6. Information to be transferred to the installation team,
7. Issues to be checked as to building survey and before leaving the site,
8. Project installation team,
9. User satisfaction feedback,
10. Project proposals,
11. Project documents,
12. Actions during project process and calendar information,
13. Analysis of project design performance.

DEVELOPMENT OF THE PRACTICAL PROTOTYPE OF THE MODEL

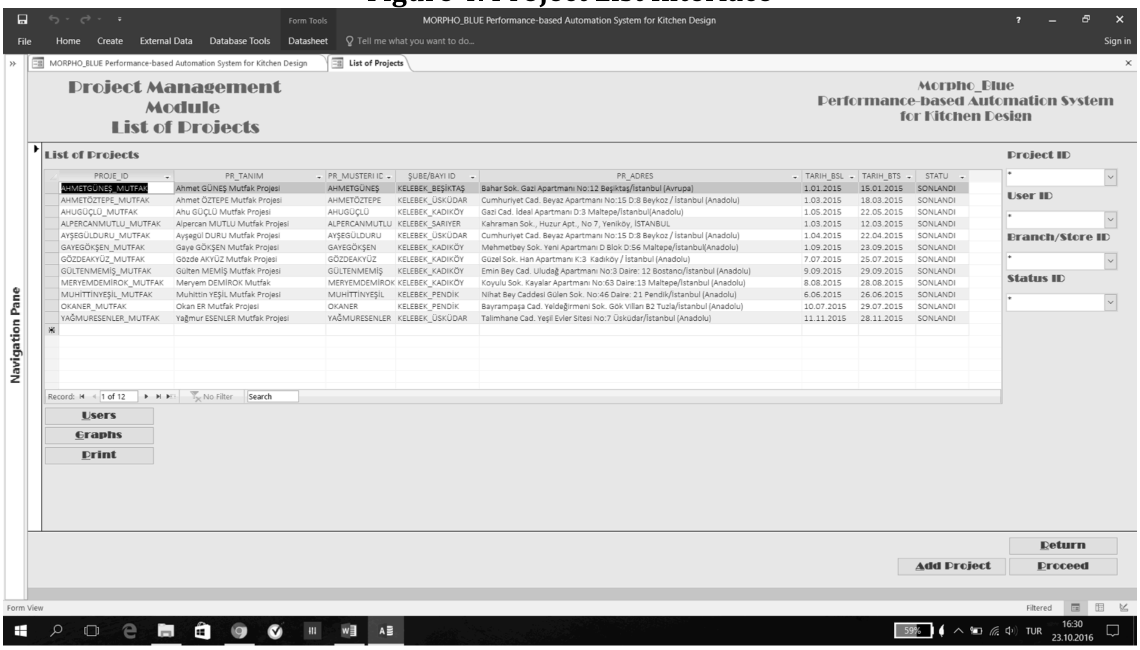
The relational database model developed on the Microsoft ACCESS platform (MORPHO_BLUE) based on the conceptual structure and relationships are provided to access of the users by virtue of the startup interface in Figure 3.

Figure 3. Software Model Startup interface



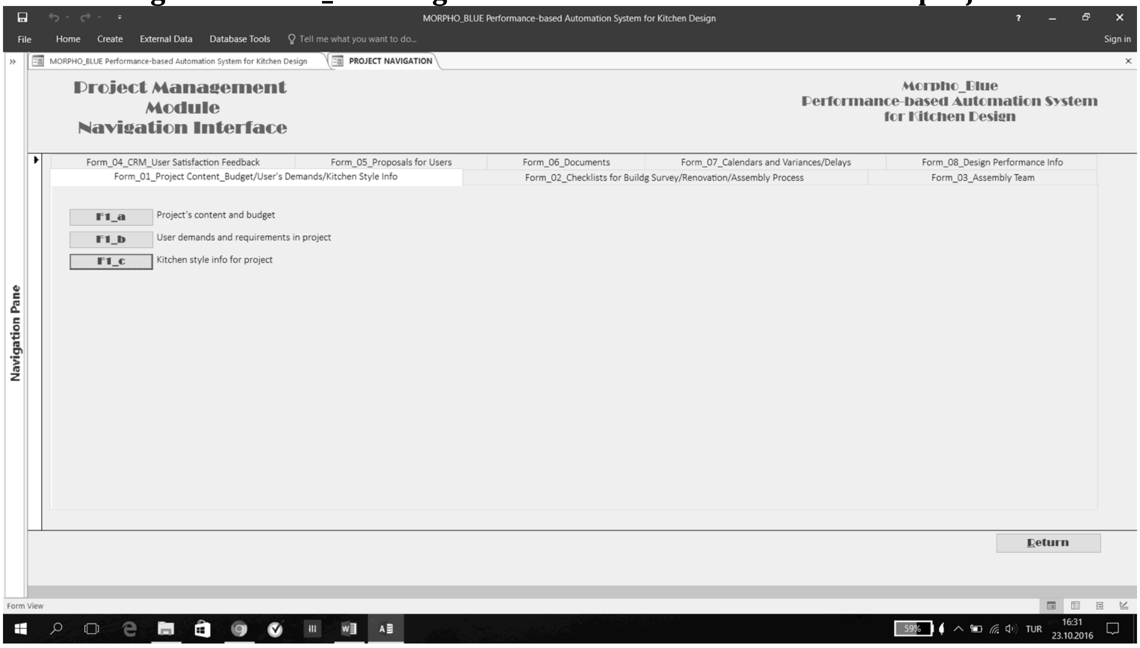
Project List Interface is accessed primarily in order to identify data related to the project (Figure 4). Filtering can be done through various features (Project, User, Branch/Dealer, Status, etc.) to the project in the database or it can be proceeded to a specific project by selecting in this interface.

Figure 4. Project List Interface



Detailed identity information of the selected project can be defined in the Project Identity Information interface and Navigation Interface Project is accessed from here (Figure 5).

Figure 5. Form_01 navigation interface associated with the project



Other modules and interfaces will not be discussed within the purview of this article but only analyzes as to performance within the scope of Performance Management Module and a limited number of and reports will be explained.

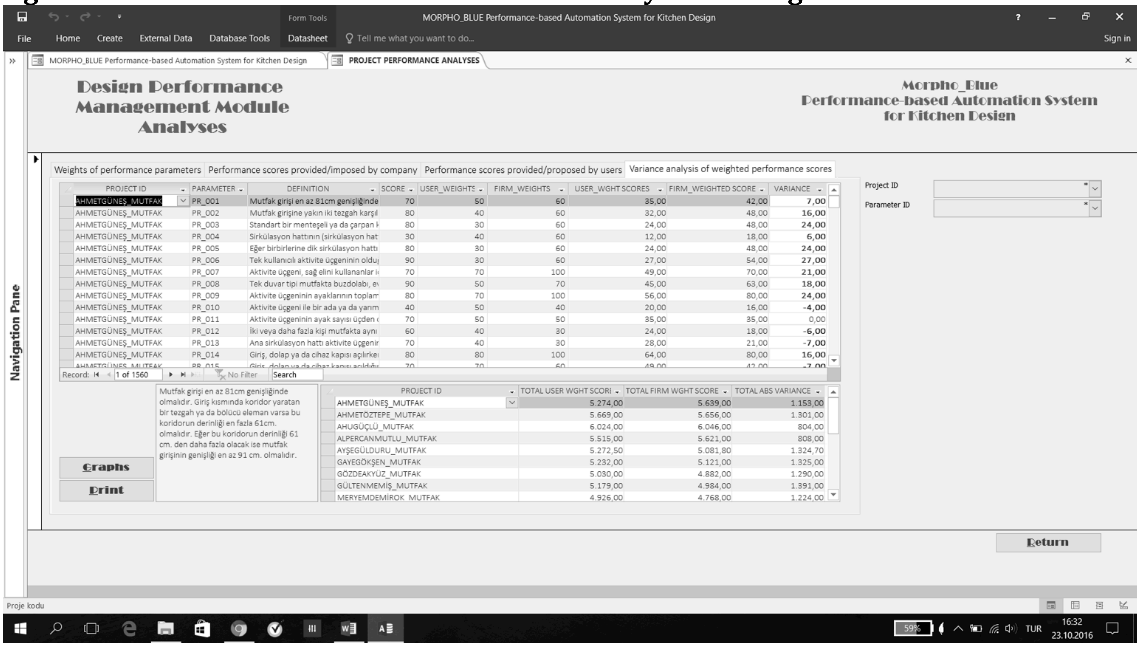
Kitchen design parameters list can be accessed on the Performance Parameters and Weight tabs and the weight of these parameters in the projects can be defined separately by the company and the customer.

Scores as to performance parameters assigned manually by the company's expert staff or by ArchKitchen software automatically are recorded in the Company Performance Scores tab; and the model generates Company Weighted Scores for the design related to the project by multiplying these scores by the weights assigned by the company. When the parametric weights are defined in the table on this interface, coloring is made by basing on the assigned values and parameters to which low/medium/high weights are given are differentiated visually.

The model basing on the scores reported by users in terms of design performance parameters on the User Performance Score tab multiplies the weights again assigned by the user by these scores and generates User Weighted Score table for the design related to the project.

Differences between the company’s and user’s weighted scores as to design related performance parameters can be analyzed and outputs needed for detecting the difference between the user’s value system and company's value system and making evaluations to give hints of being able make designs with high performance can be produced by the model on the Variance Analysis of Weighted Performance Scores tab (Figure 6). General analysis can be done when any project is taken into consideration together with data belonging to all projects before being selected and it is also possible to make detailed analyzes on a single project if desired.

Figure 6. Calculation Interface for Variance Analysis of Weighted Performance Scores



Results obtained based on the performance analysis can be converted into graphic reports by which comparisons can be made on the basis of different entities (users, performance parameters, branch/dealers, etc.). This section has been left open-ended and is open to continuous improvement by consultations to be made with stakeholders. Performance differences resulting from the company and user value systems are shown in Figure 7 on the basis of parameters. Average performance scores on the basis of branch/dealers are shown in Figure 8.

Figure 7. Performance differences resulting from company and user value systems on the basis of parameter

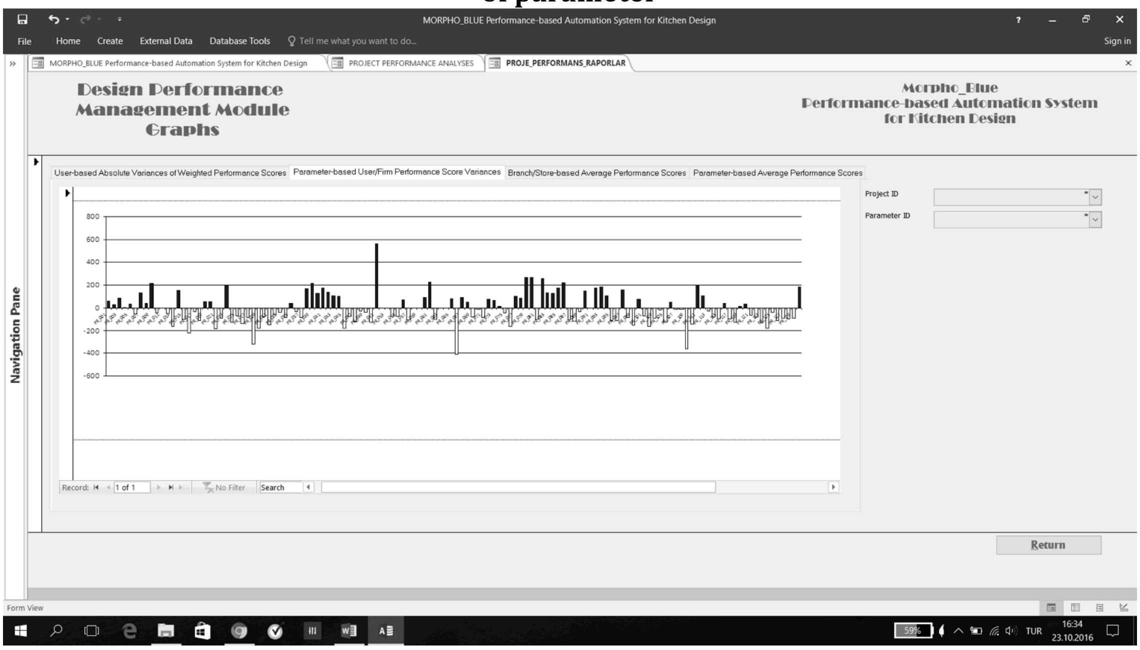
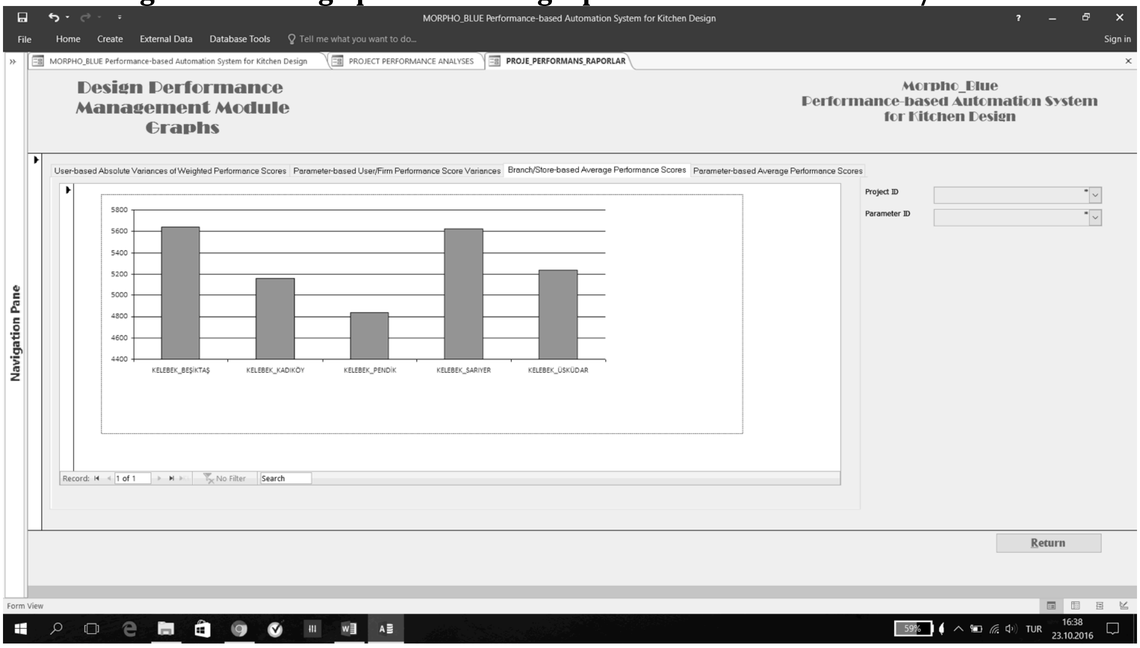


Figure 8. Average performance graph on the basis of Branch/Dealer



RESULTS

The process management model proposed within the scope of the study has the content and quality to strengthen point of view and approach at strategic level of companies producing and marketing kitchen equipment. The model, in addition to creation of data sets needed in order to transfer the power of the "Design Performance" and "Competition by Design" concepts into practice in the real sense, is expected to affect the behavioral patterns in the sector.

Companies using this model, will be able to question and measure quickly the relationships between to the features of all entities (dealers, designers, project, client, etc.) during the design and manufacturing process and the usage process performance of the project prior to the design/during design process/subsequent to design and will be able to have higher performance by better design/service. In addition, it is ensured that all stakeholders in the company are able to benefit from each other's experience through a feedback mechanism provided through the dealer network by virtue of this process management model developed to solve the problems that affect the design performance in line with the features of the company. Furthermore, it will be possible to configure the data as to customer satisfaction needed by the R&D departments as part of the process management model and develop strategies at the management level through analytical work based on these data.

Performance-based design and creation issues come to the forefront in a global scale in a way not to be only limited to the construction sector. Transaction /project / company / sector levels of the subject and research projects concerned with many aspects thereof and publications are included to the literature more and more increasingly. In addition to the originality of the model developed within the purview of this study, findings to be made based on data collected through statistical analysis will help the companies in the sector to develop their quality assurance systems and increase their competitiveness levels.

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