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DEVELOPMENT OF THE HIGH-PERFORMANCE WORK SYSTEMS SCALE FOR HOSPITALS: VALIDITY AND RELIABILITY STUDY

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ABSTRACT

Purpose- This study aims to develop a scale that evaluates the level of HPWS practices in hospitals based on employee perceptions and to make its validity and reliability.

Methodology- The study was conducted via an online survey in three public education and research hospitals. The sample consisted of 309 clinical and administrative employees. After performed face and content validity, a pilot study conducted. The item-total score correlations and Cronbach’s alpha coefficients were calculated. Construct validity was tested. Correlation analysis was performed to test scale-related validity.

Findings- Overall, a 29 items scale were obtained, encompassing 6 factors that explained 78% of the total variance. Reliability coefficients varied between .96 and .87. Confirmatory factor analyses were found to show good fit. Evidence for criterion-related validity was obtained after correlation analysis.

Conclusion- The scale that proven content, construct, and predictive validity, can be used to evaluate the level of high-performance work systems in hospitals.

Keywords: High-performance work systems, human resources management, healthcare, health workforce, validity, and reliability.

JEL Codes: M50, J45, I19

1. INTRODUCTION

High Performance Work Systems (HPWSs) was first called high-involvement management by Lawler in 1986 (Ross & Koys, 2011). In 1994, it was proposed as a model that increases the commitment of employees who independently use their discretion to fulfill their professional requirements in accordance with organizational goals (Arthur, 1994). In 1995, Huselid made the widely accepted HPWS definition “a set of innovative human resources (HR) practices aimed at improving organizational performance through employees” (Huselid, 1995).

Studies have been conducted on the basis of the systems approach by important researchers such as Delery and Doty (1996), Becker and Gerhart (1996), Pfeffer (1995) and particularly Huselid (1995). Key empirical evidence of these studies has demonstrated that HPWSs improve employee skills and promote active involvement in, and commitment to, workplace activities, thereby encouraging organizational growth and effectiveness. Based on the research conducted, the concept of HPWS has been defined in the literature as a body of HR practices designed to ensure employee identification with overall objectives and to increase employee engagement and involvement in order to deliver superior and sustainable performance by an organization when compared to its rivals. It is called “high performance” because it is designed to deliver to the organization superior and sustainable performance, and it combines a number of HR practices, which strengthen each other, to enhance organizational efficiency and effectiveness in a way that creates synergistic effects. The effectiveness of HPWS and its contribution to performance were first investigated in the manufacturing sector and then in the service sector. Most of the studies in the service
sector are in organizations such as restaurants, banking, and hospitality sector, but a growing number of studies are being conducted in healthcare services around the world.

In the remainder of this article, we review theoretical work suggesting that HPWSs can be the underused strategy to improve the quality of care and patient safety, especially when its components have high internal and external fit. Next, focused specifically on addressing the significance of the findings, the study adhered to the literature in terms of dimensions and could contribute to the literature with a comprehensive measurement of HPWS in the hospital. Finally, we compare the results of this study with some of the key policy and research results of studies on scale development.

2. LITERATURE REVIEW

Health is a labor-intensive service area that requires effective HR management practices. Research in healthcare services demonstrated that HPWSs affect employee engagement (Mihail & V. Kloutsiniotis, 2016), satisfaction (Spence Laschinger, Finegan, Shamian, & Wilk, 2001), behavior and attitudes (Harley, Allen, & Sargent, 2007), patient outcomes such as patient safety grade (Etchegaray & Thomas, 2015), mortality rate (West et al., 2002), and patient satisfaction. In addition, researchers found that HPWSs are negatively related to burnout and reduce the intention to quit the job (Ang, Bartram, McNeil, Leggat, & Stanton, 2013).

Previous studies emphasized that the use of evidence-based management practices (also known as HPWSs) such as training, development, participation in decision-making, and performance appraisal is an important and underused strategy to improve the quality of care and patient safety (McAlearney et al., 2011). For this underutilized strategy to become widespread in healthcare, health managers need to share more application examples and research results on HPWS, which is evidence-based management practices. Despite the increase in HPWS research in healthcare, there is a need for experimental studies in the health system where the clinical and patient safety results of high-performance work systems and its reflection on healthcare professionals can be discussed and measured. In addition to examining the studies mentioned above, recent studies have given the following results, especially in terms of the scales they use.

McAlearney, Hefner, Robbins, and Garman (2016) explored the potential role HPWS could play in explaining the differences in infection rate reduction efforts in hospitals that are following a program implemented in 8 hospitals in the US in 2016. Data have been collected through in-depth interviews with 194 managers from these hospitals. There was evidence from hospitals that participate and successful in infection reduction programs and facilitated the adoption and consistent implementation of the HPWS model, but applications of this HPWS model are almost negligible in hospitals with low performance. Model of HPWS subsystem (bundle) consists of 14 management practices under the sub-dimensions: (a) employee engagement, (b) appropriate leadership, (c) skill acquisition and development, and (d) empowering employees. The HPWS model should be presented on an evidence-based basis as a regulatory framework that can be applied to facilitate quality and patient safety efforts in healthcare (McAlearney, Hefner, Robbins, & Garman, 2016). This study contains a qualitative feature to assess HPWS and reflects the executive perspective.

In a study conducted by Kellner, Townsend, and Wilkinson in 2017, many non-profit organizations (foundations) show that the performance goals of HPWS practices will not conflict with a “values-based approach” to manage people. In the article, 83 human resources managers from foundation hospitals in Australia were asked how these two approaches could coexist and how they could result in a “strong HRM system” and climate with qualitative research techniques. Despite some contradictions that interviewees call “the balance between mission and margin”, careful alignment of corporate value focuses on HPWS has resulted in a stronger climate, positive employee results, and a high-performance HRM system. The article is important for HPWS to develop an understanding of how it can contribute to the performance of nonprofits, and specifically addresses the call for research on value-based HPWS practices (Kellner, Townsend, & Wilkinson, 2017). This study contains a qualitative feature to measure HPWS that is the human resources managers’ perspective.

In 2017, Kloutsiniotis and Mihail reported the effects of employees’ emotional engagement on their intention to leave, in a sample of 119 nurses and health workers and 117 doctors from 7 hospitals in Greece. HPWS has been measured in terms of training, participation in decisions, employment security, performance evaluation, job determination, and employee autonomy. Overall, 31 items were used, encompassing seven sub-scales. It is understood that HPWS practices affect the participation and job satisfaction of the employees, which leads to an increase in commitment and a decrease in the intention to leave. Although this result, which is different from the literature, cannot be generalized due to the effects of the financial crisis in Greece. It is a study that should be supported by such researches claiming that HPWS can be an efficient and effective approach even in turbulent times (Kloutsiniotis & Mihail, 2017). This study contains a quantitative feature to measure HPWS and uses the most common scales mix in the area developed by Ang et al. (2013) and Zacharatos, Barling, and Iverson (2005). Overall, 31 items were used, encompassing seven sub-scales.

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In 2018, Robbins & McAlearney explored how the implementation of HPWS in hospitals in the USA could facilitate or remove barriers to employees talking about problems by interviewing 67 executive participants from 5 hospitals. Research findings showed that talking about problems was considered an important factor influencing quality improvement and/or patient safety initiatives across all five organizations. Management efforts to facilitate conversation include both direct practices such as using structured communication processes and reporting systems, and complementary practices that support speaking. Both direct and complementary practices show that HPWS is used to encourage employees to speak by harmonizing them with leadership, talent acquisition and development, and employee empowerment practices. Both conceptual and qualitative evidence supporting the application of HPWS as a management model to systematically facilitate speech in health institutions is presented in this study. The application of an evidence-based framework provides examples of specific management practices that enable an organizational perspective rather than an employee perspective to be taken into account and has been successfully implemented to facilitate conversation (Robbins & McAlearney, 2018). This research contains increasing evidence to support the applicability of HPWS as a valuable strategy for influencing quality and safety in healthcare organizations but reflects the executive perspective.

Gkorezis, Georgiou, and Theodorou (2018) examined the mediation mechanism of organizational cynicism in the relationship between high-performance work practices and intention to leave with the participation of 299 nurses from private hospitals in Cyprus in 2018. HPWS was measured as a single factor with 11 questions from the areas of recruitment and selection, training and development, evaluation, awards, and job security. They found that organizational cynicism mediates the relationship between high-performance work practices and intention to quit and that this indirect effect is dependent on the educational background of nurses which was a dimension of human resource management (Gkorezis, Georgiou, & Theodorou, 2018).

Mielke et al., (2019) conducted a study with 281 healthcare professionals from a hospital in Switzerland. They used the 10-item HPWS scale, previously developed by Etchegaray and Thomas (2015) to ensure its cultural validity and reliability. HPWS was significantly associated with the security and teamwork climate. In clinical practice, it was stated that the HPWS scale fits the model very well with its 9-item structure and can be used for in-hospital and inter-hospital comparison. However, the scale has only one dimension and requires some adaptation to express and re-evaluate psychometric properties in other clinical areas (Mielke et al., 2019).

Wang, Xing, and Zhang (2019) investigated the dark side of HPWS in the health sector in a study conducted with 80 physicians, 125 nurses, and 18 other healthcare personnel from a hospital in China in 2019. In previous studies, there were results from other sectors that HPWS increased the level of burnout and workload. To measure HPWS in health services, the 24-item scale was used. This scale includes six HR practices for service quality with those dimensions: selection, training, performance management, reward, participation and teamwork, and information sharing, but the scale was originally tailored to the tourism industry by Hong, Jiang, Liao, and Sturman (2017).

When reviewing the literature, it has been seen that most of the studies were conducted in private health institutions in the USA, Australia, China, Switzerland, Greece, England, South Korea, and Cyprus. In Turkey, HPWSs have been studied in various sectors such as the banking and defense industries. However, no such study regarding HPWSs in the manufacturing sector. Moreover, a balanced perspective is needed because employees are the ones who implement high-performance applications and create high performance, especially in the service sector. Moreover, asking employees about the level of HPWSs will better reflect the intensity of practices and the way such practices are perceived. Therefore, it was believed that there is a need to develop a scale, which includes both the HPWS dimensions that are widely accepted in the literature (Garman, McAlearney, Harrision, Song, & McHugh, 2011; Posthuma, Campion, Masimova, & Campion, 2013) and the HR practices utilized by the hospitals, as well as allowing assessments of employee perceptions of HPWSs.
In this context, the aim of this study is to develop a scale that assesses the level of HPWS practices in hospitals based on employee perception and to establish the validity and reliability of such a scale.

3. DATA AND METHODOLOGY

This methodological study was conducted to develop a Turkish HPWS scale and to test the validity and reliability of the scale in order to measure the level of high-performance work practices implemented by hospitals. The ethics committee approval was obtained from the Ethics Committee of Marmara University Institute of Health Sciences (No: 14.01.2019-07).

The scope of the study covers employees of the top ten training and research hospitals in Turkey according to the Public Hospitals Statistical Report 2017 by the General Directorate of Public Hospitals based on the variety of branches, bed capacity, and the number of staff and applicants. Upon the consent of three hospitals located in Istanbul, Malatya, and Bursa, the study was conducted in these three training and research hospitals between September 2019 and December 2019. Employees were contacted by an online survey through hospital managers. In total, 324 out of 4307 employees who were delivered questionnaires turned in a response. The survey response rate was 7.5%. Becker and Huselid (1998) indicated that the response rate of studies on HPWSs ranged from 6% to 28% with an average of 17.4%. After questionnaires with missing or faulty data were eliminated, 309 forms were evaluated.

The questionnaire comprises three parts. The first part comprises items about demographic characteristics of participants, while the second part included items from the Structural Empowerment Scale developed by Laschinger et al. (Spence Laschinger et al., 2001) and items from the Psychological Empowerment scale developed by Spreitzer (1995). Turkish adaptation of the scales was carried out by Sürgevil, Tolay, and Topoyan (2013).

The third part consisted of a 32-item “Draft High-Performance Work Systems Scale” developed by researchers. In the first stage of developing the draft questionnaire, an item pool was created with questions of participation in decision-making, employment security, training and development, compensation, transformational leadership, performance appraisal (Mayer & Davis, 1999), and equal employment opportunity (Ang et al., 2013). This was done by drawing upon the two main scales commonly used in the field (Villajos, Tordera, & Peiró, 2018; Zacharatos et al., 2005). The back translation (Brislin, 1986) method for the translation of scale items was applied with assistance from the Department of Foreign Languages of Istanbul Okan University. A face validity study was conducted by conferring with healthcare personnel; a content validity study was conducted in accordance with expert opinions. A draft scale of 32 items was obtained after the analyses made in preliminary trial/pilot study with 157 participants.

The reliability of the 32-item draft scale that was administered to the main sample was tested using the item-total correlation and Cronbach’s alpha coefficient. Principal components analysis and the Varimax rotation technique were used for the explanatory factor analysis to test the construct validity. A confirmatory factor analysis was made to test whether the data fit the model. Finally, a criterion-related validity analysis was performed to test the effectiveness of the scale. All data analyses were made using the IBM SPSS 24 and IBM SPSS AMOS 24 programs.

4. FINDINGS

4.1. Face and Content Validity

The item pool created through a literature review was conferred with five experts, four of whom were experienced in healthcare sector and held a doctoral degree and one who was from the business management field. Experts rated each of items using four options as “item is not appropriate,” “item should be seriously reviewed,” “item should be slightly reviewed,” and “appropriate.” The “content validity index” was obtained by using a statistical method, the Davis technique (Davis, 1992). The content validity index was calculated by dividing the number of experts who marked the “item should be slightly reviewed” and “appropriate” options by the total number of experts. The Content Validity Index (CVI) of the 41-item draft scale was found to be .86.

In addition, the expert group was asked to rate each statement from 1 (Incomprehensible) to 4 (Comprehensible) and to clearly write down their opinions and suggestions for each statement. In accordance with the opinions of healthcare personnel and experts, changes were made in some statements. The statement, “Whether I will get a raise depends on my performance,” was changed to “The share I will receive from the revolving fund depends on my performance.” The statement, “If you are one of the better performers in this organization, you get one of the better raises,” was changed to “If you perform better, you get one of the best shares from the revolving fund.”

A pilot study is recommended after content validity in methodological studies (Erkuş, 2019). The preliminary trial/pilot application of the scale is presented below.
4.2. Preliminary Trial - Pilot Study

A preliminary trial/pilot application was performed with 157 participants selected from the target population in order to obtain the scale that would be administered to the main sample. The aim of the preliminary trial is to identify potential problems in the questionnaire, to obtain preliminary reliability results related to the new scale, to detect any faults or issues with the scale, and to establish whether the new construct differs from other related structures (Slavec & Drnovsek, 2013). This stage consists of determining the readability and comprehensibility of items, spelling errors, and the average response time.

The consistency of the scale was calculated using the Cronbach’s alpha reliability coefficient in the pilot study. The Cronbach’s alpha coefficient, which indicates the consistency of 41 items with the overall test, was found to be .944. An item-total correlation value of < .30 indicates that the corresponding items do not correlate with the overall scale, and the internal consistency changes when such items are removed from the scale. Thus, four items with a value of < .22 were removed from the scale. (IG4R: I’m not sure how long I will be employed in my organization; P4R: Whether or not my supervisor likes me is important for my performance review; EI4R: Individual differences prevent creating equal employment opportunities in this organization; and U2: I get an average salary for this job.)

In the pilot study, the explanatory factor analysis was performed using the principal components analysis and the Varimax rotation technique. It was decided to remove the items with a factor loading of < .30, which were E11: My organization supports employees in balancing work and family responsibilities; E12: Men and women have the same employment opportunities in this organization; and P1: The assessment of skills I have is quite error-free. After repeated analyses, factors with an eigenvalue of ≥1 were obtained. The Cronbach’s alpha coefficients were calculated for the reliability of the six subfactors obtained. After internal consistency tests for the dimensions, the removal of certain items (KE4R: I do not have much word on the decisions made in my workplace and KE5: I feel like I’m in control of things that is going around me in my workplace) was observed to increase the reliability, and therefore, these two items were removed from the scale. The sample adequacy of the tests was analyzed using the Kaiser-Meyer-Olkin (KMO) value and Bartlett’s test of sphericity (KMO = .903, Bartlett’s test of sphericity χ² = 3371.34, df = 496, p < .001). The draft HPWS scale was finalized with 32 items in six subfactors (Danayiyen & Bekaroglu, 2019).

It was established that the draft scale, which was reduced to 32 items after the analyses performed in the preliminary trial, was completed in an average of 13 minutes. The next procedure to be conducted was the administration of the draft scale to the main sample.

4.3. Descriptive Statistical Findings

The main sample consists of a total of 309 participants. Among the study participants, 72.2% (n = 223) were female and 27.8% (n = 86) were male. The age range of participants varied between 19 and 65 years, and the mean age was approximately 33.9 years. In addition, 61.2% (n = 189) of the participants had bachelors and higher levels of education. The mean work experience of employees was 11.3 years, the mean years of seniority in their organization was 7.1 years, and the mean weekly working hours were 46.4 hours. A great majority (n = 298, 96.4%) of the participants were working during daytime and in mixed shifts. Of the employees, 35.3% (n = 109) were working in administrative, 64.7% (n = 200) were working in clinical units, and 84.8% (n = 262) were in direct contact with patients. Regarding the professions of participants, 47.3% (n = 146) were nurses, midwives, or medical assistants; 30.4% (n = 94) were medical secretaries or data entry specialists; 12.3% (n = 38) were physicians; 6.1% (n = 19) were technical experts or technicians; and 3.9% (n = 12) were managers or coordinators. Finally, a great majority (n = 216, 69.9%) of the participants were members of a union.

4.4. Construct Validity

Explanatory factor analyses were performed using PCA and the Varimax rotation technique. Sample adequacy of the analyses was analyzed using the Kaiser-Meyer-Olkin (KMO) value and Bartlett’s test of sphericity (KMO = .940, Bartlett’s test of sphericity χ² = 8967.30, df = 406, p < .001). Table 1 presents the dimensions from the factor analysis explained variance, eigenvalues, and means. The explanatory power of the scale was 78%, while Cronbach’s alpha was .96.

The Cronbach’s alpha coefficients for the dimensions were calculated and found to vary from .96 to .87. Based on the internal consistency tests of the dimensions, it was decided to remove the following three items from the scale to increase the validity and reliability of the scale: E2: The organization I work for will remunerate me if I receive further training, E13: Training and awareness activities are carried out in this organization in order to create equal employment opportunities, E15: Managers care about providing equal employment opportunities in this organization.
The number of scale items was reduced to 29 upon the removal of these three items. The six subdimensions from the factor analysis were named according to the items loading on the corresponding factors (Karagöz, 2019; Şencan, 2005). The six dimensions from the factor analysis were named as follows: performance appraisal, transformational leadership, compensation, employment security, training and development, participation in decision-making and teamwork. These are taken place in Table 1 and briefly described after the table.

### Table 1: Variances Explained, Reliabilities and Factor Loadings of HPWS Scale

<table>
<thead>
<tr>
<th>Factor Name</th>
<th>Items</th>
<th>Factor Loadings</th>
<th>Variance Explained (%)</th>
<th>Eigenvalue</th>
<th>Reliability</th>
<th>Mean</th>
</tr>
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<tbody>
<tr>
<td>Performance Appraisal</td>
<td>P6: How many &quot;extra&quot; things I do is important to my performance review</td>
<td>.839</td>
<td>15.91</td>
<td></td>
<td>.94</td>
<td>2.9</td>
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<td></td>
<td>P5: How much effort I put into my job is important to my performance review</td>
<td>.833</td>
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<td></td>
<td>P3: How many mistakes I make in my work is important to my performance review</td>
<td>.812</td>
<td></td>
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<td></td>
<td>P2: How much work I get done is important to my performance review</td>
<td>.789</td>
<td>15.91</td>
<td>14.53</td>
<td>.94</td>
<td>2.9</td>
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<td></td>
<td>P8: Coming up with good ideas for the company improves my performance review</td>
<td>.677</td>
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<td></td>
<td>P7: Finding ways for the company to save money is important to my performance review</td>
<td>.562</td>
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<td>Transformational Leadership</td>
<td>LD2: My supervisor encourages me to express my ideas and opinions.</td>
<td>.791</td>
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<td></td>
<td>LD3: My supervisor gets me to look at problems from many different angles</td>
<td>.790</td>
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<td></td>
<td>LD4: My supervisor listens attentively to my concerns</td>
<td>.771</td>
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<td></td>
<td>LD5: My supervisor treats each of us as individuals with different needs, abilities, and aspirations</td>
<td>.753</td>
<td>15.86</td>
<td>2.56</td>
<td>.96</td>
<td>2.9</td>
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<td></td>
<td>LD1: My supervisor talks enthusiastically about what needs to be accomplished</td>
<td>.742</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation</td>
<td>P9: The share I will receive from the revolving fund depends on my performance</td>
<td>.791</td>
<td>13.02</td>
<td>1.89</td>
<td>.87</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>P10: If you perform better, you get one of the best shares from the revolving fund</td>
<td>.780</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U3: There is an equitable compensation system here</td>
<td>.705</td>
<td>12.80</td>
<td>1.46</td>
<td>.93</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>U1: I get a competitive salary on the healthcare job market</td>
<td>.683</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P11: If I perform well, my chances of moving up are improved</td>
<td>.615</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U4: Working in this organization has additional attractive benefits (flexible working hours, the number of days off, etc.)</td>
<td>.598</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Security</td>
<td>IG2: My job is guaranteed in where I work</td>
<td>.865</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IG1: This organization provides me with retirement security</td>
<td>.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IG5: My work contract that offers job security</td>
<td>.840</td>
<td>12.80</td>
<td>1.46</td>
<td>.93</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>IG3: The guarantee of being employed in my organization as long as I do good work</td>
<td>.787</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training and Education and Teamwork</td>
<td>E4: The opportunity to develop new skills and knowledge for my current job, or for possible future positions</td>
<td>.761</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E3: The opportunity to receive training and attend courses and workshops</td>
<td>.751</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E5: Support in planning my professional development</td>
<td>.723</td>
<td>12.80</td>
<td>1.12</td>
<td>.92</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>E1: The opportunity to receive enough training for me to learn new ways to do my job</td>
<td>.675</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E6: The opportunity to receive training above the legal obligation for both patient and employee safety</td>
<td>.654</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in Decisions and Teamwork</td>
<td>KE2: If there is a decision to be made, everyone is involved in it.</td>
<td>.765</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>KE1: I feel I am really part of my work group</td>
<td>.681</td>
<td>7.59</td>
<td>1.05</td>
<td>.90</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>KE3: My organization places a great deal of importance on team development</td>
<td>.623</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 309.
F1: The performance appraisal dimension consists of six items. This dimension covers the importance placed by the hospital on performance appraisal by scoring or proportioning sensitivity to new ideas, extra contribution during business processes, finding ways of saving, and doing error-free work.

F2: The transformational leadership dimension consists of five items. Transformational leaderships refer to encouraging followers to discover new and innovative ways over and above solving their problems, accepting individual differences of employees, and regarding the needs and abilities of each individual when giving assignments.

F3: The compensation dimension consists of six items. It covers a fair and competitive compensation of labor and the trust in the consistency of the measuring instrument utilized by organizations to pay from the revolving funds alongside the benefits.

F4: The employment security dimension consists of four items. Employment security, which is a traditional form of assurance that can be defined as a long-term perspective provided by a working system, refers to the perceived risk of job loss in the near future, and thereby, is an important determinant for job satisfaction and high performance.

F5: The training and development dimension consists of five items. It is one of the most important distinctive features of a high-performance working system, covering the creation of opportunities required for active participation; information acquisition; transformation into skills and implementation; planning for training on legal obligations; and encouraging employee development.

F6: Participation in decision-making and teamwork consist of three items. This dimension measures the importance placed by the hospital on teamwork; the participation of individuals in decision-making; and the question of whether individuals perceive themselves as part of the team. It delivers the message that the opinions of employees and primarily themselves are valued.

The construct finalized in accordance with the explanatory factor analysis was verified through a confirmatory factor analysis, which evaluates the extent to which a factorial model comprising latent variables constituted by several observable variables fit the actual data (Jöreskog & Sörbom, 1984; Karagöz, 2019). A confirmatory factor analysis was performed to verify the latent construct obtained and to determine the fit indices. The results of the first analysis produced warnings for modification, indicating that there was covariance between fit indices and certain standard errors.

The results of analysis after the modification revealed positive improvements in the fit indices. Table 2 shows that each observed item was statistically significantly predicted by the associated latent dimension when evaluating the model fit statistics of the first-order confirmatory analysis.

<table>
<thead>
<tr>
<th>Model</th>
<th>Chi-Square (χ²)</th>
<th>df</th>
<th>χ² / df (≤ 5)</th>
<th>CFI (≥ .95)</th>
<th>GFI (≥ .90)</th>
<th>RMSEA (≤ .08)</th>
<th>PCLOSE (&gt; .050)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-Order CFA</td>
<td>573.07</td>
<td>342</td>
<td>1.67</td>
<td>.97</td>
<td>.89</td>
<td>.04</td>
<td>.778</td>
</tr>
<tr>
<td>Second-Order CFA</td>
<td>575.59</td>
<td>349</td>
<td>1.64</td>
<td>.97</td>
<td>.89</td>
<td>.04</td>
<td>.842</td>
</tr>
</tbody>
</table>

*Norm values are in parentheses.

The most commonly used fit indices are reported (Cole, 1987; Karagöz, 2019) to be Chi-Square Goodness of fit (χ²), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Goodness of Fit Index (GFI). Because of GFI values can be overly influenced by sample size, values greater than or equal to .85 are also considered within acceptable limits of fit (Byrne, 2010). Upon examining the coefficients indicating the relationship between the observed variables and the factors of the factorial model of the developed scale, it was concluded that all coefficients were at a good level. It was ascertained from the model fit statistics of the second-order confirmatory factor analysis that the data fit the model well.

4.5. Criterion-Related Validity

Criterion-related validity is used to measure how well one measure estimates the outcome of another measure in order to determine the effectiveness of the instrument. If a test is useful to predict a past, present, or future performance or behavior, then it has this type of validity (Gürsakal, 2001). Criterion-related validity is divided into two subgroups. Predictive validity is obtained by calculating the correlation between the predictive score obtained from the scale and the criterion known to measure the properties intended to be measured (Cook & Beckman, 2006). A simultaneous application is conducted for Concurrent validity. The developed scale is administered simultaneously with another scale that examines the same or an associated construct and was previously proven to be valid (Mielke et al., 2019). This analysis was used to examine the associations between the subdimensions of the HPWS scale and the empowerment scale, with the latter chosen because various relationships of these two scales have been discussed in previous studies (Laschinger, Finegan, Shamian, & Wilk, 2004; Spence Laschinger et al., 2001).
The correlation analysis revealed significantly positive correlations between the structural empowerment dimension of the empowerment scale and the HPWS scale dimensions: performance appraisal ($r = .597, p < .001$), transformational leadership ($r = .661, p < .001$), compensation ($r = .486, p < .001$), employment security ($r = .540, p < .001$), training and development ($r = .698, p < .001$), and participation in decision-making and teamwork ($r = .546, p < .001$). As shown in Table 3, there were also significantly positive correlations between the psychological empowerment dimension and performance appraisal ($r = .411, p < .001$); transformational leadership ($r = .398, p < .001$); compensation ($r = .257, p < .001$); employment security ($r = .479, p < .001$); training and development ($r = .414, p < .001$); and participation in decision-making and teamwork ($r = .471, p < .001$). These findings constitute evidence for the criterion-related validity of the scale and take place in Table 3.

5. DISCUSSION AND CONCLUSION

First, the literature was reviewed, and an item pool of the scale was created by drawing from the two scales commonly used in the field and adding two different dimensions. After content validity and face validity were achieved through the opinions of five experts with experience in the healthcare sector and a doctoral degree, a pilot study was conducted to test the items on 157 individuals representing the main sample. Upon the removal of a total of nine items, the draft scale was finalized with 32 items and six factors.

The draft scale was then administered to the main sample of 309 individuals. The literature includes different views on the sample size in scale development studies. There are opinions arguing that a sample size of 5 to 10 times of the number of items is enough (Cohen & Swerdlik, 2018; Şencan, 2005), whereas some researchers suggest that 50 is too weak, 100 is weak, 200 is moderate, 300 is good, 500 is very good and 1000 is perfect for an adequate sample size (Comrey, 2013). The sample size of the present study is considered good in both views as well as being adequate according to the Kaiser-Meyer-Olkin (KMO) value and Bartlett’s test of sphericity.

Construct validity analyses were carried out by administering the draft scale to the main sample. The present study primarily used the combination of exploratory factor analysis and confirmatory factor analysis, which is a technique used for construct analysis in psychological, sociological, educational, political sciences, marketing, etc. studies (Karagöz, 2019). After the exploratory factor analysis, a further three items were removed from the draft scale. The equal employment opportunities dimension, which was projected during scale development, could not be obtained from the analysis upon the removal of these items. It would be appropriate if the equal employment opportunities dimension was described as providing equal job opportunities for better understanding rather than defining it as the affirming and proactive use of differences to achieve high performance beyond legal obligations. However, it is common to change dimensions during scale development after statistical analyses (Parasuraman, Zeithaml, & Berry, 1988).

Various methods are used to name the subdimensions in the literature. One of these is naming by considering the common characteristics of the items loading on subdimensions. Another is naming by referring to the item with the highest loading value among the items loading on the subdimension (Karagöz, 2019; Şencan, 2005). The former method was chosen in this study, and the scale was finalized with 29 items comprising the performance appraisal, transformational leadership, compensation,
participation in decision-making and teamwork, training and development, and employment security dimensions. The naming of
the factors was made considering scales developed in various fields of the literature, studies on the subject, and recommendations
of expert opinions (Ang et al., 2013; Etchegaray, St. John, & Thomas, 2011; Özçelik, Aybas, & Uyargil, 2016; Villajos et al., 2018;
Zacharatos et al., 2005). Upon examining the coefficients indicating the relationship between the observed variables and the
factors of the factorial model of the developed scale, it was concluded that all coefficients were at a good level. It is believed that
the study adhered to the literature in terms of dimensions and will contribute to the literature because there is no previous study
performed in this context.

The reliability of the scale was established by calculating the Cronbach’s alpha reliability coefficient. Such coefficients were
considered individually for each subdimension. The Cronbach’s alpha reliability coefficients for the six subdimensions varied from
.87 to .96, and the Cronbach’s alpha coefficient was .96 for the overall scale.

Finally, an analysis of the criterion-related validity was performed for the effectiveness of the instrument. This analysis examined
the associations between the subdimensions of the HPWS scale and the empowerment scale. The empowerment scale was chosen
for the analysis because previous studies (Laschinger et al., 2004; Spence Laschinger et al., 2001) have discussed that HPWS
practices drive personnel to improve their performance, thereby leading the institution to achieve high performance, and have
demonstrated empowerment as a mediator. The results of the correlation analysis indicated moderately positive correlations
between the dimensions of the two scales, which prove how well the scale effectively predicted the outcome of another measurement.

Considering the findings presented, it has been concluded that the scale that proven content, construct, and predictive validity,
can be used to evaluate the level of high-performance work systems in hospitals. The HPWS scale can be recommended for future
research to examine complicated relationships, such as the impact of human resource management on organizational
performance, quality of service, clinical outcomes, and a public health issue like patient safety in hospitals.

The limitations of the research were that the study population consisted of personnel from three hospitals because of the
difficulties in obtaining research permits from public hospitals and that the validity of the scale over time could not be verified
because of the intensive workload of the healthcare personnel. Regarding this, the scale can be used again and tested for
consistency over time in different sample groups.

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Danayiyan, Bekaroğlu


ABSTRACT

Purpose- The purpose of this study is to analyze the relationship between corporate sustainability performance and brand performance. By using brand value as a measure of corporate performance, in this study we focus on the crucial question of whether corporate sustainability performance pays off or not.

Methodology- The sample comprised of 63 non-financial companies included in Borsa Istanbul 100 Index between 2014 and 2018. We test our hypotheses by simultaneously estimating the panel logit and panel probit models. We have two models to test the hypothesis. In the first model the dependent variable is the brand performance. Brand performance was proxied through Brand Finance data. In the second model the dependent variable is the corporate sustainability performance. The proxy that we used for the corporate sustainability performance was the membership of BIST Sustainability Index.

Findings- Analysis results showed that the sustainability performance, financial performance, firm size, firm age and their involvement in the service sector had a positive impact on brand performance. When the determinants of the corporate sustainability performance of companies were examined, it was seen that brand performance, firm size and their involvement in the manufacturing sector had a positive impact on sustainability performance. Finally, the financial leverage of companies with high brand performance and sustainability performance was also found to be high.

Conclusion- The empirical results tend to confirm the positive influence of corporate sustainability performance on brand performance. Further, the findings indicate that companies with a leading level of brand performance have a higher sustainability performance.

Keywords: Brand performance, corporate sustainability performance, stakeholder theory, brand finance, BIST Sustainability Index.

JEL Codes: G10, G11, G14

KURUMSAL SÜRDÜRÜLEBİLİRLİK PERFORMANSI VE MARKA PERFORMANSI ARASINDAKİ İLİŞKİ: BORSA ISTANBUL ÖRNEĞİ

ÖZET

Amaç- Bu çalışmanın amacı, kurumsal sürdürülebilirlik performansını ile marka performansı arasındaki ilişkiyi analiz etmektir. Marka değerini kurumsal performansın bir ölçüsü olarak kullanarak, bu çalışmada kurumsal sürdürülebilirlik performansının marka performansı üzerinde pozitif bir etkisinin olup olmadığı araştırılmıştır.


Bulgular- Analiz sonuçları işletmelerin sürdürülebilirlik performanslarının, finansal performanslarının, çocuklarının, yaşının ve hizmet sektöründe yer almalarının, marka performansı üzerinde pozitif etkisi olduğunu göstermiştir. Analizlerin devamında işletmelerin sürdürülebilirlik performanslarının belirleyicileri incelendiğinde, marka performansı, çocukları ve hizmet sektöründe yer almayı sürdürülebilirlik performansını yüksek olan işletmelerin finansal kalınlıklarını da yüksek olduğu tespit edilmiştir.

Sonuç- Ampirik sonuçlar, kurumsal sürdürülebilirlik performansının marka performansı üzerindeki olumlu etkisini doğru bulamaktadır. Ayrıca, bulgular marka performansı yüksek olan işletmelerin daha yüksek bir sürdürülebilirlik performansına sahip olduklarını göstermiştir.

Anahtar Kelimeler: Marka performansı, kurumsal sürdürülebilirlik performansı, paydaş teorisi, brand finance, BIST Sürdürülebilirlik Endeksi

JEL Kodları: G10, G11, G14
1. GİRİŞ


2. LITERATÜR ÖZETİ
Kurumsal sürdürülebilirliğin son yıllarda iş anlayışı için bir sorumluluk olarak görülmesiyle birlikte paydaş kavramı da doğrudan gündemde gelmiştir. Paydaşların işletmeler üzerine yaptığı baskılar artarken, işletmeler de aldığı kararlarda paydaşların beklentilerini ve ihtiyaçlarını göz önünde almaya başlamıştır.


Bu analiz çalışmasında, literatürde yapılan bu çalışmalardan yola çıkılarak KSP’nin marka performansı ile ilişkisini test etmek amacı ile ilk olarak aşağıdaki hipotez oluşturulmuştur.

Hipotez 1: Kurumsal sürdürülebilirlik performansının marka performansı üzerinde pozitif etkisi vardır.


Hipotez 2: Marka performansının kurumsal sürdürülebilirlik performansı üzerinde pozitif etkisi vardır.

Şekil 1’de ve Şekil 2’de araştırma hipotezimiz ile analiz değişkenleri arasındaki ilişkiye gösteren kavramsal çerçeve sunulmuştur.
Şekil 1: Kavramsal Çerçeve

![Diagram 1: Conceptual Framework](image)

3. METODOLOJİ

3.1. Örneklem


3.2. Analiz Değişkenleri

Bu bölümde kurumsal sürdürülebilirlik performansı ve marka performansı arasındaki ilişkiyi analiz etmek için kullanılan bağımlı değişkenler, bağımsız değişkenler ve kontrol değişkenleri tanımlanmıştır.


Finansal performans; piyasa temelli performans ölçümü Tobin’s*Q değeri ile ifade edilmiş olup bu değer aşağıdaki formüle göre hesaplanmıştır.

\[
\text{Tobin’s}^*\text{Q} = \frac{\text{Piyasa Değeri} + \text{Toplam Borç} - \text{Cari Varlıklar}}{\text{Toplam Varlıklar}}
\]

Finansal performans; piyasa temelli performans ölçümü Tobin’s*Q değeri ile ifade edilmiş olup bu değer aşağıdaki formüle göre hesaplanmıştır.

\[
\text{Finansal performans (TOBIN)} = \text{Piyasa Değeri} + \text{Toplam Borç} - \text{Cari Varlıklar}
\]

Finansal kaldıraç (KAL) toplam borçların toplam varlıklara oranı ile elde edilmiştir.

Firma büyüklüğü (TV) toplam varlıkların doğal logaritması alınarak hesaplanmıştır.

Yaş (YAS) cari yıl ile firmanın kuruluş tarihi arasındaki fark olarak hesaplanmıştır.

Sektör (SEK) kukla değişken kullanılarak ölçülmüştür. Kukla değişken işletme BIST İmalat Sanayi sektöründe yer alıyorsa ‘1’, yer almıyorsa ‘0’ değerini almaktadır.

3.3. Veri Analizi


Hipoztezim denklem 1,2 ve 3’te gösterilmiştir, logit ve probit tahmin modelleri ile test edilmiştir.

\[
MP_{it} = \alpha + X_1 KSP_{it} + X_2 TOBIN_{it} + X_3 KAL_{it} + X_4 TV_{it} + X_5 YAS_{it} + X_6 SEK_{it} + \varepsilon_{it}
\]
MP_{it} = \alpha_1 + X_1KSP_{it-1} + X_2TOBIN_{it-1} + X_3KAL_{it-1} + X_4TV_{it-1} + X_5YAS_{it-1} + X_6SEK_{it} + \varepsilon_{it}\hspace{1cm}(2)

KSP_{it} = \alpha_1 + X_1MP_{it} + X_2TOBIN_{it} + X_3KAL_{it} + X_4TV_{it} + X_5YAS_{it} + X_6SEK_{it} + \varepsilon_{it}\hspace{1cm}(3)

MP; t türünde (1/0) değeri alan kükla değişkenidir. Bu değişken eğer i birim t türünde ‘1’ değeri alırsa, yarışmak için önemli olan firma Brand Finance Turkey 100 listesinde yer almış, eğer i birim t türünde ‘0’ değeri alırsa, yarışmak için önemli olan firmanın bu listeye girememesi olduğu fakat çıkarılacaktır. KSP; t türünde (1/0) değeri alan kükla değişkenidir. Bu değişken eğer i birim t türünde ‘1’ değeri alırsa, yarışmak için önemli olan firma Brand Finance Turkey 100 listesinde yer almış, eğer i birim t türünde ‘0’ değeri alırsa, yarışmak için önemli olan firmanın BIST 100’de yer alan geleneksel bir firma olduğu çıkarılacaktır.

3.4. Bulgular

2014-2018 yılları arası Borsa İstanbul-100 Endeksinde kesintisiz yer alan 63 işletmenin değişkenlerine ilişkin tanımlayıcı istatistikler ve korelasyon değerleri Tablo 1'de yer almaktadır.

Tablo 1: Değişiklere Ait Tanımlayıcı İstatistikler

<table>
<thead>
<tr>
<th>Değişkenler</th>
<th>Değişken Isimleri</th>
<th>Ort. Sapma</th>
<th>Std. Sapma</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MP</td>
<td>Marka Performansı</td>
<td>0.44</td>
<td>0.50</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. KSP</td>
<td>Sürdürülebilirlik Performansı</td>
<td>0.29</td>
<td>0.46</td>
<td>0.34*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. TOBIN</td>
<td>Finansal Performansı</td>
<td>1.05</td>
<td>0.85</td>
<td>0.19*</td>
<td>-0.07</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. KAL</td>
<td>Finansal Kaldırıcı</td>
<td>0.63</td>
<td>0.38</td>
<td>0.40*</td>
<td>0.08</td>
<td>0.41*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. TV</td>
<td>Firma Büyüklüğü</td>
<td>21.56</td>
<td>1.61</td>
<td>0.34**</td>
<td>0.64</td>
<td>-0.19*</td>
<td>-0.01</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. YAS</td>
<td>Yaş</td>
<td>41.08</td>
<td>16.68</td>
<td>0.16*</td>
<td>0.11*</td>
<td>-0.06</td>
<td>-0.16*</td>
<td>0.11</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>7. SEK</td>
<td>Sektör</td>
<td>0.71</td>
<td>0.45</td>
<td>-0.37*</td>
<td>-0.04</td>
<td>-0.18*</td>
<td>-0.34*</td>
<td>-0.14*</td>
<td>0.44*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Açıklayıcı değişkenler arasındaki korelasyon katsaylarının hiçbirinin 0.44’ün üzerinde bir değere sahip değildir ve bu ikili korelasyon değişkenleri regresyon analizi için ciddi çoklu bağlantılı probleminin olmadığını göstermektedir. Değişkenlerin varyans genişlik faktörü (VIF) de 10 eşik değerinin çok altında ve bu değer çalışmadaki modeller için ciddi bir bağlantılı probleminin olmadığını işaret etmektedir. VIF değerleri Ek’tte yer alan Tablo E1’de verilmiştir.

Bir firmanın Brand Finance Turkey 100 listesinde yer alma olasılığını açıklamada kurumsal sürdürülebilirlik performansının rolünü test etmek için (1) ve (2) numaralı denklemler tahmin edilmiştir ve Tablo 2’de logit ve probit regresyonlardan elde edilen parametre tahminleri raporlanmıştır. Örneğimde yer alan işleyenler Brand Finance Turkey 100 listesinde yer alırsa daha büyük değişken olarak tanımlanan MP, 1 değeri almakta, aksi takdirde 0 değeri almaktadır. Model 1 için sonuçlar, TOBIN (p<0.10), KAL (p<0.05), TV (p<0.05), YAS (p<0.05) ve SEK (p<0.05) kontrol değişkenleri ile KSP’nin (p<0.10) katsaylarının istatistiksel olarak anlamlı olduğunu göstermektedir. Marka performansı bağımlı değişkeni (MP) ile KSP, TOBIN, KAL, TV ve YAS pozitif ilişkili iken SEK değişkeninin negatif ilişkili olduğu görülmüştür. Şirketlerin finansal performanslarının iyi olması, ölçülerek büyük olması, yaş olarak daha eski olması ve hizmet sektöründe yer almaları, şirketlerin bu listeye girmiş olan şirketlerin finansal kalınlıkları daha yüksektir. Marka değerinin yüksek olması, şirketlerin daha kolay borçlanmasına olanak sağladığı söylenebilir.

Sürdürülebilirlik faaliyetleri şirketler için uzun dönemli bir yatırımdır. Bu yatırımın marka değeri üzerindeki gecikmeli etkilerini test etmek için, Model 2 oluşturulmuş ve bağımsız değişkenlerin gecikmeli değişeri kullanılarak tahmin yapılmıştır. Sonuçlar Model 1 ile paralellik göstermiştir.

Tablo 2: Marka Performansı Logit Probit Model

<table>
<thead>
<tr>
<th>Değişkenler</th>
<th>Model (1)</th>
<th>Model (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Logit</td>
<td>Probit</td>
</tr>
<tr>
<td><strong>Bağımsız değişkenler</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sürdürülebilirlik Performansı</td>
<td>KSP</td>
<td>0.94(0.44)**</td>
</tr>
<tr>
<td><strong>Kontrol değişkenleri</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finansal Performansı</td>
<td>TOBIN</td>
<td>0.39(0.20)**</td>
</tr>
</tbody>
</table>

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Finansal Kaldırac KAL 3.94(0.76)***  2.25(0.41)***  4.28(0.91)***  2.43(0.49)***
Firma Büyüklüğü TV 0.39(0.15)***  0.23(0.08)***  0.46(0.17)***  0.29(0.10)***
Yaş YAS 0.09(0.02)***  0.05(0.01)***  0.10(0.02)***  0.06(0.01)***
Sektör SEK -3.29(0.56)***  -1.89(0.30)***  -3.43(0.66)***  -2.01(0.37)***

Constant -13.32(3.33)***  -7.82(1.90)***  -15.37(3.95)***  -9.37(2.29)***
LR statistic 186.09  186.16  159.29  160.43
McFadden R² 0.43  0.43  0.46  0.46

*p<.05, **p<.01.

Analizlerin devamında, bir firmanın BIST Sürdürülebilirlik Endeksi’nde yer alma olasılığını açıklamada marka performansının rolünü test etmek için (3) numaralı denklem tahmin edilmiştir ve Tablo 3’te logit ve probit regresyon analizlerinden elde edilen parametre tahminleri raporlanmıştır. Örneklemdede yer alan işletmeler BIST Sürdürülebilirlik Endeksi’nde yer alırsa bağımlı değişken olarak tanımlanan KSP, 1 değeri el almakta, aksi takdirde 0 değeri el almaktadır.

Model 3 için sonuçlar, MP (p<0.05), KAL (p<0.05), TV (p<0.05) ve SEK (p<0.05) değişkenlerinin katsaylarının istatistiksel olarak anlamlı olduğunu göstermektedir. Kurumsal sürdürülebilirlik performansı (KSP) bağımlı değişken ile MP, KAL, TV ve SEK değişkenlerinin pozitif ilişki olduğu görülmektedir. Bir şirketin marka performansının iyi olması (Brand Finance Turkey 100 listesinde yer alması), finansal kaldıracının yüksek olması, firmanın ölçük olarak büyük olması ve firmanın üretim sektöründe yer alması, şirketin aynı zamanda BIST SE endeksideşte yer alması, marka değerini arttırmaktadır. Bu sonuçlar Hipotez 2’yi desteklemektedir. Finansal kaldıracın yüksek olması, BIST SE endeksideşte yer alan firmaların daha kolay borçlanabildiği şeklinde de yorumlanabilir.

Tablo 3: Kurumsal Sürdürülebilirlik Performansı Logit Probit Model

<table>
<thead>
<tr>
<th>Değişkenler</th>
<th>Model (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Logit</td>
</tr>
<tr>
<td><strong>Bağımsız değişkenler</strong></td>
<td></td>
</tr>
<tr>
<td>Marka Performansı MP</td>
<td>1.29(0.45)***</td>
</tr>
<tr>
<td><strong>Kontrol değişkenleri</strong></td>
<td></td>
</tr>
<tr>
<td>Finansal Performansı TOBIN</td>
<td>-0.38(0.31)</td>
</tr>
<tr>
<td>Finansal Kaldırac KAL</td>
<td>2.55(0.69)***</td>
</tr>
<tr>
<td>Firma Büyüklüğü TV</td>
<td>1.75(0.22)***</td>
</tr>
<tr>
<td>Yaş YAS</td>
<td>-0.01(0.01)</td>
</tr>
<tr>
<td>Sektör SEK</td>
<td>1.47(0.54)***</td>
</tr>
<tr>
<td>Constant</td>
<td>-42.12(5.20)***</td>
</tr>
<tr>
<td>LR statistic</td>
<td>189.73</td>
</tr>
<tr>
<td>McFadden R²</td>
<td>0.43</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01.

Analiz sonuçları ile ilgili olarak bir başka tespit ise Tablo 2’de MP bağımlı değişkenini açıklayan KSP değişkenin anlamlı düzeyi Model 1 için %5 ve katsayısı logit ve probit modeller için sırası ile 0.94 ve 0.52 ikten Tablo 3’te KSP bağımlı değişkeni açıklayan MP değişkenin anlamlı düzeyi %1 ve katsayısı logit ve probit için sırası ile 1.29 ve 0.71’dir. Bu sonuçlar marka değeri olan işletmelerin müşterilerine karşı kendilerini daha sorumlu hissettiği veya onlardan gelecek olası baskılarla karşı sürdürülebilirlik faaliyetlerine daha duyarlı olduğunu şeklinde yorumlanabilir.

4. SONUÇ

Bu çalışmada amaç kurumsal sürdürülebilirlik performansının (KSP) işletmelerin kurumsal performansları üzerindeki etkisini analiz etmektir. İşletmeler için kurumsal performans kriteri olarak, finansal performans kriteri yerine, marka performansı bağımlı değişken olarak kullanılan analizler gerçekleştirilmiştir ve marka performansının KSP performansına duyarlı olduğu tespit edilmiştir.

Analizlere, 2014-2018 yılları arasında BIST 100 Endeksi’nde aralıksız faaliyet gösteren, mali kuruluşlar hariç işletmeler dahil edilen kurumsal sürdürülebilirlik performansı ile marka performansı arasındaki ilişki panel logit ve panel probit yöntemleri ile analiz edilmiştir. Marka performansı olarak işletmelerin Brand Finance Turkey 100 listesinde yer alması, sürdürülebilirlik performansı olarak şirketlerin Borsa İstanbul Sürdürülebilirlik Endeksideşte yer alması performans kriterleri olarak belirlenmiştir. Analiz sonuçları, şirketlerin sürdürülebilirlik performanslarının, finansal performanslarının, ölçüklerinin, yaşının ve hizmet sektöründe yer...
almaların, marka performansları üzerinde pozitif etkisi olduğunu göstermiştir. Analizlerin devamında şirketlerin sürdürülebilirlik performanslarının belirleyicileri incelendiğinde, marka performanslarının, ölçeklerinin ve üretim sektöründe yer almalarının sürdürülebilirlik performansını pozitif etkilediği görülmüştür. Son olarak marka performansı ve sürdürülebilirlik performansı ile şirketlerin finansal kalıbıları arasında pozitif bir ilişki olduğu tespit edilmiştir.

Analiz sonuçları şirketlerin yapmış olduklarını sürdürülebilirlik faaliyetlerinin marka performanslarına olumlu yansıdığını göstermiştir. Bu sonuç sürdürülebilirlik faaliyetlerinin işletmelerle pozitif bir geri dönüşünün olup olmadığını merak eden yöneticiler için daha önceki çalışmalarda elde edilen benzer bulguları destekleyerek gelişmekte olan ülkeler için bu kapsamlık literatürde katkı sunmuştur.

KSP’nin Türkiye ve yurtdışındaki işletmelerin başvurularında önemli bir faktör olduğunu söyleyebilir. Sonuçlar güçlü kurumsal markaları sahip firmaların, paydaşlara yönelik KSS girişimlerine katılalarak markalarına daha fazla değer katabileceği göstermiştir. Başka bir deyişle, firmalar KSS’yi çeşitli paydaşla ilişkilerini yönetmek ve bu sayede rekabet avantajlarını ve nihayetinde finansal performanslarını artırmak için bir araç olarak kullanmalıdır.

Bu çalışma bazı kısıtlamalar içermektedir ve sonuçları değerlendirmelmesinde bu hususun göz önunde bulundurulması gerekmektedir. İlk olarak, Borsa İstanbul Sürdürülebilirlik Endeksi’nin 2014 yılından bu yana hesaplanmaya başlanması sebebiyle çalışmanın veri seti 2014-2018 arasında yalnızca yılın başı kapsamlaktadır. İkinci kısıtlama ise BIST Sürdürülebilirlik Endeksi’nin daima olmamızı için istatistiksel bir sonuca varmak için genel bir kitle olmayan bir%BIST 50 Endekssi’nde iki alan işletmeler için zorunlu olup olmadığını merak eden işletmelerle birleşik yazılmıştır. Bu sonuçların sürdürülebilirlik faaliyetleri işletmelere pozitif bir geri dönüşünün olup olmadığını merak eden yöneticiler için daha önceki çalışmalarda elde edilen benzer bulguları destekleyerek gelişmekte olan ülkeler için bu kapsamlık literatürde katkı sunmuştur.

REFERANSLAR


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www.brandfinance.com
www.borsaistanbul.com

Ek

Tablo E1: Varyans Artışı Faktörleri (Variance Inflation Factors - VIF)

<table>
<thead>
<tr>
<th>Değişken</th>
<th>VIF</th>
<th>SQRT VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP</td>
<td>1.75</td>
<td>1.32</td>
</tr>
<tr>
<td>KSP</td>
<td>1.77</td>
<td>1.33</td>
</tr>
<tr>
<td>KAL</td>
<td>1.48</td>
<td>1.22</td>
</tr>
<tr>
<td>TV</td>
<td>1.9</td>
<td>1.38</td>
</tr>
<tr>
<td>YAS</td>
<td>1.48</td>
<td>1.22</td>
</tr>
<tr>
<td>SEK</td>
<td>1.69</td>
<td>1.3</td>
</tr>
<tr>
<td>Ortalama VIF</td>
<td>1.62</td>
<td></td>
</tr>
</tbody>
</table>
METRO LINE ON ACCESS TO ISTANBUL AIRPORT AND SIMULATION STUDY OF THE COVID-19 EFFECT

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ABSTRACT

Purpose- It has increased the demand for air transport in the medium and long distance for about two and a half times in Turkey, as in all the world, over the last decade. This increase is for the city of Istanbul in which hosting such a rate of 50% of air traffic in Turkey has brought the need for a new airport. The first phase of Istanbul Airport (IST-LTFM), that is planned to meet the increasing air transport demand in Istanbul and to increase the existing passenger and cargo carrying capacity, was completed in October 2018. Transportation to Istanbul Airport, which is located further away from the places where the settlement is dense, has gained importance due to its location. Since currently only highway transportation is available, it is planned to provide transportation to the airport by rail and seaways. In the first part of the research, the literature integration with other transportation modes, airport integration and airport access options are viewed. In this context, the information of integration between upcoming rail systems and Istanbul Airport have been obtained from secondary data sources.

Methodology- In the second part of the study, the estimated number of passengers at Istanbul Airport in 2021 and the effects of the COVID-19 crisis on the forecasts have been evaluated. In the practice part of the research, through a computer-aided simulation program, the rate of GHYMETRO project’s response to the estimated passenger demand in 2021 was investigated in 3 different scenarios.

Findings- It is foreseen that the GHYMETRO project, which will be carried out according to the data obtained as a result of simulation analysis under effective capacity conditions (with 95% and 100% occupancy rate), can meet 70% of the total passenger demand at Istanbul Airport in the 1st Scenario. In the scenario 2, which is assumed that the COVID-19 crisis continues, it is observed that there will be 99% residual capacity in the pessimistic situation, and 72% residual capacity in optimistic situation. Finally, it is predicted that there will be 43% residual capacity in the pessimistic situation and 14% residual capacity in optimistic situation in Scenario 3, where the normalization process is evaluated after the COVID-19 crisis.

Conclusion- Based on these analyses, it can be concluded that COVID-19 crises stroke almost all aviation activities and its related sectors severely so that up-to-date projects should be taken place to carry on their operations.

Keywords: Istanbul Airport, metro capacity, COVID-19 crisis, air transportation, simulation.
JEL Codes: L93, R41, L98

1. INTRODUCTION

The air transport industry has been an undisputedly important catalyst of globalization and one of the pillars of today’s economy and society. The world economy is now increasingly dependent on air travel, and an increasing share of value is transported by air (Martin, 2009). Unsurprisingly, air traffic has grown steadily both in terms of passengers and transported cargo since the advent of civil aviation. Looking back, world passenger traffic has been around 12% annually since 1945; since 1960, an annual growth of 9% has been reported. Air traffic is expected to continue in the future and double in traffic every 12 years (TRKC, 2010).

Today, the interaction between modes of transport is more intense than in the past, and this has led to the emergence of transport integration, common model, and intermodal concepts (EUROCONTROL, 2005). Airports are no longer an exception, now considered as one of the important multi-mode junctions and central nodes in the network. The transport industry places
great emphasis on research of how to improve the sustainability of the industry through better network integration and the introduction of smoother modes of transport and more optimized systems. Airports, the most vital parts of air transportation, are an important stop in most cities. This situation reveals the necessity of the connections to the airports, primarily the railway (Mahmassani, Chebli, Slaughter, & Ludders, 2002). Since railways are the most sustainable transport links, there has been a clear political trend to encourage investments at this field (European Commission, 2011). Therefore, the development of efficient railway infrastructures and integration with central transportation nodes such as the airport is an important issue in planning more efficient and sustainable transportation networks. Integration with other modes of transportation is an advantage for all parties, since long-distance transportation by air makes a noticeable difference compared to other models (Barreira, 2012).

In the light of the fact that network between city and airport is essential for more demand, Istanbul Airport is planned to be linked to the city by many means of transportation. Railway connection is one of the most important way to provided sustained transportation to/from the airport since it is not being affected from any traffic jam. Especially in crowded cities, intense traffic may cause long transportation time which leads passenger to lose their enthusiasm while choosing air transportation. Hence, new metro line for new airport is quite necessary. To fill this need Gayrettepe – Istanbul Airport Metro Line (GHYMETRO) is being constructed. With this GHYMETRO line, the integration of the city with important public transport hubs and urban rail system lines will be ensured, so that fast and comfortable access to Istanbul Airport will be provided. With this progress, new questions are lined waiting to be replied. How much will new metro cover the present demand and if COVID-19 crisis or similar crises breaks out, would it be still rational to construct such alternative way to the airport etc. In this study these questions are tried to be answered with actual and estimated data obtained from air transportation companies and aviation authorities.

In this study, the capacity coverage ratio of the Istanbul Airport and the effects of the COVID-19 crisis on the forecasts and investments will be evaluated in line with the number of passengers envisaged in 2021. In addition, different scenarios will be evaluated about the continuation of the crisis and the transition process. Then, the impact of a crisis such as COVID-19 on demand will be examined. Afterwards, the issue of discontinuing, suspending, or canceling the investments made through the estimated passenger demand during the crisis and after the crisis in the normalization process will be discussed. It is aimed with this study that, what authorities should do before and/or during an unexpected event while evaluating development and investment options. Another aim is providing a perspective to make reasonable changes depending on pessimistic and optimistic scenarios.

2. LITERATURE REVIEW

Within the scope of the research, the studies on the integration and development between airports and rail systems and their effects on travel times were reviewed. The obtained information emphasizes the importance of simultaneous operation of different modes of transportation to improve the transportation network and reduce the total travel time for both cargo and passengers.

Literature emphasizes that business travelers are less sensitive to ticket fares and they are keen to choose airport which shortens their total travel time wherever leisure travelers looks for cheaper ticket. Moreover, figures show that great majority of air travelers prefer public transportation to access to the airport (Koster, Verhoef, & Kroes, 2010; Chang, 2013; Akar, 2013; Gokasar & Gunay, 2016).Integration between transportation means such as high speed rail services, metro, tramway, bus, shuttle services etc. utilizes total carried passenger capacity. Therefore, instead of constructing new infrastructure types, authorities should focus on connecting existing modes in order to keep costs at minimums and utility at maximum (Givoni & Banister, 2007; Jiang, Timmermans, Chen, Sun, & Yao, 2019; Givoni & Chen, 2017). In addition to all transportation facilities, it is clearly seen that since astronomic figures are in question, integration of railway systems and airport must be observed and calculated before coming into operation. Hence, integration models must be designed for all different scenarios and comprehensive analysis should be made with decision support systems from obtained data such as simulation outputs, survey result etc (Obermair & Glock, 2014; Zografos, Madas, & Salouras, 2010; Gudmundsson, Cattaneo, & Redondi, 2020).

Research in methodology has shown that Binary logit (BL), binary panel mixed logit (BPML), generalized binary panel mixed logit (GBPML), goal function modelling (GFM), Auto Regressive Integrated Moving Average – ARIMAX, Principal Component Analysis (PCA) and discrete selection models are commonly used since it is not an isolated and/or single concept to comprehend (Koster, Verhoef, & Kroes, 2010; Zografos, Madas, & Salouras, 2010; Gokasar & Gunay, 2016; Gudmundsson, Cattaneo, & Redondi, 2020). Therefore, while making a decision about integration of transport types, both internal and external factors should me taken into consideration.

Integration air transportation with other way of transport has so much different result depends on country and region. When the distance between two point is faraway, demand will increase naturally. So that, even small percentage of integration with
air transportation may provide high benefit (Jiang, Timmermans, Chen, Sun, & Yao, 2019). Since most part of passengers does not prefer/use private car to access airport, public transportation integration become even more vital for sustainable transportation network (Akar, 2013; Chang, 2013; Gokasar & Gunay, 2016).

In case of unexpected events, managers and authorities should have alternatives to come up with. Petrol crisis, epidemics etc. have massive effect on air transportation. That is why, investments and developments must be delayed or cancelled provided that undesired global events occur. What authorities should do is, predicting possible healing process and rearrange their plans (Gudmundsson, Cattaneo, & Redondi, 2020).

The studies in the field are listed in the table below Table 1.

**Table 1: Literature Review**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Purpose of Study</th>
<th>Methodology</th>
<th>Results and Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Givoni &amp; Banister, 2007)</td>
<td>Determining the role of railways in air transportation in the future.</td>
<td>Railway connections to airports and relationship between rail and air transport networks has been compared.</td>
<td>Integration can provide better utilization of existing air capacity rather than replicating some high speed rail routes and services.</td>
</tr>
<tr>
<td>(Koster, Verhoef, &amp; Kroes, 2010)</td>
<td>Analyzing the cost of access travel time variability for air passengers.</td>
<td>Binary logit (BL), binary panel mixed logit (BPML) and the generalized binary panel mixed logit (GBPML) model have been applied.</td>
<td>Business travelers are willing to pay more to relatively shorten travel time, in part because of its low cost sensitivity.</td>
</tr>
<tr>
<td>(Zografos, Madas, &amp; Salouras, 2010)</td>
<td>Establishing a decision support system for total airport operations management and planning.</td>
<td>For the elicitation of decision support requirements and stakeholders' preferences, the goal function modelling (GFM) approach was initially used.</td>
<td>This system offers a simple, fast, and useful solution to scenarios that may cause delays or halts of activities. Thus, forward-looking scenarios can be simulated, and more accurate decisions can be made.</td>
</tr>
<tr>
<td>(Chang, 2013)</td>
<td>Examining the preferences of elderly passengers to the airport</td>
<td>Five-point Likert-scale was used to reach data. After getting data, Importance-Performance Analysis (IPA) is used.</td>
<td>Elderly passengers prefer to be transported to the airport by private vehicles instead of public transportation.</td>
</tr>
<tr>
<td>(Akar, 2013)</td>
<td>To examine the choice of modes of transportation to Port Columbus International Airport</td>
<td>Principal Component Analysis (PCA) and Binary logit models have been applied respectively.</td>
<td>Passengers traveling alone or with few people seem to prefer public transportation rather than individual vehicles. Those who prefer public transportation prefer rail systems the most after shuttle services.</td>
</tr>
<tr>
<td>(Obermair &amp; Glock, 2014)</td>
<td>A research on the railway connection of Vienna International Airport has been conducted.</td>
<td>Modeling was implemented using the AnyLogic simulation program.</td>
<td>With this program, a transport company foresees easily to guess which train allows transporting maximum passengers efficiently.</td>
</tr>
<tr>
<td>(Gokasar &amp; Gunay, 2016).</td>
<td>It is aimed to be modelled of access to airports in Istanbul in 2016.</td>
<td>A study was carried out by applying the discrete selection model.</td>
<td>If public transportation is available at origin point of passenger, they prefer public transportation more intensely.</td>
</tr>
<tr>
<td>(Givoni &amp; Chen, 2017)</td>
<td>Examining the airport-rail integration level and potential in Shanghai Hongqiao Integrated Transport Center.</td>
<td>The integrated hub model - short-haul services are provided by the airlines using the railways (rather than aircraft) to feed traffic into the airlines' long-haul services- has been implemented.</td>
<td>Despite the excellent infrastructure, the actual level of integration is low, but the potential benefits of this integration can be enormous.</td>
</tr>
<tr>
<td>(Jiang, Timmermans, Chen, Sun, &amp; Yao, 2019).</td>
<td>To discover the determinants of the airport-rail integration service in China.</td>
<td>A comparative analysis based on historical data and specified preferences was used.</td>
<td>A small increase in the market share of the airport-railway integration service provided a significant increase in the number of passengers.</td>
</tr>
<tr>
<td>(Gudmundsson, Cattaneo, &amp; Redondi, 2020)</td>
<td>Predicting the healing process of air transport after Covid-19.</td>
<td>Auto Regressive Integrated Moving Average - ARIMAX models are applied with structural changes.</td>
<td>Although the results obtained differ across countries, in general, it means that at the end of 2023, air transport companies will catch up with the previous situation.</td>
</tr>
</tbody>
</table>

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3. DATA AND METHODOLOGY

3.1. Methodology

Today, aviation operators use different simulation tools to support decision-making at various levels through the use and evaluation of alternative scenarios (Hafner, 2019; Landau, et al., 2015). In this study, it has been evaluated how Gayrettepe - Istanbul New Airport Metro Line (GHY METRO) connection, which is planned to be completed in the middle of 2021, can meet the passenger demand in 3 different scenarios. The AnyLogic 8.5.2 simulation program was used to simulate different scenarios. In the research, a simulation was designed by considering the frequency of the metro, travel time, metro capacity and the number of passengers that can be transported each time. The data required to estimate the transportation of the foreseen passengers in 2021 was taken from the General Directorate of State Airports Authority (DHMi). Information such as the number, capacity and duration of the railway system were obtained from GHYMETRO and METRO ISTANBUL data sharing sources. Different scenarios as transportation some of the passengers other than by rail, increasing the number of voyages during peak hours and the presence of other transportation modes, nevertheless, are not included in the simulation. Since all obtained data is annual, estimations are made by taking the average values into consideration.

To calculate the accurate one-way capacity of each wagon (for 50 passengers) for an hour, tens of simulation have been run. The simulation model shown in Fig.1 was run in perfect condition where no crises or demand-fall occur. After test, the average number which was stated as 939 is used for all different scenarios by multiplying number of wagon and workhours. Figure 1 shows the transportation time and number of passengers carried to airport.

Since our study works on the metro which has 200 passenger capacity firstly, 939 was multiplied with 4. Secondly, emerging data was multiplied with 18 which is estimated as daily workhour. Finally, it is figured out that, two-way (between city and airport) and 200 passenger capacity metro working 18 hours can carry approximately 135,216 passenger a day.

Figure 1: Model with time and number of passengers carried for one-way 50 Passengers

3.2. Simulation Model

The number of incoming and outgoing passengers in 2021, which is the first of the estimated data to be used in the implementation section, is assumed to be 70 million for 2021, according to the increase rate of the past 3 years (approximately 2%). The daily passenger carrying capacity of the GHY METRO, was accepted as 70,000 in the secondary data sources given by the authorities. It was also assumed that the travel time of the line would be 32 minutes on average and transportation to the airport would be provided every 3 minutes. It is assumed that the metro service operates on average 18 hours a day and transports an average of 200 passengers each time to the airport and / or city. The percentages used in the scenarios were determined by the experts’ outlook in the aviation field and the feasible restricted forecasts made by the authorities. In the study, different future scenarios were determined in line with the scarce data and expert comments. Thus,
hypothetical expert opinions on future data and information which is not approved by official authorities were considered as a limitation in the study. The table below shows the percentages to be used in 3 different scenarios (table2).

Table 2: Percentages to be used in 3 different scenarios

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>%100 of Total Estimated Passenger(TEP)</td>
<td>Pessimistic Case (%1 of TEP)</td>
<td>Pessimistic Case (%40 of TEP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optimistic Case (%20 of TEP)</td>
<td>Optimistic Case (%60 of TEP)</td>
</tr>
</tbody>
</table>

The estimated number of passengers to be transported per day (if a total of 70 million passengers are distributed per day on average) used in Scenario 1 is 192,000. The situation where the metro line operates at full capacity (100% efficient use) is simulated. In this case, it is seen that it is possible to transport an average of 135,216 people per day (total daily round trip).

In Scenario 2, the situation is simulated in which the COVID-19 crisis or similar crisis environment continues, and all interaction and travel opportunities are extremely limited. It is assumed that the drug to be developed for the treatment of COVID-19 crisis will be widely available in the market in late 2021 or early 2022 (Gudmundsson, Cattaneo, & Redondi, 2020). Therefore, there is both extreme concern by the passengers and strict restrictions by the authorities. In this scenario, two different situations - optimistic and pessimistic- are evaluated. In the pessimistic scenario, a situation is simulated in which almost no scheduled flight is allowed except for compulsory flights. This means that the total estimated number has decreased by 99% and the total number of passengers carried per day is reduced to 1100 passengers. In the optimistic scenario, the situation in which the crisis environment continues but certain scheduled flights are allowed, and the low level of travel activity is on. In this case, it is assumed that 38.350 passengers, which represent only 20% of the total estimated number of passengers, are carried.

A scenario is simulated in Scenario 3 where the COVID-19 crisis or a similar crisis environment is over, and the normalization process takes place under the control of authorities’ precaution. In this scenario, two different situations are evaluated, named optimistic and pessimistic. In the pessimistic scenario, a situation is simulated in which the rules are a bit stricter and travel is significantly restricted without an acceptable reason.

3.3. Data Analysis

All the estimated and actual data obtained were analyzed separately for all scenarios using the AnyLogic Simulation Program. Estimated demands are determined according to each scenario in the program and the rates of meeting the demand are revealed with the simulation data obtained.

In the first scenario, total handled passengers are assumed as 192,000 daily. In the full capacity metro simulation of 135,216 of the total passengers can be transported with the upcoming rail system. This figure corresponds to 70.43%, an important part of the passenger needs to be carried daily, in line with the information accepted in the simulation model (Table 3.). In this scenario, the crisis cases that cause all direct and indirect aviation companies to come to a halt have been consciously ignored in future predictions. Otherwise, long-term plans based on the short-term increases and decreases instead of average data by years may have undesired erroneous results.

In the second scenario, the situation in which the COVID-19 crisis or a similar crisis environment continues is discussed. In the light of the analysis data, when the pessimistic situation in which the flights drop to 1% level is simulated, 99.98% capacity surplus is envisaged. When the optimistic situation, where certain strict restrictions are eliminated and the total demand is assumed to be around 20%, is simulated, an overcapacity of 71.63% is expected (Table 3.).

Within the scope of the third scenario, the situation in which the crisis environment has ended, and the normalization process has been taken into consideration. Two possibilities are simulated, pessimistic and optimistic, to determine the potential
range based on estimates and expert opinions. When the pessimistic situation, which is assumed to be 40% of the total demand, where normalization begins but the restrictions continue by the authorities, is simulated, an overcapacity of 43.0% is envisaged. When the optimistic situation, which is assumed to be stretched with normalization, and where 60% of the total demand is supposed to travel, is simulated, a capacity surplus of 14.80% is expected (Table 3).

Table 3: Demand Coverage Rates of Scenarios

<table>
<thead>
<tr>
<th>Scenario Description</th>
<th>Estimated Number of Passenger (Daily)</th>
<th>Estimated Metro Capacity (Daily)</th>
<th>Demand Coverage Rate (Daily)</th>
<th>Unused Metro Capacity (Daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.st Scenario (%100 of Estimated Number of Passenger)</td>
<td>192000</td>
<td>192000</td>
<td>70,43%</td>
<td>0%</td>
</tr>
<tr>
<td>2.nd Scenario (pessimistic case) (%1 of ENP)</td>
<td>1100</td>
<td>1100</td>
<td>100%</td>
<td>99,9%</td>
</tr>
<tr>
<td>2.nd Scenario (optimistic case) (%20 of ENP)</td>
<td>38350</td>
<td>135216 passengers</td>
<td>100%</td>
<td>71,63%</td>
</tr>
<tr>
<td>3.rd Scenario (pessimistic case) (%40 of ENP)</td>
<td>76800</td>
<td>76800</td>
<td>100%</td>
<td>43%</td>
</tr>
<tr>
<td>3.rd Scenario (optimistic case) (%60 of ENP)</td>
<td>115200</td>
<td>115200</td>
<td>100%</td>
<td>14,80%</td>
</tr>
</tbody>
</table>

*ENP: Estimated Number of Passenger

4. FINDINGS AND DISCUSSIONS

In three different scenarios made with the help of Anylogic Simulation Program, it was tried to foresee to what extent the GHYMETRO line will meet and/or exceed the total passenger transport demand at Istanbul Airport. In the first scenario, normal conditions are taken into consideration and it is assumed that the number of passengers will increase in line with the historical data announced by ICAO and DHMI. In addition, the data in the first scenario also parallels the data accepted in the subway work. In addition, it is stated that the expeditions and capacity can be increased to meet the passenger demand if needed. The data obtained after the simulation study show that 70.43% of the passengers already carried by bus and car can be carried by rail systems. When this figure is viewed in terms of city traffic, it seems possible that bus and car density will decrease significantly. In addition, the absence of any traffic on the metro line is expected to shorten the time for passengers to travel to and from the airport. Another advantage of the subway service is the decrease in the rate of individual vehicles and carbon monoxide emission. This will help reduce air pollution.

The second scenario is simulated to present the figures that will arise when faced with a situation that would largely halt the activities of the aviation industry, such as the COVID-19 crisis, which particularly affected the world in the first quarter of 2020. In the pessimistic situation simulation, which was based on when the crisis was experienced at the highest level, an excess capacity of 99.9% emerged. Although unacceptable, these results could be recorded in times of crisis, e.g. in April and May 2020 (DHMI, 2020). It shows that no investment should be made in such a situation. On the contrary, ongoing investments should be canceled or stopped. But especially sudden changes should be ignored when making such decisions. Otherwise, it may not be possible to meet the demand encountered after normalization. In the optimistic situation simulation, the process in which the mandatory restrictions that cause the number of trips to be reduced are considered. Although not as pessimistic, an overcapacity of 71.63% is anticipated. In such a case, even if the long-term investments are not canceled, they can be delayed due to the inconvenience state of normalization process. Otherwise, in this process, where revenues are at very low level, costs may put businesses under greater difficulties.

Situations that are tried to be simulated in the third scenario were carried out to predict a precautionary stage before the emergence of any extraordinary situation or the situation that will occur when the normalization stage is passed at the end of this period. In the pessimistic situation scenario, a capacity surplus of 43.0% is predicted to occur during the post-crisis normalization process. While simulating this process, two states have been considered. First one is that the authorities lifted the measures only in the limited process during the normalization process and secondly, suspicious, and abstaining attitude of passengers using air transportation. In this case, it is considered as an appropriate decision that to postpone the investment until at least one of two states has lost its effect. In the optimistic scenario, a situation simulated in which the abstaining attitudes of the passengers has been decreased, crisis has been significantly overcome psychologically and sociologically, and the authorities have greatly stretched the rules. As a result of the analysis, it is predicted that an excess capacity of 14,80% will occur. In such a case, tendency of the process should be evaluated by the experts over again, and if the picture gives a positive impression, the metro line works should continue as planned. However, if the estimations are made that the normalization process will be prolonged, it may be considered an appropriate strategy to delay or slow down the plans in parallel with this period.
5. CONCLUSION

Air transport can have a much wider network when supported by other modes of transport. It is extremely important to integrate multiple transportation methods to shorten the total journey time. All these works should be carried out in line with potential demand. Crisis periods are processes that should be managed cautiously for the aviation sector, which is directly affected by most global events. The COVID-19 crisis that emerged in the first quarter of 2020 not only brought air transportation to a halt, but also significantly affected future investment plans. Since different scenarios are determined in accordance with the data and expert comments currently available, it is likely that there may be some changes in figures and rates in future studies.

In the first scenario where the crises are ignored, the expected normal demand is expected to be met by 70.43% with the metro line to be built. This is expected to significantly reduce urban-airport road traffic. Thus, direct contribution will be made to the reduction of air pollution. In addition, the journey time of the passenger from the city to the airport will decrease and become more prominent. Total journey time will be shortened.

In the pessimistic situation simulation of the second scenario, in which crisis periods are simulated, no alternative is anticipated for any indirect or direct aviation business, other than bypassing the process immediately. Because a business policy that is arranged according to the moments of crisis will lose its validity in post-crisis situations. As a result of the optimistic situation analysis in the second scenario, long-term investments can be stopped by suspension or postponement. In this way, it can be ensured that scarce assets are used for more vital items such as personnel wages in these situations where incomes are minimized.

In the pessimistic situation simulation of the third scenario in which the normalization process is simulated, the emergence of an overcapacity of 43.0% indicates that the process has not yet returned to normal. In such a case, when deciding to stop or cancel an investment, two things or at least one of both must be taken into consideration: (1) the authorities that have a power to stretch the restrictions, (2) abstaining the approach of passengers and employees. Otherwise, it may not be possible to return the expenditures in the short term. In the optimistic situation simulation of the third scenario, an analysis was carried out, assuming that authority restrictions have been stretched, and the abstaining approaches of passengers and employees have turned to normal, or at least one of them occurred. In this case, only an excess capacity of 14.80% is foreseen. In accordance with positive rise forecast, short-term delays or no-delays can be made to investments and plans upon. Thus, at the end of normalization, it will be possible to provide sufficient service infrastructure to meet the targeted demand.

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ASSESSMENT OF TOTAL QUALITY MANAGEMENT ACCORDING TO STRATEGIC PLANNING: A CASE STUDY FOR A BUSINESS IN THE TEXTILE-APPAREL INDUSTRY

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ABSTRACT

Purpose- After evaluating the core elements and general concepts of Total Quality Management (TQM) through extensive literature analysis, the objective of this study is to adapt it to a company in order to search these principles totally out. This company, which is one of firms of the textile-apparel sector in Turkey, is preferred for this direction because its management team already is notified about TQM’s highlights and supports application.

Methodology: Strategic overview, in the business context, is an important principle and the main aim of every organization would be to obtain it. TQM is about sustainability of improvement of individual, group and organizational performance. The main focus on continual improvement is what distinguishes TQM from other management practices. TQM is not a potential fix; it’s about continuously improving the way issues are applied. Most companies are applied TQM strategies in today’s environment to gain sustainable business advantage.

Findings- The analysis shows that the implementations start with the preparation of some survey questions for all of the corporation’s employees, its people, consumers and people working in this company to find out their degree of satisfaction, since TQM includes discovering the points due to quality influence where they are dissatisfied with the business and promoting the business. By using a systematic approach, the results are analysed in depth. Assessment values are summarized with the contribution of the management.

Conclusion- This enables the difference between its expectations and actual results to be highlighted. Any recommendations for the organization are given at the end of the study, based on the assessments.

Keywords: Business, strategic, textile-apparel sector, total quality management (TQM).

JEL Codes: E32, L19, M11, Z31

1. INTRODUCTION

Over the last thirty years, the business environment has been changing at an ever increasing rate. It has come from a number of causes, including advancement of technologies, globalization, and globalization and growing desire for quality products and services from consumers. It is increasingly understood that quality and consumer loyalty goods and services are essential to sustainability for every business.

Quality has become one of the most important consumer decision factors in the selection among competing products and services. It is a fact that the word of “quality” has not a determined and specific mean. Everyone can define quality with respect to his/her thought. Now a few of this definition will be given. The total composite product and service characteristics of marketing, engineering, manufacture, and maintenance through which the product and service in use will meet the expectations of the customer. Statistical Process Control (SPC) is the most popular way of getting high quality products from a manufacturing process. It is also the main subject of Quality Control and Total Quality Management (TQM). Thus, this is necessary to make the implementation according to the subject. The choice of competitive services and products has made quality one of the most significant aspects for customer perception. Whether the consumer is an individual, an industrial
company, a retail organization or a militant defense program, the phenomenon is widespread. Therefore, understanding and quality improvement is a key factor that leads to success, growth and increased competitiveness. Improved quality and successful use of quality as an integral part of the overall business strategy have significant returns on investment. To consider taking a global perspective and concepts and theories about quality management, it is important to understand the entire monitoring system as a new management approach (Oakland, 2005; Samat et al., 2000; Wilkinson, 1992). TQM is a concept that is rooted in the continuous improvement of market results and the consistency of the products generated by these operations; it is also a holistic management process, geographically restored over an organization and which includes both divisions and staff and applied retrospectively to cover all vendors and consumers. TQM as an administrative technique of a corporation that sets itself firmly by its Quality Assessment to ensure the institute Efficient application of total quality management (TQM) in organizations has become a major topic for the workers detailed consumers, workers, professionals and profitable institutions who serve directly or indirectly within a company (Qaiser & Rizwana, 2015; Ngambi & Nkemkiafu, 2015). If workers become interested with different organizational procedures and are educated to become more professional, a TQM campaign cannot succeed (Khanna & Gupta, 2014). Many scholars believe that human resources (individuals) are crucial to enforcing quality control strategies, since humans are also the major factors in operations (Zhou, 2012). High-leadership organizations conduct every of the nine TQM Principles are more successful and able to deliver output of better quality (Das et al., 2011). Competencies relate to managers’ talents, knowledge, personalities and actions within the companies’ context. A healthy combination of these qualities fosters professional growth synergies, fosters the attention of staff, customers and organizations, and contributes to superior results (Plessis & Beer, 2010). Today’s market challenges faced by companies, that is, globalization, competitiveness through production, and technological progress. Achievement subsequently depends on developing the organizational competencies, such as tempo, responsiveness, cognitive ability (Gupta et al., 2012).

The European Framework for Quality Management (EFQM), the Swedish Quality Award (SIQ), and the Malcolm Baldrige National Quality Award (MBNQA) are the various evaluation frameworks that define the TQM compliance requirements while taking into consideration its core principles. The American MBNQA approach combines soft as well as hard facets of TQM and has been found to be immensely useful in terms of incorporating changes to the strategic and organizational processes across both public and private organizations. This paradigm incorporates six elements, including leadership, strategic strategy, consumer attention, performance management, human resource management, and knowledge and review, and has been extensively studied by numerous scholars, including Yusr et al.(2017), Ooi (2014), and Sila (2007). TQM is a method of management that emphasizes on continual change by resources, strategies and principles (Mahmood et al., 2014). The past several decades also seen TQM’s major involvement in corporate policies. Being a systematic method of management, TQM strives for quality growth in all aspects of the company (Abbas, 2019). This attribute contributes closely to sustainability (Li et al., 2018). Management leadership serves as a guiding factor in the adoption, growth and progress of TQM through a corporate climate that is agile, creative and stakeholder driven. The leaders’ engagement has to be influenced by priorities, objectives, and initiatives that allow the organization to produce greater success (Rahman & Bullock, 2005). In this context, the way the equipment, software and network services are handled and distributed is a crucial factor in determining the contribution of management to quality (Fotopoulos & Psomas, 2010). The maintenance of partnerships with the major supply providers and other stakeholders is a core aspect in every organization’s approach in the new market climate (Vanichchinchai and Igel, 2011). In the other side, the success of certain strategic TQM considerations such as product design and development, project control and the usage of quality assurance techniques include employee involvement by comprehensive preparation, encouragement and coordination (Seinor and Swailer, 2004). From the academic point of view, there are certain researches which have the study and interpretation of how the concepts of success function as their core aim. Most common are those evaluating performance processes focused on universal ISO 9000 principles or other quality control and development methods including such benchmark tests, Six Sigma, Just in Time, Lean, Enterprise Resources Management and the Balanced Scorecard (Dahlggaard-Park et al., 2013). Prajogo and Sohal described two contradictory claims in a study of the literature that concerns the interaction between TQM and creativity. The first statement indicates that TQM is positively linked to success in innovation as it creates a structure and community that will provide companies with a productive atmosphere to innovate (Roffe, 1999; Kanji, 1996; Mahesh, 1993). The supporting claim suggests that applying the concepts and methods of TQM could impede organizations from becoming innovative (Samaha, 1999; Wind & Mahajan, 1997). Customer oriented theory has gained substantial publicity in relation to its harmful impact on competition from many main concepts of TQM (Slater & Narver, 1998; Wind & Mahajan, 1997).

Dean and Bowen suggest though from an organizational development viewpoint, TQM is somewhat more obsessed with execution of the plan, or delivery, than with strategic option, or purpose. Thus, the problem is to examine which specific TQM approach may be related to. Reed et al. suggest that TQM’s material should be differentiated on the basis of two market orientations: customer orientation and method orientation. With consumer awareness, companies should concentrate on

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achieving a business edge, where they might underperform their rivals by drawing more consumers for respected services and paying a higher price. Though not expressly mentioned, this notion implies that TQM is correlated with a policy of distinction under consumer orientation. In the other side, businesses would be seeking production quality changes to minimize errors and losses within product orientation. This perspective can be traced back to TQM’s beginnings as grounded in Statistical Process Control (SPC) concepts. The principle of kaizen that dominated TQM literature throughout the 1980s and 1990s often underlined the value of developing procedures rather than innovating goods (Reed et al., 1996; Imai, 1986). Many of the often addressed issues relating to philosophical aspects are (i) challenges in determining what TQM is, (ii) how to categorize different levels and subgroups, (iii) what to include and what to remove under the TQM umbrella, (iv) what concepts are reasonable to use in the order to categorize, (v) what are the interactions between TQM, BE, Lean, and 6σ, and (vi) is TQM unusual? The misperceptions were either about philosophical issues or about regarding the application / functional dimensions of QM (Dahgaard-Park et al., 2013).

According to this subject, the main objective of this study, after researching important features and basic principles of TQM through a thorough literature review, is to extend it to a company to thoroughly explore such principles. This company, which is one of the businesses in the apparel industry in Turkey, is preferred for this target because its top management is already aware of the advantages of TQM and encourages its application. Implementations of this study starts with the preparation of certain survey questions for all employees of the company, its consumers, the people working in an organisation to find out their degree of confidence, since TQM involves the identification of points due to statistical process control where they are dissatisfied with the business and promote the company. Evaluations are evaluated in depth using a systematic approach in the last part of the research. The results of the assessment are highlighted with the guidance of the management. It illustrates the disparity between the goals and the real outcomes. Several suggestions-recommendations for the organization are given at the end of the report, based on the importance of the research. Some comments for the corporation are addressed at the completion of the research in accordance with the assessments.

2. LITERATURE REVIEW

2.1. Background of Quality Management

Since the Second World War there have been several significant developments after centuries when the principles of quality and quality control have evolved dramatically. Quality management (QM) began with simple inspection systems in which a company traditionally employs inspection teams to examine measure or test products and compare them to a product standard. That will happen to all phases of the development of products including the landscape, research in progress and shipping. The system was based on the inspectors’ finding of poor quality products from good quality. This is then dismantled, reworked or sold in lower quality. Several outcomes have been obtained (Jabonski, 1994; Johnson, 1993; Kanji & Asher, 1993; Berry, 1991). The statistical inference quality monitoring (SQC) theories developed by Walter Shewhart, scientist from the Bell Laboratories. Shewhart suggested that control of production processes is much more effective than inspection of endpoints for quality assurance and improvement. Over certain years, total manufacturing requirements, standard checks and evaluations have been used to track the management of quality and insure the standards are met (Anderson, 2010; Yong and Wilkinson, 2002).

During the Industrial Revolution, the abilities of trainees working for skilled craftsmen and qualified trainees were achieved and their quality was guaranteed and defective goods were not given to the customer. In the conditions of time and high efficiency, this traditional method was successfully applied. Operative control of quality as a craftsman who was fully controlled throughout his production process and who asserted the performance of the goods successfully completed. In addition, the original research by Shewhart (1939) on improving the process of statistic control (SPC) and PDCA (Plan Do Test Act) had an immense effect in that area. However, the origins of engineering devices date from the 1930s and innovation still persists (Schroeder et al., 2005; Yong and Wilkinson, 2002). To increase the efficiency of the operations, organizations adopt different efficiency management (QM) activities. Experts believe that QM activities are scientifically as well as behaviorally based methods. The correlation between performance-oriented technological and interpersonal strategies has contributed to paradoxical partnerships. Improving efficiency in quality involves recognizing the connection between technologically and behaviorally driven methods (Cho et al., 2017).

The absence of an overall analytical structure defining the role of QM activities in strategic planning contributed to the advent of severability clause-based strategies (Jusoh & Parnell, 2008; Sousa & Voss, 2008; Simpson et al., 2012; De Clercq et al., 2014; McAdam et al., 2016). Having established the question or phenomenon of SME strategy implementation as the point of reference for the analysis of QM theoretical development, contingency-based theory construction is required to demonstrate which QM techniques can affect strategic alignment. This observation is concerned with the description of concept by Gioia and
Pitre (1990) as a description of topics and their interconnections which demonstrate how a problem exists, or why. Contingency theory has arisen as a tool for investigating the linkages between strategic planning and QM processes (Garg and Goyal, 2012; Raymond and St-Pierre, 2013; McAdam et al., 2016) and allows a variety of contingency factors or variables (CVs) to be defined immediately. QM provides a variety of views on its effect on performance, reliability and standardization with respect to its effects on quality, growth and creativity (Backström et al., 2017). Nonetheless, the desire to merge the two sides of this continuum remains impossible to apply in reality. This is somewhat shocking, considering that the original aim of QM was to increase service for clients of practitioners (Fundin et al., 2017). Yeung et al. (2004) has demonstrated how QM activities fit with business objectives in a survey of 225 Hong Kong-based electronics firms. However, following this optimistic observation, the authors have observed substantial misalignment between QM theory and reality, owing mainly to the complex, rapidly evolving operating environment. In view of the fact that the Yeung et al. (2004) thesis was (a) undertaken over a decade ago and (b) focused on a single industry in a single geographic region, it would be worth revisiting the issue of whether research into QM and Practice is distorted. As such, this review seeks to recognize the issues that QM professionals are facing and help appreciate how recent QM work approaches them.

The systemic approach known as Total Quality Control (TQC) was founded by Deming as Edwards Deming, an American statistician and physicist. The results of a system involving interlinked processes according to him are quality. Ishikawa has defined TQC as company-wide quality control. Quality was the outward domain of QC (Quality Control) experts, but Japanese culture indicates that everybody in all business units join, exercise and research quality control. The productivity responsibility for all workers is generally worked out rather than by a professional profession. TQM is a strategy to continuously increasing the quality of received products and services by engaging all levels and organization functions (Yong & Wilkinson, 2002; Samat et al., 2002; Wilkinson, 1992). Four P’s are essential to supplying consumers with premium goods and services. The following four Ps are: Planning – includes policy development and implementation and Techniques; the creation and product management of effective alliances and services. Performance – including the establishment of a metric system for results; an organization’s healthy scorecard self-assessments, evaluations, feedback and benchmarking. Processes – involves process awareness, implementation, creation and redesign; frameworks for controlling quality; continuing improvements. People – Human resources management; changing culture; coordination; individuals; Development and continuing to learn; communication processes (Oakland, 2005; Oakland, 1993; Ross, 1993). TQM’s principal goal is to include a management structure and organizational culture that requires a systemic mechanism of continuous enhancement of company processes which would also increase the standard of services TQM provides (Dedhia, 2005; Samat et al., 2002).

2.2. Perception for the Management of Total Quality

While many suggestions for successful implementing changes exist, there is no tried and true way of ensuring a successful experience of change. Although the transition is specific to company and management, companies that plan to make a shift have several different choices, recognized as commandments for change. These are listed as below (Keleda, 1996; Powell, 1995; Bounds et al., 1995; Porter & Parker, 1993):

1. The evaluation and the need for modification of the organization: this assessment should comprise the background, operational aspects, the effectiveness of the business as well as its strengths and weaknesses at various levels of the organization.

2. Establish a shared vision and direction: The vision is an effort, in sometimes grandiose terms, to express the desired future business. Strategic objectives should be short and up-to - date and should be equally anxious and powerful.

3. Separate from the past: even though hanging onto certain components of organizational structure, such as the destination, mythologies or culture and history, is also essential to take a close look at what activities and frameworks no longer perform and try to get beyond them

4. Set an urgent feeling: The pioneers of organizational reform will create a sense of urgency by thoroughly explaining the condition and speaking to the company itself continuously. TQM data can be presented to organizational members about customer fulfillment, competitive forces, and the need for satisfaction as a status to understand the need to achieve TQM systems.

5. Respect the effective leadership position of every company without the assistance of members who can be seen as tools to transformation, even for the TQM. Top management supports and promotes a vision of TQM culture, aligns employees with a vision and leads to change.
6. Policy sponsorship alignment: Implementers must be able to accept TQM’s focus on communication, synergy and staff involvement from those who are the receptors of change, as key sponsors.

7. Craft an implementation plan: Organisations need to have implementation plans that map out key events, steps, and processes the plan should enable the organisation to bridge the gap between what is and what should be. Implementation plans must be designed with the needs of specific organisations in mind.

8. Development of capable structures: changing the status quo and developing new ways of organizing, measuring and evaluating progress are essential to any organizational changes. Many realistic solutions such as product tests, seminars and preparation, or visual frameworks such as flags, gatherings or going through a team's office room may be used.

9. Communicate, connect individuals and remain honest: efficient leadership from the start of a change effort is critical every dimension of modification has to be mentioned, outlined and discussed at various managerial levels.

10. Supporting and institutionalizing change: administrators highlight the importance of transition by reinforcing their current behavior, and Senior Management engagement is evident and seen every day.

Quality oriented evaluation for publication by a recognised body of standards that includes guidelines, specifications or protocols for an organized approach to a particular task. It can contain specifications for product construction, research procedures, classifications, best practices and other factors. It defines safety criteria which are meant to minimize accident risk. Quality oriented has several advantages: It sets commodity value thresholds. They are a quality-process system. It cuts prices, and saves time and money. A collection of practices or strategies whose aim is to determine that all quality criteria are met by inspection and testing via tracking processes and addressing quality issues.

2.3. TQM Advantages and Developments

Generally, TQM (Total Quality Management) has three main advantages and benefits in terms of enhancing profitability and competence, enhancing business efficiency, and improving customer satisfaction. Improved profitability and competitive performance and competitiveness of companies (for instance market shares, growth, and investment revenue) are definitely enhanced by improving product and service quality. Higher costs minimize promotions, repeat sales and greater customer shares provide the gains of better quality facilities. Businesses with advancement quality are important and quality of the product is increasing faster, which is an important component of business profit growth. A quality distinguishing strategy based on the customer can often not only lead to customer satisfaction but also to an increase in sales volume and reduced prices (Powell, 1995; Bounds et al., 1995; Porter & Parker, 1993; Cartin, 1993). TQM allows a corporation, by developing and simplifying its business process (efficiency), to generate more with its existing capabilities and, for the first time, to do more with a greater awareness of internal and external customer requirements (effectiveness). This increase in efficiency and effectiveness can reduce total costs, decrease customer sales, increase sales and even attract new customers at lower marketing expenses. A good end result does not actually impact outcomes, but in the long run.

The main goal of this research is to use it to an enterprise to find out these important concepts after examining the key elements and conceptual frameworks of TQM through extensive literary studies. This company has been chosen for this destination, since its senior management is already aware of and supports the advantages of TQM. It is one of the companies in textile industries in Turkey. The results of the assessment are stated through the management’s commitment.

3. DATA AND METHODOLOGY

3.1. Production for Apparel-Textile Industry

Apparel is one of the industries where consequential-significant phases of the generation in the industrialised-technical politically organized bodies of households under a single government have been established much more or fewer parallel to this sourcing of producing. Research and Development is the fundamental of this industry. It bases on developing and producing new products to meet consumer demand and find ways to produce these products. Moreover, the relative frequency via which modern goods are defined has accumulated (so-named fast fashion) and the consuming - using up of garments in the industrialised lands-cities-locations have become larger. The Second important issue is marketing of Products of this business which all activities involve in creating and selling profitable Products. Manufacturers must decide what raw materials to buy and what fabrics to manufacture and they base their decisions on careful studies of what customers want (Macchion et al., 2015; Morgan & Birtwistle, 2009; Martinich, 1997).
Append is one of the basic necessities of human civilization along with food, water and shelter. The textile industry is real dealt out and various sector with a universal framework in large stages of the industry, where producing and consuming appear in various locations-places and sometimes various subcontinents. The apparel goods chain structure circular from the generation of raw matters (fibres). This growing consumption has become parallel-collateral with differences in the development policies in the apparel sector approaching what is named fast fashion. Apparel Production Segment includes all people and processes involved in designing and making garments (Macchion et al., 2015; Morgan & Birtwistle, 2009).

In a very short time, ABC Company has a vision and can be a leader in the clothing sector of children and teenagers and created a new trademark in Marmara Region. This business consists of design, product management, sampling, human resources, finance, product development, and sales and marketing departments. Process Sequence of Apparel Manufacturing of this company is presented as below in Figure 1.

**Figure 1: Process Progression of the Manufacturing of Apparel (ABC Apparel Company)**

Apparel production companies have various departments or divisions and may include research and merchandising - design and product development.

### 3.2. Implementation of TQM

These stages are summarized as below (Richard, 2005; Weaver, 1995; Oakland, 1993; Ross, 1993; Berry, 1991);

**Stage 1: Identification and Preparation.**

**Stage 2: Management Understanding and Commitment** the success of a company sometimes depends on the top managers’ single-minded approach to dealing with company problems.

**Stage 3: Scheme for Improvement:** For the development of a quality improvement scheme, it is necessary to identify the quality problems in each division, each department and throughout the whole organisation.

**Stage 4: Critical Analysis:** For a review and critical analysis, it is necessary to obtain the information about success and its quantification in order to understand the further requirements for quality progress.

The textiles and apparel sectors are in the short term candidates for diverse industries (Syduzzaman et al., 2014; Islam & Khan, 2013; Balaji, 2012).

- No manufactured goods danger is available. Turkey is one of the few countries in the world with sufficient capacity for raw materials.

- There is an essential prerequisite to be interested with promotions and distribution platforms. New marketing and supply channels investments are therefore increasing in the target markets.

- Sectorial international exchange firms will reduce selling and distribution issues for small and medium-sized enterprises.

- To boost corporations’ profits, the government has begun offering
• Brand analysis assistance
• Opening, store and server assistance in international nations.
• Support for international fairs participating.
• Encouraging education in foreign trade.
• Support for professional workers.
• Environmental awareness support.

4. STRATEGIC PLANNING ON THE APPLICATION OF PRINCIPLES OF TOTAL QUALITY MANAGEMENT

Leadership or Management of a business is an essential consideration for the performance of an organisation. While successful leadership is not the only component of high performance, it is important to improve it. From total destruction into a powerful and proud organization, effective leadership can transform the organization into effective guidance and supervision. Leadership thus has a powerful effect on an individual’s behavior to leverage the capacity for achievement of organizational performance. Leadership has been one of the subjects of growing emphasis in researchers’ interest (Mustafa & Bon, 2012; Day & Zaccaro, 2007; Juran, 1989).

A well-managed quality improvement process (QIP) can help a company achieve that lofty goal and the benefits are real and unbeatable. A QIP can provide a company with a sustainable competitive advantage of significant proportions. Some of the benefits to be achieved as below (Garvin, 1998; Cartin, 1993; Bound et al., 1995; Juran, 1989);

• Improving profitability,
• Increasing customer retention,
• Reducing customer complaints and warrant claims.
• Reducing costs through less waste, rework, and so on,
• Greater market sharing,
• Increasing employee involvement and satisfaction, lower turnover,
• Increasing ability to attract new customers.

The applications tend to plan these questionnaires for all workers, consumers, clients, providers, and workers in this field, as TQM needs the recognition and assistance of points where they are unhappy with industry. These questionnaires are classified according to the fields. These are listed as below;

Comments on requires
• Which easily does the business react to enquiries from its customers?
• How acceptable is the time taken to respond?
• How does the business react, giving the details that they want to their customers?
• What kind of details will they want?
• How well does the business suit its needs to position orders in this way?
• How effective are the employees of the business at managing technological queries?
• How do they help represent our customers?

Cost Expenditure Questions
• Why do the costs of businesses align with those of like-minded suppliers?
• Where does the firm stand to give them value for money?
Delivery Query

- Are they consumer friendly?
- What are the lead times for delivery?
- Which should have been acceptable?
- How frequently does the firm fail to deliver on time?
- And how late are the deliveries when it does?
- Which reliable is the company to let consumers know if the supplies are not going to arrive on time?
- How critical is the business shipping to a given period for customers?
- What is appropriate for them at that time?

All topics were divided into two regions as stated in the questionnaire methodology according to the significance and satisfaction levels of the participants on each subject.

The six topics are seen in the following diagram due to answers of the questionnaire methodology among many of the subjects falling within each continent.

**Figure 2: Region of Opportunities and Strengths Chart**

(i) **Region of Opportunities**: The subjects in this region are those having an importance score higher than the average and a satisfaction score lower than the average. This means that although people attach an extreme importance to these subjects, ABC Business does not meet their expectations. Therefore, each subject in this region can be seen as an opportunity to increase the satisfaction level. ABC Business should pay much more attention to these subjects and make some improvements in these fields.

(ii) **Region of Strengths**: This is the region of subjects that people are satisfied with and give importance to for these subjects, ABC Business seems to meet people’s expectations and make them happy. The only thing that must be done is to sustain the current satisfaction level; therefore, there is no urgent need to make improvements.

**Policies and Strategies**: People of ABC business consider keeping up with technological developments as an important subject. Additionally, defining tasks and responsibilities clearly is a subject which managers and officials deem important.

**Appreciation and Rewarding**: Although appreciation of success and effort is the subject to which all people attach the highest importance, they do not give the same importance to the existence of a clear and written appreciation and rewarding system. Managers have greater expectations of the issues related with appreciation and rewarding system than workers and officials do.
Social Rights and Waging System: People believe that issues related with payment system are very important, as usual in many companies. Being provided with social rights and being able to purchase company’s products easily are not taken into account by managers; however, they are considered as important by workers and officials.

A significant result is that determination of wages and salaries according to personal qualifications and job done possess the highest importance for all people, regardless of the educational level. While quality of food and transportation services is of considerable importance for primary and secondary school graduates, they do not care about job safety.

People appreciate their company for keeping up with technological developments; however, this satisfaction decreases as educational-training level increases. Another subject causing unhappiness among people with high educational-training level is that organisational structure, tasks and responsibilities are not clear yet.

Management Attitudes: Reliable communication and criticisms made on the job not on the personality are the two subjects, which are considered as extremely important by all people, regardless of their positions. Moreover, workers are less interested in how performances are evaluated whereas managers give much importance to the existence of a clear and written performance evaluation system. Additionally, consideration of needs and wants by managers, supports for improving technical and professional skills are the most important issues for officials.

Working Environment: While workers and officials primarily give importance to a comfortable, clean and peaceful working environment and teamwork, for managers, reliable communication, being open to criticism and correction of faults have prior importance. Moreover, holding meetings effectively and being ready for meetings on time are of considerable importance for officials and managers rather than for workers.

Cleanliness and comfort of the working environment gains more importance as the educational level increases. The only exception is that postgraduates give as much importance to these issues as people graduated from primary school. Easy access to tools and equipment, harmony and co-ordination among people, and attending meetings at predetermined times are more strongly considered by people with higher educational level one interesting point is that postgraduates attach less importance to teamwork than university and high school graduates do.

5. CONCLUSION

All people are highly pleased with determining the vision, mission and values altogether as the strategy of the business. One of the subjects that almost all people complain about is that organisational structure, tasks and responsibilities are not clear yet. While workers think that ABC Textile Company utilises from their performance effectively, managers and officials do not agree with them. A significant result about social rights and payment system is that the employees of ABC Textile Company become unsatisfied with the payment system as educational level increases. In addition, dissatisfaction resulting from working hours and number of working days is directly proportional with the educational level.

People appreciate their company for keeping up with technological developments; however this satisfaction decreases as educational level increases. Another subject causing unhappiness among people with high educational level is that organisational structure, tasks and responsibilities are not clear yet. While considering the fact that the essential goal of TQM was to achieve a satisfaction level among all partners of an organisation at least it aimed and to improve and sustain this satisfaction level on a continual basis.

Everybody is delighted to decide the dream regarding to government and strategy as the purpose and principles overall. One of the issues in which almost everybody worries is that the organizational framework, roles and obligations are still not simple. While employees think the ABC Business utilizes its money effectively, administrators and officials do not agree with them. An essential fact of the civil justice and wage structure is that this company’s workers are unsatisfied with the salary program as the standard of employment rises. In fact, the dissatisfaction that results from working hours and the number of working days is directly linked to the degree of employment.

People respect your company as you keep pace with technical developments; however, the cost of education rises. Another issue that causes discontent for highly educated individuals is the fact that the organisation’s context, authority and duties are still unclear. Taking into consideration that the main aim of TQM was to achieve at least a certain degree satisfaction between all employees and to develop and expand this sense of happiness continuously.
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THE CONTRIBUTIONS OF GROUPWARE SYSTEMS TO ORGANIZATIONAL COMMUNICATION AND STRATEGIC MANAGEMENT IN COVID-19 EPIDEMIC PERIOD

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ABSTRACT

Purpose - The purpose of this study is discuss how Groupware systems integration and practices would affect the organizational communication and strategic management of business organizations in Covid-19 epidemic period.

Methodology - So what do people could do in these difficult conditions? Will people throw the ideas to garbage or they keep producing although they are into the trash? are the main discussion questions of this study.

Findings - Based on findings, by the process of wrestling the unpredictable environmental circumstances in Covid-19 period; it would be the most practical strategic decision for strategic managers and business leaders to integrate the Groupware systems to the business organizational structures and take advantage of Groupware systems in business operations as a communication tool.

Conclusion - The study concludes that many businesses in Covid-19 epidemic period should use Groupware systems since they provide many substantial contributions to business strategic management and ease the organizational communication.

Keywords: Strategic management, Covid-19 period, organizational communication, groupware systems, strategies in epidemic

JEL Codes: M1, O3, L2

1. INTRODUCTION

Successful strategic management subjects to a problem itself, not to a solution. Managers could benefit from the real problem as an entrepreneurial opportunity by finding an innovative solution and start a new business to meet exact needs of society. Steve Blank, who is considered to be the Guru of Entrepreneurship and new startups, has a saying that “Get out of the building!” Most of people are just inside the building. To understand whether their ideas are correct or not; people need others’ opinions. Different views could help people to discover whether the problem they have identified is really a problem that can benefit from as a good initiative. These days, due to the conditions of the Covid-19 epidemic make gathering others’ ideas difficult to observe and implement. Because getting out of the building is very dangerous and not healthy so far.

Covid-19 period has damaged most of business activities and a variety of industries in many ways. Many developing businesses have been closed despite the fact that they were in the beginning stage of their lifecycle. Cities were empty, people were leaving their homes to migrate rural areas and they have preferred to wander away from shopping malls, markets and such crowded areas. Covid-19 period commonly has forced business people, entrepreneurs and employees to work from home by the necessity of social distance enforcement. However, the obligation of working from home might bring along several undesirable outcomes since many employees are not accustomed to work remotely. Most of managers have little idea about how they could decide future strategic plans and implement them to new working requirements and dealing with new abnormal working conditions constrains strategic managers. They are almost not even able to figure out and meet demands of their employees and working teams by afar. Most of strategic managers and decision makers in the organizations are emotionally unprepared to deal with such extraordinary circumstances.
In the light of the reports published by the leading research institutes of the world such as The Gallup Wellbeing Index, Harvard Business Review, and The Self-employment Review including the evaluations of Covid-19 period, the researchers have reported that strategic managers, top level decision makers and entrepreneurs could not estimate which is the most appropriate need-oriented business roadmap to follow regarding future business facilities and entrepreneurship activities after the epidemic. The decision making process in organizations would have influenced very unfavorably by the pandemic.

Today still the business people and strategic managers have no choice to get rid of the ambiguity and they have to deal with the uncertainty to survive. The best business approach would be deciding new strategic business plans and adapt them to the organizational practices and shortcomings of the former strategies to struggle tough economic conditions (Jeyaraj et al. 2006). To plan useful business strategies, managers have to exploit the technological and information systems on their business practices and the technological infrastructure of business organizations must have to be developed. By the process of wrestling the unpredictable environmental circumstances, it would be the most advantageous alternative for the strategic managers and the business leaders to integrate the Groupware systems to the organizational structures and take advantage of these systems in their organizational practices.

In the following section, the significant arguments compiled from the researches on the subject are discussed. After giving brief information about strategic management in Covid-19 epidemic period, how could strategic managers alter Covid-19 epidemic conditions to business growth opportunities will be discussed. Then, the differences in planning new strategies, establishing close relationship with employees and investing in home technologies to get effective business outcomes in Covid-19 period from same practices in pre-epidemic period will be debated. Further, the Groupware systems and the areas where these systems are used will be described. Lastly, developing new strategic business model by integrating Groupware systems, both the disadvantages and advantages of Groupware systems to organizational communication and strategic management in Covid-19 epidemic period will be discussed. Why Groupware systems are the appropriate technological systems for the business organizational communication and strategic management in the Covid-19 epidemic period, and the contribution of Groupware systems to strategic management and business organizations will be explained in the light of various insightful examples.

2. LITERATURE REVIEW

How could strategic managers alter covid-19 epidemic conditions to business growth opportunities? Strategic managers are forced to reshape the previous business strategies in this period. New strategic plans, new targets for employees, new funding requirements, a new supply chain management, new objectives for subordinates, a new organizational structure, new technological systems applications and implementations have been required in business organizations in recent Covid-19 period (Ågerfalk et al. 2020).

The new business scenarios and strategies forthcoming up with Covid-19 epidemic have been emerged by the volatility and inconstancy of demand for products and services which causes stress on many strategic managers. With respect to a survey conducted by Harvard Business School to measure the effects of Covid-19 on businesses and economies, 75% of the business owners who participated in the survey stated that they were highly deeply concerned about the unpredictable nugatory economic impact of the spread of the epidemic whole world.

If small and medium sized businesses redesign previous strategic business plans, they still have a chance to be succeed by switching these undesirably complex conditions to business opportunities. Since many of the strategic managers have altered working places as their homes, they feel undisturbed and free working environment allowing them to plan new feasible and applicable strategies; right.

2.1. Planning New Strategies

First, strategic managers should make sure that they have a strong motivation for how businesses can survive in difficult conditions. Managers should treat their working teams in early times in a day and strategic managers should set a plan against the negative expectations on their organizations regarding ideas everything will be getting worse in near future considering the business operations and future sales. Strategic managers should believe first that nothing will be get out of control and then they should make their employees believe same opinions and they should influence them in a positive manner.

For example, managers let their employees work from home will need to adapt a new technological infrastructure to lead their office workers and organizational operations in Covid-19 epidemic and provide them lack of technological devices and software in order to business duties and tasks being fulfilled from home (Wagner et al. 2019). On the other hand, managers have to rescheduled strategic plans and implement them to all marketing plans including existing markets and new markets to enter.
Strategic managers also should take action to ensure the continuity of their business plans with their newly constructed organizational, technological and operational infrastructure.

2.2. Establishing Close Relationship with Employees

Strategic managers should provide effective communication with their employees whom allow them to work from home to avoid exposure to negative health consequences of the epidemic in their workplace. Even if employees already start to use some communication tools in their office by the epidemic, communication will gain a new dimension for managers when they switch from home as a working place. Physical appearance and online communication in the office environment is different from online communication in the home environment. Abuses are likely to occur in this new communication type, and managers may have some trust problems and even conflicts with their employees in spite of the fact that there is no shortage of many work-from-home opportunities.

Strategic managers may have trouble communicating with their working teams in a meaningful and efficient way. Thus, to minimize such communication problems, they should find the video conference programs such as Zoom that best fits the existing remote technological system of the company and the software like Zoom videoconference program could meet communication needs and resolve some of reliance problems. Managers could not only contact with their employees but also they could use these programs to maintain the working environment where they can do brainstorm pioneering important ideas and useful insights. To illustrate, strategic managers could encourage the candidates to interview by video conferencing. Office-based face-to-face meetings allow strategic managers to execute the online version of meeting. Many of employees have the custom of ignoring notifications, claims, requests and orders when they are in the physical office are tend to continue these habits via online debates and conferences in the home offices. Accomplished strategic managers should remind these employees to stick to the business requests and should track the employees on the purpose of providing them to meet expectations quickly and complete their duties comprehensively. After all, these online tools are means of communication for managers during Covid-19 pandemic.

2.3. Investing in Home Technologies to Get Effective Business Outcomes

As a strategic manager, top executives make sure that homes of their employees are equipped with the latest technologies to help them work efficiently from home. Without these advanced technologies, the business practices, the productivity of organizations and strategic goals could be negatively affected. It is possible to face effectivity and efficiency troubles in business operations. Hence, strategic managers consider investing in the latest technologies for their employees to use their homes by not experiencing any connection errors (Mert, 2020).

There are very useful sophisticated technological tools managers could buy and integrate the business systems. For instance, strategic managers could benefit from the software up-to-date technologies such as Skyroam to radiate Wi-Fi signals from local data to distant networks. This will help the employees use the internet at the speed of office level without getting money out of their pocket. Similarly, managers could invest in some video conferencing programs such as Amazon Chime.

3. CONCEPTUAL FRAMEWORK

Groupware system which is a software that supports working teams’ interactions and helps to improve some dynamics such as forming business calendars, scheduling business plans, and meeting on videoconferences (Mohamed et al. 2004). Applying knowledge management principles to enhance cross-functional team performance (Roseman and Greenberg, 1996). Journal of knowledge management. Groupware systems refer to online programs that afford assistance to business people working together collectively while the working places are located remotely from one place to another.

Groupware systems that enable business people in a real time collaboration which are called as a synchronous software. Groupware systems allows the employees to share of calendars, e-mail, information, business conferences online. Each organization member could observe and reach the dataset of other person having broadcasted. Groupware systems sometimes may be called as a collaborative software called as Computer-Supported Cooperative Work (CSCW) (Klein, 2012).

As mentioned Groupware systems have been generally classified in two groups: synchronous groupware and asynchronous groupware (Licea and Favela, 2000) regarding whether working team members collaborate in real time or not. Synchronous groupware supports group presentations online by the use of video calls or online chat (Sapsed et al. 2002). Synchronous groupware systems could assist online presentations from different working places at a same time, video calls with chat must have been at a different time at one working area before (Wang, 2008).
On the other hand, asynchronous groupware systems require shared computers and software such as e-mail and the workflow of online business processes (Campbell, 2006). Meanwhile using the same computer, business people need to be in the same place but they have a chance to be online at different hours (Borges et al. 2001). Some high-tech software programs like online business workflows could give employees a chance to fulfill their personal tasks from different working places at different time durations (Wagner et al. 2019).

A couple of online applications of groupware systems subsume the programs Lotus Notes and Microsoft Exchange. These online systems could assure business people calendar sharing, e-mail sending, and the replicating working sheets and files via spread of online business network groupware system. As a result of online information sharing, all program users could reach the same data; in other words, the data becomes visible and accessible by network participants (Wise et al. 2013).

Moreover, online face-to-face conferences and business meetings could be performed by the programs CU-See Me and Microsoft NetMeeting. Lotus Notes and Domino Lotus Notes were the first full-featured data sharing groupware systems. These groupware system programs have been formed for the purpose of the use of customer care services and business operations like sales consultancy. These Groupware systems usage areas focus designing the concept of object stores in which data is gathered and analyzed by various replicated online server providers.

Domino advertisement systems like HTTP called as Hypertext Transfer Protocol services and online data storage services like Lotus Notes serve as an Internet application server which provides online systems security and keep the quality of online systems features such as encryption constant and sustainable (Markolf et al. 2018). Microsoft Exchange Server is similar to Notes and Domino (Tuma and Tuma, 2006). It stores collaboration features and security information of working teams in an organizational online network (Robichaux, 1999). Novell GroupWise has boundaries restricted with Novell Directory Services which ensure a powerful online reviver to business workflows (Ying et al. 2014).

4. DISCUSSION

4.1. Developing New Strategic Business Model by Integrating Groupware Systems

Covid-19 epidemic has rendered many strategic business plans dysfunctional and outdated. Therefore, to cope with the new out of the common conditions; strategic managers require to implement new strategic plans and develop a practical business model. If managers do not have a strategic plan and business model to overcome adversity welded from Covid-19 pandemic, they have no chance to apply literal business practices (Seetharaman, 2020).

The managers could determine denouements that help business operations to keep up with critical changes by the help of Groupware systems applications. For instance, strategic managers could determine which of their business customers are by Groupware systems. The most crucial solution is empowering the organizational technological infrastructure in the Covid-19 epidemic period so that integrating Groupware systems applications to existing organizational information systems is the right action plan for the businesses should implement right now (Liu et al. 2020). Strategic managers could generate new marketing strategies by the use of Groupware systems with an ease to keep these plans functional since Groupware systems applications could ensure strategic managers a facility of close supervision. Some of the suppliers could not be responding to demands of businesses, strategic managers could identify other alternative suppliers during this period. Strategic managers should get the business priorities right and they need to temporarily postpone some non-priority transactions until the getting over these troublesome days.

4.2. The Disadvantages of Groupware Systems to Organizational Communication and Strategic Management in Covid-19 Epidemic Period

Groupware systems have lots of advantages, but the systems have several disadvantages in business organizations. Groupware systems may bring impersonality, technological problems, lack of social cues or may slow to develop new business connections and may extend the process of completing business tasks (Bergiel et al. 2008).

The disadvantage linked with impersonality is about the behavioral science. People could not get face to face communication which limits mimics and body expressions. This may result in loss of reliability among working team members responsible for business projects and thus the group members may hesitate to share their individual ideas (Wang and Rean, 2017). This impersonality issue may also lead to miscommunication and misunderstandings due to the lack of body and facial expressions. Misinterpretation of information sharing is commonplace when communication is done via information systems (Alvarez et al. 2018).
The disadvantage of technological problems may have arisen from either the multitude or lack of Groupware systems’ features. The number of applications of groupware systems may cause complexity for program users whom are inexperienced of doing mistakes while interpreting the dataset. Furthermore, Groupware systems may trigger the invasion of personal privacy because of the lack of unreal social indications (Gilson et al. 2015).

Another disadvantage is related with the cost of Groupware systems applications and the affordability of program users. In Covid-19 epidemic period, there has been an economic crisis whole of the world and many economic restrictions of small to medium sized businesses have been faced while budgeting their business operations. Thus many businesses have perceived that they could not afford to invest in Groupware systems integration to their information systems and despite the fact that Groupware systems applications have been required for the success of organizational practices, strategic managers could not decide to pay for it. Some of the practices of Groupware systems are training programs, technical support, operating, and server and networking hardware and these practices cost too much compared to the budget and the capital level of many companies (Renties et al. 2012).

The other disadvantage of Groupware systems may be the network speed and the reliability of data sharing. Businesses having outdated information systems may observe many failures of systems due to the compatibility of the systems. However, program users of Groupware systems would not face such problems since Groupware systems have strict data share policy which protects the rights of customers without any legacy gaps and missing.

Lots of disadvantages of Groupware systems applications have been based on the fact that these information systems could only be successful if a critical mass of program users have been preferred to apply the systems. However, Groupware systems users usually have low level of education on the business community concerning systems. This low level education leads a doubt of strategic managers that investing in Groupware systems is a right decision regarding the capability of organization members to effectively apply these systems to their duties and business tasks (Luppicini, 2007). Having a videophone is useless if a person is the only one who has it (Wagner and Thompson, 2017). Another concern that contributes to Groupware systems is the notion of interoperability and the lack of compatibility of online applications. If strategic managers have decided to invest in Groupware systems that they would have to sustain that business people or the employees, they desire to connect via these systems must have the compatible form of technologic devices and software as well (Hamilton, 2020).

4.3. The Advantages of Groupware Systems to Organizational Communication and Strategic Management in Covid-19 Epidemic Period

Groupware systems applications make easier for people to do what task they have to fulfill easily as expected by almost all strategic managers in Covid-19 epidemic period (Stuerzlinger et al. 2006). The success and effectiveness of Groupware systems on business operations are closely linked with several success factors. For instance, in multicultural firms due to cultural differences Groupware systems could change in practice to support collaboration and this ability of adaptability to certain changes makes sure employees feel secured and supported by the organizations since groupware systems only work completely when employees feel secured in organizational structures (Suadamara, 2011).

Furthermore, Groupware systems could promote connect business people by making employees feel a part of the projects of organizations and the systems allow employees to start communication from the beginning of their attendance in organizations and keeping strong communication up till they decide to leave their job (Kuruppuarachchi, 2009). This advantage of Groupware systems is very helpful for achieving success in strategic management and meeting the new normal organizational requirements in Covid-19 epidemic period.

Supporting and coordinating the data sharing and communication network among employees are the main goals of information systems (Lee and Choi, 2003). Yet, information systems are not in charge of dictating and controlling them (Lee et al. 2012). Groupware systems must provide some contributions to program users. For example, these systems have to have some online education packages which help program users to learn how to apply Groupware systems applications to their business practices (Franseen et al. 2011). Besides, Groupware systems section each stage in accordance with the next rollout warning, this warning makes the application more comprehensible and practical in order to address unknowing business program users.

There is one motivational illustration of an organization using groupware systems in Covid-19 epidemic period. This organization really attaches significance to its rivalries and needs of its customers. The firm had not utilized the information systems as efficiently as it has done in recent epidemic period. Thus the company could administrate the analysis of internal operations such as technological capabilities, the weaknesses of technological infrastructure, and the requirements of technological systems (Chorfi et al. 2020).
The chief information officer (CIO) has quickly improved and reformed the firm’s internal use of information technology systems by the Covid-19 epidemic period. The most important task of CIO has been the formation of firm-wide information systems standards in order to compete with the competitors in business environment having uncertain conditions. While reviewing communication software and focusing on gaining competitive advantage among the rivals, CIO has notices the Notes groupware systems (Liu et al., 2020). CIO has introduced later that Groupware system is a breakthrough technological system; because this online system has the potential to form a revolution in how business members both inside and outside of the organization communicate simultaneously and Groupware systems could coordinate business activities and information sharing by the regard of inspecting security issues. Ere long, CIO has acquired a site license to apply and integrate Notes to the information systems of the organization.

CIO has applied Notes program greatly within various parts of the organizational operations. CIO has set the business principals to the lower level managers both at national meetings via Groupware systems and meetings at local offices through information systems. During these meetings CIO has promoted company vision of how Notes could help to lead company expertise and to ensure the interoperability of business facilities (Penichet, 2008).

In Covid-19 epidemic period, based on companies’ interests and purposes the requests to information systems especially Groupware systems have improved and the authorization of technological infrastructure in almost all companies has empowered rapidly throughout the information systems of firms in spite of the fact that the widespread use of Groupware systems within the home offices had advanced slowly before Covid-19 epidemic period (Pan and Zhang, 2020). Groupware systems where the e-mail access had been commonly adopted into information systems, the application of Groupware systems in data sharing processes and the integration of Groupware systems into business operations and strategic management systems, had been panned out of well at home offices remote control systems in Covid-19 epidemic period. According to moderate level field studies about Groupware systems integration to remote information systems, the researchers argue that at least two organizational goals such as cognitive and structural goals of the organizations have impacted by the adaptability of employees and executive managers to and the ability to understand the mechanism of these information systems.

Briefly, Groupware systems have lots of advantages for businesses and strategic management decision especially in Covid-19 epidemic crisis although several disadvantages (Verma and Gustafsson, 2020). If users of Groupware systems could decrease the social pressure, these systems become efficient for organizational practices due to saving process time and making processes more flexible. Groupware systems also may reduce travel expenses and information sharing cost. Further, these systems provide to facilitate faster, easier, more persuasive and more clear social network, enable telecommuting, make forming project teams with common interests easy where gathering many people by face-to-face at the same time at a same place and help to solve problems of working teams fast (De Araujo, 2018).

All in all, Groupware systems could increase efficiency of business operations. Each group member responsible for a certain project could access to all of information relevant to business tasks. Abundant work could be eliminated by Groupware systems, less time is required for searching data, and so group members have a chance to spare more time to work on required tasks. In addition, Groupware systems could arise the creativity. With an open communication, each member of working groups could share new ideas and diversified insights which improve the innovativeness of the project as a whole (Van Slyke et al. 2002). Lastly, Groupware systems could regulate common schedules, manage e-mails with ease, maintain bulletin boards, hold real-time network meetings, share files collectively with the calendars and make database and spreadsheets access practical and applicable.

5. CONCLUSION

In Covid-19 epidemic period, strategic managers require the services of freelancers to overcome the difficulties of tracking and working from home. These freelancers are professionals with significant experiences about information systems allowing business people to work from home remotely and provide the desired business results. Fortunately, there are many experienced freelancers in information systems sectors and businesses today.

If strategic managers decide to invest in Groupware systems such as Notes information systems, online applications and data sharing systems etc. they may be considering reducing the other business costs, since Groupware systems integration is highly expensive especially for small and medium sized companies. One of the leading Groupware systems companies, has hosted thousands of designers from all over the world and has organized a design contest to enter leading innovative markets (Van Slyke et al. 2004). After all this company is able to quickly access and convince many new Groupware systems users to buy their information systems and integrate their existing business organizations at an affordable pay in exchange for a low-cost award to the winner.
Those who work in information systems industries where the Covid-19 epidemic is deeply negatively affected often have transferable technological skills that could add value to the companies taking advantages of Groupware systems. Many strategic managers may have broader skills and experiences in different industries but; it is now time to learn and apply more on information systems technologies (Abdous and Yoshimura, 2010). The strategic managers who could demonstrate superior energy and have a motivation to learn more about Groupware systems could plan and manage accomplished business strategies in Covid-19 epidemic period (Giesbers et al. 2014).

In summary, the study concludes that many businesses in Covid-19 epidemic period should use Groupware systems since the systems provide many substantial contributions to business strategic management although these systems have several disadvantages being eliminated. The only concern that strategic managers should notice is the organizations have to have properly educated employees and systems users on the procedures of Groupware systems to get maximum benefit from these systems in business operations. In order to obtain the maximum efficiency level from Groupware systems, employers need to take full advantage of all the systems features and tools that Groupware systems offer.

REFERENCES


DETERMINING THE FAULTY AND REFUND PRODUCTS IN MANUFACTURING SYSTEM: APPLICATION ON A TEXTILE FIRM

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ABSTRACT

Purpose- In this study, it is aimed to improve the production and quality control processes of a company operating in the textile industry. For this purpose, predicting faulty and refund products by using simulation of oversampling and undersampling applications.

Methodology– In this study, there are 250 different variables and 72959 lines of data on the production line. These data have been taken from the last 1-year data of the firm. In this study, simulation has been done. New machine learning methods have been used by simulating. The reason for the simulation is that it was easy to detect the refund and faulty conditions made in a large lot group production in previous studies. However, the aim is to investigate whether the accuracy of the prediction algorithms will yield consistent results in terms of the increase in the number of refund and faulty products when production is made in a larger structure. In the simulation method, “oversampling” and “undersampling” methods have been used. While making simulation prediction, in the literature, boosting algorithms, which are used as ensemble machine learning techniques, have been used. In this study, simulation has been done as follows, while the number of production lots increased, refund and faulty products were increased within the same application. The reason for doing this is to investigate whether the prediction status in normal machine learning algorithms can be captured in a larger data stack. This process is called oversampling. Then, the “undersampling” method was applied. According to the “undersampling” method, it is aimed to determine the refund and defect situations in a smaller lot by taking samples of refund and defective products with less frequency. At the end of the study, the results were interpreted by applying boosting algorithms.

Findings- As a result of the study, it is concluded that “undersampling” and “oversampling” simulations predict better than usual machine learning methodology.

Conclusion- In this study, it has been observed that the ensemble machine learning algorithms (adaboost, xgboost, gradient boosting algorithms), which are one of the ensemble machine learning methods that emerged in 2016, were applied to the production data for the first time and showed success in the prediction of faulty and refund products.

Keywords: Machine learning, boosting algorithms, production planning, fault detection.
JEL Codes: C45, L23, C44

1. INTRODUCTION

Production planning is one of the most important issues in the production process. Production planning has become more important issue within factories due to the intensification of production systems and the improvement of capital activities. Factors that make production planning to be at the forefront in a business can be listed as follows:

✓ Difficulties in administrative process management of activities in businesses,
✓ Competition status and continuity of relationships among the existing businesses in the same market,
✓ Production processes are continuous and complex,
✓ Determining the factors in the demands and preferences of consumers,
✓ Efforts to have a place in the market in terms of service, quality and price with technological developments,
✓ Proliferation of supply and distribution activities with the increase of the customer network,
The main functions of the production planning process can be listed as follows: First of all, orders are transferred to the system according to their delivery dates and priorities. Business processes are initiated and assigned according to business processes. In order to complete the orders, priority order information of the transactions is provided in the system. It is ensured that the delay times in production and the speed of the processes are controlled. Priority status of the works is controlled with other report operations such as reporting summaries, faulty and warehouse products. According to machines, people, departments, workload and capacity are compared and input / output analyzes are made and reported.

The production planning process is extremely important in a business. The main purpose of production planning is to realize the production of a particular product in the required quantity, at the specified quality and time. In order to achieve this, the necessary production factors must be either produced by the enterprise or supplied on time from another location. In addition, the qualities of the product, namely its quality, quantity, required raw materials, materials, staff, labor force and capital costs are the direct factors affecting production (Tekin, 2012). Production planning fulfills the specified functions, respectively (Demirögen & Güzel, 2009).

The principles to be followed in the preparation of the production plan in the production process of an enterprise can be listed as follows.

- Providing service at the enterprise’s mass production level,
- Ensuring that material, raw material, machine hours and labor losses are minimized.
- Adjusting the inventory level of the finished goods or semi-finished goods.
- In this process, production times are shortened with effective production planning.
- Provision of supply to main suppliers and distribution centers in a short time,
- If more than one product will be produced in the production plan, providing the necessary flexibility to provide opportunity the lucrative demands,
- Arrangement of production and stocks based on sales forecast depending on potential customers in the production process,
- Checking whether the production processes are in the long-term production plan or the short-term production plan, making available resources full stock,
- The most important function that should be in every production plan is to minimize costs and maximize the quality and profit level by using the available production resources and facilities in the most optimal way.

When the production plan has been prepared according to these principles, it becomes a tool for the distribution of time intervals according to production, the production process according to these plans, and the necessary machinery, control and equipment. During the production plans, after the distribution of tasks made after the main production planning, they are equally responsible for this process, from the person who physically performs the work on the machine to the manager at all levels during the sharing of the entire workload. Even a yarn or color change in production raw materials significantly has affected the quality of the process. Changes in the production process completely has affected the quality of the products.

In this study, the enterprise produces more than one product in the production process. In production, raw material products have gone through 15 different processes. Different production errors has occurred in each of these processes. In this study, the outputs of the variables in the production process are dealt with and the correlation results that cause the formation of faulty products have been presented. Boosting algorithms have been applied to the variables resulting from the correlation, and the error results have been tried to be determined before the error occurred at the end of the production process. At the same time, some faulty products are returned in this company. In this study, the prediction of refund products by boosting algorithms have been also performed. In this study, in the first paragraph it is explained the manufacturing systems in the firm and its importance for the firm. In the second part, it has been given the literature review related with manufacturing in the firm the scope of machine learning and data mining applications. In the third part, the data and and methodology have been given. In the next part, findings, conclusion and further studies have been also given, respectively.

2. LITERATURE REVIEW

There are many studies about manufacturing and quality control process in literature. In this study, it has been studied boosting machine learning algorithms to decrease the number of faulty products.
In one study, machines operating cold press in a production facility stop at certain intervals. This downtime has caused economic losses due to the process in which production has not been carried out. In order to reduce this time, prediction has been made in the optimized usage processes of the machines. Then, classification, decision tree and weighted learning algorithms, which are data mining techniques, have been used in the related study. These methods have been applied in Weka and Rapidminer programs. For another study, in a beverage production company, the data cube created according to the volume, sales channel, delivery location, activity type, product group, brand and time dimension has been analyzed first. As a result of the model created, it has been observed that clustering has gained importance according to the type of activity, product group, product size (volume) and daily cash receipt. In this study, data mining application has been carried out on the 5-month transaction data of the customers, which are producing regionally, specifically for the enterprise. Clustering method and decision trees algorithms have been used in practice. The customers have been divided into homogeneous groups by using the clustering method in order to determine the company's distribution strategies according to the customer groups by considering the daily transaction data of the customers. By applying decision trees algorithms, the data hidden in huge volumes could be useful for the company has researched. For another study, in a logistics company, the tables in which the main information regarding the orders received from the customers are kept and the charts kept in line with the demands of the customers have been used. In this study, it is aimed to find the limit value that separates the points that geometrically correspond to the customers who lost and continue to work by looking at the compliance and demand dates in two-dimensional space. In this model, classification and decision trees algorithms have been applied. Another study, supplier selection has been made in a production facility. Among the variables in the data set, the most important variable was chosen as the “delay” as the decision variable for the supplier selection. The relationship between each variable and the delay was examined in the established model and the variables affecting the delay were determined. While measuring success level, “delay = 1”, “on time delivery = 0”, respectively (Quality Certificate (ISO-TSE) - R&D - Guarantee certificate - Sector group - Number of administrative staff - Number of technical staff - Form of establishment - Firm type - City - Number of items variables were taken. In the analysis, artificial neural network, C&R Tree, C5.0, Chad, one of the decision tree algorithms, and K-Means, Kohonen and Two Step algorithms from the clustering algorithms were used in this study. However, K-Means from these algorithms have resulted a higher consistency ratio. This analysis was done with SPSS Clementine program. In another study, data mining has been discussed in detail in a production company. In the application part, the reasons for the improper separation of the products produced in a manufacturing enterprise have been determined. Variables of the study have been grouped as shift order, production month, production day, error groups (originating from the person, machine, machine and person), production frequency, quantity put in the package, factory, machine failure, product group, customer, staff, profile type and production type (mass production or not). A model was developed for decision analysis with decision trees and artificial neural networks algorithms. SPSS Clementine 11.1 application was used. In another study, data mining applications were carried out in a carpet manufacturing enterprise to improve the carpet manufacturing process and product quality. Product error data and machine data were modelled separately. An effective approach was used for variable reduction with feature compatibility analysis. The causes of carpet and machine faults have reached a standard with knowledge gaining technique. Error id, date, workbench, mail, employee, quality, pattern, color, width, height, error part, customer, type of error, cause of error, barcode order, barcode date variables have been studied. Along with statistical methods, C4.5 algorithm and artificial neural networks (Radial Based Function Networks) were used. For another study, optimization work was carried out in a leading company in the automotive field. The study took place in the cutting section of the company. Error variables such as stitch error, cut error, half piece, fabric error, end-of-eart piece, pattern shift, color difference were determined. Relationships between input and output variables were interpreted with Canonical correlation analysis. Then, with Multiple Regression Analysis, separate estimation equations were created for each output. The assignment of the most appropriate values for the input variables has been achieved by a hundred percent at the desired values for the width and height. Fifty-five percent improvement has been achieved for the hole diameter. With the Gams Program, error codes and error types have been defined then applied statistical methods and comparisons have been made with multiple regression analysis. For another study, it is aimed to estimate the production time. For this purpose, the water meter production process has been examined. The analysis was made in the WEKA program using the Decision Tree C4.5 Algorithm. For this purpose, a mathematical programming model has been created by using the association rules of data mining techniques. But a genetic, hybrid algorithm has been developed to apply to large-scale problems. Retailing sector was chosen as an application. Ms.sql, statistical methods, association rule and LINGO program were used in the study. For another study, data covering the first 9 months of 2009 on an operational basis belonging to an institution serving in the retail sector was used. The target audience of the company are retail businesses and catering businesses. The parameters in the data are classified as products, product codes, product packaging information, product main brand codes, sub-brand codes, information about the category and sub-categories, product category and customer information. The aim is to ensure that customers with high profits have been grouped and to focus on these factors. Data manipulation methods were applied and then EDA methods were used. Classification and regression models from data mining models, clustering and association rules
have been examined. At the same time, by using C&R Tree and CHAID algorithms, it has been tried to determine which factors are effective in gathering “high amount of profit” customers in this group. The studies were carried out with SPSS Clementine package program. Another study was developed a quadratic model in the field of production logistics, and made a multi-dimensional scaling analysis that was used to locate the products in the warehouse. In this study, traveling salesman problem used in optimizing routes during order picking was explained. This application was made with one-way analysis of variance, association rules and independent sample t-test. Also, paired sample t-test and statistical methods were used. Another study carried out in a company that does business in the production sector, in the quality control department. In the quality control process, measurement data is very high and in this sense, as the volume of the data increases, the rate that people understand decreases. Variations are the enemy of quality and there is variation in everything. In this study, a decision support system was implemented in the quality control process with classification algorithms, which are data mining methods. While preparing this study, Cross Industry Standard Process Model (CRISP) was used for data mining. NaiveBayes, SMO algorithms, C4.5 Random Forest Classification Algorithms, R, Weka and Minitab programs were used.

3. DATA AND METHODOLOGY

3.1. Data

In this paper, an estimation of the number of faulty products was made by considering the production variables in a company producing in the textile sector. While doing this study, simulation was done. The reason for the simulation was that it was easy to detect refund and faulty products in a small lot group, but the process have become more difficult as the amount of mass production increases. The aim is to determine the accuracy of the prediction algorithms in this determination point in the same way the increase the number of refund and faulty products when a larger lot production has been made. The question was tried to be investigated. In the simulation method, “oversampling” and “undersampling” methods were used. The concept of “oversampling” is referred to as a higher number of sampling. In other words, while the number of production lots is increasing at this simulation point, the question of whether it can be showed the same success in a more crowded data stack is increased by increasing the refund and faulty products within the same application. Likewise, according to the concept of “undersampling”, it is aimed to determine the refund and faulty situations in a smaller lot by taking samples of refund and faulty products with less frequency.

In this paper, the sector was examined in the manufacturing sector. There are 250 different variables that affect the production result. Later, considering the relationships of the variables, correlation status were examined and less variables were processed. The reason for this is that some of the existing variables have more effect on the result, while other variables have less effect on the result. In addition, some variables include “multicollinearity” problem. “Multicollinearity” problem shows that there is a relationship between the variables and this relationship eventually leads to inconsistency. In order to reduce the correlation between the variables, the variables that have the most impact on the product were taken. The variables that have the highest effect on the product were taken from the variables that have high relation with each other. This process is called attribute selection in Figure 1.

**Figure 1: Correlation Matrix After Feature Selection**
As seen in Figure 1, the correlation has gone from -1 to 1. There is a positive correlation at point 1 and a negative correlation at point -1. There is a strong negative correlation from -0.5 to -1. There is a positive correlation from 0.5 to 1. Attributes that are strongly correlated with each other cause a multicollinearity problem. Therefore, instead of taking two variables, modeling has been done by taking the variable that affects the production the most. Figure 1. “VariantKey”, “Kdtkmpus”, “Kdtkmen”, “Fetuvboycek”, “Fph”, “OutQuantityx”, “Status”, “Oprbs”, “Oprsk”, “Oprm”, “Oprgrm”, “Oprd”, “Hmkmbatch”, “Oprfk” since these operation variables cause “Multicollinearity” problem, it should be disabled because it will affect our selection of feature. Considering Figure 1, the feature that is between the +0.5 and -0.5 correlation band has been selected by removing the mostly light colored parts and much darker colored parts from the feature selection. As a result, it is important that the variables to be modeled correlate with each other. If there is a high correlation between the variables as in the Figure 1, the variables that affect the production should be considered. Other variables should not be added to the model. After determining the required attributes, XGBoost, ADABoost and GradientBoost algorithms were applied. These algorithms make a difference in manufacturing in the literature. These algorithms are referred to as Ensemble Machine Learning Algorithms in the literature. The reasons for using these algorithms are that there is no work in the field and avoiding “oversampling”, ie “over-learning” status of our data, enables ensemble machine learning algorithms. In our study, the condition of refund and faulty products constitutes 8% of a data of 72 thousand lines. Usual machine learning algorithms easily learn 92 percent of 72 thousand lines, and predict the rest at high prediction rate. The point to avoid here is that the machine does not memorize it. If it is memorized, the application made when more lots of products come is also likely to encounter errors. Therefore, every situation should be considered. Another reason for the need for an ensemble machine learning algorithm is the "precision" and “f” scores in the model. Next part of the study, ensemble machine learning algorithms will be discussed. And also the flow of the study can be seen in Figure 2.
3.2. The Proposed Methodology: Ensemble Machine Learning Algorithms

Gradient Boosting Algorithms: Gradient Boosting algorithm is an ensemble machine learning algorithm that works for both regression and classification problems. Gradient Boosting algorithm has used the boosting technique, combining a number of weak learners to create a power learner. The regression tree algorithms have used as the basic learners are based on the errors calculated by the previous tree, one tree in series. Since it comes from decision tree algorithm in Gradient Boosting algorithm, initial leaf is created first. Leaf nodes symbolize predictions; they are the extreme points of trees. This leaf holds our first prediction about the weights of samples. Then, new trees are created by considering the prediction errors. This situation continues until the number of trees decided or no further improvement from the model. First, the variable to be predicted (target variable) is averaged. This number is the initial leaf, our first predict attempt. By comparing this value with the target variable, it is observed how many incorrect predictions are made. Residual value is found by subtracting the predicted value from the observed value. The initial tree will be established as a model that predicts the errors obtained as a result of the initial leaf. If it has been added the first prediction and the results from the initial tree, it can be predicted the target variable 100% accurately. However, this situation is caused overfitting. Gradient Boosting algorithm has added learning rate to trees to overcome this overfitting problem.

XGBoost Algorithms: XGBoost (eXtreme Gradient Boosting) is a high performance version of the Gradient Boosting algorithm optimized with various arrangements. It has been introduced with the article titled “XGBoost: A Scalable Tree Boosting System” published by Tianqi Chen and Carlos Guestrin in 2016. This algorithm has not been implemented in the manufacturing field yet. The most important features of the algorithm are its ability to obtain high prediction rate, to prevent overfitting, to manage empty data and to do them quickly. According to Tianqi, XGBoost runs 10 times faster than other popular algorithms. Software and hardware optimization techniques have been applied to achieve better results using fewer resources. XGBoost Algorithm is a decision tree based algorithm and is shown as the best among decision tree algorithms. The first step in XGBoost is to make the first base score. This prediction number can be any number since the correct result will be achieved by converging with the next steps. This number is 0.5 by default. How well this estimate is made is analyzed with incorrect residuals of the model. Errors have been found by subtracting the predicted value from the observed value. At the next stage, the decision tree that predicts errors is established. The aim is to learn the errors and approach the nearest prediction. The similarity score is calculated for each branch of the tree created. Similarity score shows how well the data is grouped in branches. Accordingly, the formula is as follows.

\[
\text{Similarity score} = \frac{(\text{The sum of incorrect predictions})^2}{\text{Number of incorrect estimates} + \lambda}
\]

The purpose after calculating similarity scores is whether a better prediction can be made. The value of lamda (\(\lambda\)) in the similarity score formula is the parameter of regularization. Trees of all possible possibilities are modelled for a better prediction. Similarity scores are calculated for all tree values. To decide which tree structure is better, the gain must be calculated. While the branches of the tree have been evaluated with the “similarity score”, the whole tree has been evaluated with the “gain” score. The formula for the gain score is as follows.

Gain Score = Left Similarity Score + Right Similarity Score - Similarity Score of Previous Tree

After determining which tree has higher gain score and deciding to use the tree, pruning process begins. The value called “gamma” is selected for pruning. Gamma is an assessment brought to gain score. Branches with a gain score are lower than a gamma score require pruning. Therefore, increasing the gamma value only helps to keep the valuable branches in the tree and to prevent overfitting. Pruning continues from the last branch up. If it is decided not to prune the bottom branch, there is no need to examine the branches above. The default gamma value is 0. If the gamma value is 0, it means that if the gain score gets negative value, the branches will be pruned. If all the branches are pruned, the best prediction is 0.5 at the top. After these definitions and calculations, the lambda value mentioned in the similarity score can be examined in more detail. This value refines the model. According to the similarity score formula, the similarity score has been calculated as lambda increases, hence the gain score decreases. Only high-scoring branches can survive, get rid of pruning. Lambda value is 1 by default. As Lambda value increases, learning rate will become harder, but overfitting will decrease. Lambda affects only branches that have a single value due to its position in the formula. In other words, the more value in the branch, the lower lambda similarity score.

XGBoost Algorithm shows higher prediction rate using different techniques and is optimized to work on large data sets. The main issues that it diverges from other algorithms are as follows: regularization, pruning, working with null values, system optimization, parallel processing, high flexibility, maximum depth, internal cross validation.
ADABoost Algorithms (Adaptive Boosting): ADABoost algorithm is both the most basic and the simplest among the boosting algorithms. ADABoost algorithm is a method based on decision tree algorithm. Decision tree algorithms have been used since data mining and machine learning methods came out. But in some cases it does not give good results. For this reason, ADABoost Algorithms have been developed. In ADABoost algorithms, random values are called forests in big data. Normally, there is no restriction on the size of the tree. But the AdaBoost algorithm takes its name from a node called stump and two leaved trees. The algorithm steps and advantages of AdaBoost Algorithms are as follows. New nodes definitely perform worse than normal decision trees. This situation is referred to as weak learner. In addition, in large forests where random data are generated, the value (votes) of each tree is equal in random forests. However, the value (rating) of some stumps is greater in AdaBoost. Finally, it does not matter which tree was formed before when evaluating in random size data, namely in random forests. But sorting is important in AdaBoost algorithm. The mistake made in the first situation affects the second situation.

The value that comes out of AdaBoost is made through the following definitions:

\[ h_t(x); \text{the value of one of the stumps,} \]

\[ at: \text{shows the weight of the value of that stump.} \]

If the binary classification problem is solved, the weight is determined as in the equation below.

\[ \ln \left( \frac{1 - \text{error of that stump}}{\text{error of that stump}} \right) \]

In the AdaBoost algorithm, multiple-row models are created, each of which corrects errors in the latest model. AdaBoost algorithm focuses on mispredicted observations and the next model works to predict accurately these values. The steps to implement the AdaBoost algorithm are as follows. Initially, all observations in the dataset are given equal weight. A model is based on a subset of data. Using this model, predictions have been made for the entire data set. Errors are calculated by comparing predictions and real values. When creating the next model, more weight is given to incorrectly estimated data points. Weights can be determined using the error value. For example, the higher the error, the greater the weight value assigned for observation. This process is repeated until the error function changes or until the maximum limit of the number of estimators is reached.

4. FINDINGS

The most challenging part of data science is data manipulation. While modeling the data, many important operations such as extracting the data, creating correlation matrices, choosing the features according to the correlation between the variables have been performed in this step. Later, “undersampling” and “oversampling” operations were performed as simulations. Afterwards, the separation of training data and test data was done. Then, sensitivity, f-score and complexity matrix values were analyzed as a whole. Later, cross validity analysis, an important step of machine learning, was carried out. The reason for the need for cross validation analysis is based on the foundation of machine learning. In machine learning, some of the data is divided into test and some as training data. If the same data is always divided into test data and training data, the machine will go to memorize. The problem of “overfitting” will arise. Later, the data was manipulated and the dependent and independent variables were separated. As a result of the simulation, undersampling was performed on the data. The extraction and visibility of the attributes related to the correlation matrix of the data are shown in Figure 1. After that, it is aimed to obtain better results by applying Ensemble Machine Learning algorithms that give better results to simulated data. Then, by cross-validating, different data sets were created thanks to the data allocated for testing and training from each data of 72 thousand lines each time. Firstly, in Figure 3., the complexity matrix result is shown without reducing the sampling. Here, first of all, Ensemble Machine Learning techniques were applied, no simulation was performed and the results were examined. In Figure 4, a new model has been established by undersampling and simulation results have been obtained. In Figure 5, Ensemble Machine Learning algorithms were applied by simulating “oversampling” and the accuracy of the model was examined as a result of the complexity matrix.

Figure 3: Complexity Matrix Result Without Reducing Sampling

![Confusion Matrix Results Without Undersampling](image-url)
5. CONCLUSION

In this study, “Ensemble Machine Learning” methods, which are newly introduced to the literature, have been applied in the manufacturing sector. The purpose of this study is to determine the production line that can create an error that can predict the result when a new firmware data is entered for production. In the literature, mathematically applied Boosting Algorithms (ADABost, XGBoost, Gradient Boost), which appeared in 2016, were applied in the literature. Another difference of the study is the simulation dimension. In machine learning, simulation studies are carried out with “undersampling” and “oversampling” algorithms. “Undersampling” application has been referred to the literature as reducing the number of samples. This situation can be stated as follows: The error rate in the data of 72 thousand lines is lower in percent. The prediction results may not be very good. In order to test its accuracy, by “undersampling”, that is, decreasing the total data set and keeping the incorrect data set constant, increasing the error rate as a percentage makes an important contribution to the accuracy of the results. It can also be seen from the graph of the final Figure 3 and 4. Later, the same Ensemble Machine Learning algorithms were applied to another simulation methodology, “oversampling”. In this process, the prediction algorithm was made by increasing the sample number and error rate. As a result of the simulation, “Undersampling” and “Oversampling” methods were found to give better results than classic data mining techniques. To sort the simulation results in itself, the “Undersampling” methodology gave better results than the “Oversampling” methodology. Three complexity matrix is made in Finding section and results are analyzed better. In this study, products that are “returned”, “faulty” and normal are analyzed in the same model with ensemble machine learning algorithms. It can be tried artificial neural network and deep learning algorithms in this model for future studies.

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DIGITAL TRANSFORMATION IN HUMAN RESOURCES MANAGEMENT: INVESTIGATION OF DIGITAL HRM PRACTICES OF BUSINESSES

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ABSTRACT
Purpose- This study was carried out to determine the effects of changes in the digital world on Human Resources Management Practices.
Methodology- Content analysis method, which is a qualitative research method, was used in the research. The data were obtained from secondary data obtained from interviews with Business executives and HR managers. In order to reach these interviews, "Digital Human Resources Management", "Digital Transformation HR", "Digital Transformation Human Resources Management", "Digital Business" titles were searched and interviews suitable for the research were included in the study. In this way, 16 (sixteen) companies formed the sample of the research. All data obtained from the search has been classified and analysed.
Findings- As a result of the research, it is seen that businesses have carried many HRM Practices to digital environment. Among the digital HRM Practices that businesses use the most; Using chatbots, receiving job applications using QR code, mobile HRM applications, making data-based analysis using the dashboard, using artificial intelligence in recruitment processes.
Conclusion- It has been observed that the enterprises examined within the scope of the research closely follow the digital transformation in HRM and all businesses that want to gain competitive advantage should be closely follow this digital transformation in HRM.

Keywords: Digital HR, digital transformation, human resources management, digitalization, industry 4.0.
JEL Codes: M12, M15, M54

INSAN KAYNAKLARI YÖNETİMİNDE YAŞANAN DİJİTAL DÖNÜŞÜM: İŞLETMELERİN DİJİTAL İKY UYGULAMALARININ ARAŞTIRILMASI

ÖZET
Amaç- Bu çalışma, dijital dünyada yaşanmakta olan değişikliklerin İnsan Kaynakları Yönetimi Uygulamalarına olan etkilerini belirlemek amacıyla yapılmıştır.
Bulgu- Araştırmayla sonuçlanan, işletmelerin bir çok İKY uygulamasını dijital ortama taşıdıkları görülmüştür. İşletmelerin en çok kullandıkları dijital İKY uygulamalar arasında; Chatbotların kullanılması, iş başvurularının QR kod kullanılarak alınması, mobil İKY uygulamaları, dashboard kullanılarak veriye dayalı analizler yapılır, işe alım süreçlerinde yapay zekanın kullanılması sayılabilir.
Sonuç- Araştırma kapsamında incelenen işletmelerin İKY alanındaki dijital dönüşümü yakından takip ettikleri görülmuştur ve rekabet avantajı sağlamıştır. İŞLETMELERIN BÜYÜKlü VE DIŞKODE BİLGİ YÖNETİMİ

Anahtar Kelimeler: Dijital İK, dijital dönüşüm, insan kaynakları yönetimi, dijitalleşme, endüstri 4.0.
JEL Kodları: M12, M15, M54

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1. GİRİŞ

Dijitalleşme, günümüzde Endüstri 4.0 ile birlikte işletmeleri en çok etkileyen konulardan birisidir. Dijitalleşme işletmelerin mal ve hizmet üretiminde dijital teknolojilere dayanıklığını ifade etmektedir. Dijital teknolojiler işletmelere maliyet ve zaman tasarrufu sağlakmak ve bu sayede işletmeler rakiplerine karşı rekabet avantajı kazanabilmektedir.

Yaşanan dijital dönüşümün en çok etkilenen fonksiyonlarından birisi de İnsan kaynakları yönetimidir. İnsan odaklı bir dönemde kağıt vb. tasarrufu sağlanması işletmelerin maliyetlerini azaltırken, araştırmaların Amacı ve Önemi konularında değinilmiştir. Bulgular kısmında araştırdan elde edilen sonuçlar değerlendirilecektir. Ancak günümüzde teknolojinin ilerlemesi ile birlikte insan kaynakları yönetiminde dijitalleşme oldukça önemlidir.

İnsan kaynakları yönetimi alanında kullanılan dijital teknolojiler arasında yapay zekalı robotların mülakatların gerçekleştirilmesi, Chatbotların kullanımı, bordro, izin, özür bilgilerinin dijital ortama taşınması, eğitimlerin online olarak yapılması, iş başvurularında QR kod kullanımı, tüm İK fonksiyonlarının mobil uygulamaları taşınması ve buradan takip açılması, online performans ölçümü ve anında geri bildirim yapılması, kariyer planlarının dijital ortamda yapılması gibi avantajlar mevcuttur. Dijitalleşme insan kaynakları uygulamalarını açıktan çalıştırılmaktadır.

Dijital dönüşümünden en çok etkilenen işletme fonksiyonlarından birisi de İnsan kaynakları yönetimidir. İnsan odaklı bir dönemde kağıt vb. tasarrufu sağlanması işletmelerin maliyetlerini azaltırken, araştırmaların Amacı ve Önemi konularında değinilmiştir. Bulgular kısmında araştırdan elde edilen sonuçlar değerlendirilecektir. Ancak günümüzde teknolojinin ilerlemesi ile birlikte insan kaynakları yönetiminde dijitalleşme oldukça önemlidir.

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Son on yılda, dijital teknolojiler perdesi gerekteyse her sektördeki işletmeleri etkiledi ve bazı iş modelleri eskimiş hale getirildi ve yeni dijital ekonomide gelişmek isteyen kuruluşlar için zorunlu hale geldi (Som, 2019: 2). Veri yönetimini için bir destek sistem olarak tanımlanan teknoloji - veri ve bilgi işleme, depolama, iletişim ve internet iletişim, bilgi ve iletişim Teknolojileri (BIT), tank olduğumuz olağanüstü teknolojik evrimin bir sonucu olarak zaman içinde büyük ölçüde değişmiştir (Garbelli, 2020: 27).

Dijital dönüşüm, İK işlevlerinin kuruluşlarda gerçekleştirildiği geleneksel yöntemlerle sorgulamaktadır (Fenech, Baguant ve Ivanov, 2019: 168). Dijital dönüşüm konusundaki görüşün stratejik bir konu olduğunu düşündüğünde, dijital olarak düşünmek artık tek bir departmana ayrılmamıştır. Öncelikle İnsan Kaynakları Yönetimi’ne (HRM) dijital dönüşümün önemi arttırmaktadır (Som, 2019: 2).


Birçok endüstri, işletmelerin çalışanlarından talep ettiği beceri ve yetenek düzeylerini etkilemektedir; organik ve yapay zeka gibi teknolojilerin yaygınlaşmasıyla da değişim gerektirmektedir. Bu süreçte en çok tartışılan konulardan biri, Dijital Teknolojilerin ekonomideki yayılmasının istihdam veya işsizlik üzerindeki etkisidir (Demir, 2019: 4).


İçinde bulunduğumuz yeni dönemde akıllı fabrikalar, sanal dünya ile fiziksel olanan en iyi biçimde yorumlayıp işleyen müşteri ihtiyaçları doğrultusunda senkronize eden, çok iyi gözlemci, planlamacı ve pro-aktif çalışanlarla (Smart Workers) olan ilişkisi artracaktır. Bu İK planlaması açısından, sadece işleri, insanları olan ihtiyaçları karşılayan otomasyon ve yapay zeka gibi teknolojilerin yaygınlaşmasıyla da değişmektedir. Bu süreçte en çok tartışlan konudan biri, Dijital Teknolojilerin ekonomideki yayılmasının istihdam veya işsizlik üzerindeki etkisidir (Demir, 2019: 4).

En esnek olan, dijital dönüşüm, işlevlerin işleyişini ve süreçlerin uygulanmasını kolaylaştırır ancak dijitalleşme İKY’yi sadece günlük idari işleri kolaylaştırıktan daha fazla etkiler. Dijitalleşme, İK planlama; işe alım ve seçim; performans yönetimi; ödül yönetimi; sağlık ve güvenlik; çalışan ilişkileri; iş tasarımı gibi işlevlere de etkili olmaktadır. Bu, dijitalleşme İKY’ye organize edildiğinde insan sermayesinin dijital çağın stratejik ihtiyaçları ile uyumlu bir sermaye olmasını sağlama sorumluluğu dolayısıyla değişmiştir (Fenech, Baguant ve Ivanov, 2019: 168).

Dijitalleşme sadece endüstriyel üretim ve çalışma sürecini değiştirmemekte; doğal kaynakların sektöründen nüfuz ederek, sektörlerde, karsı karsa birlikte, işsel ve yetkinlik düzeylerini etkileyeceği beklenmektedir (Seçer, 2017: 763).

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3. VERİ VE YÖNTEM
Araştırma, nitel araştırma yöntemlerinden içerik analizi yöntemi ile gerçekleştirilmiştir ve araştırmada, amaçlı örnekleme yöntemi kullanılmıştır. Araştırmada, örnek olarak belirlenen işletme yöneticileri ve insan kaynakları yöneticileri ile yapılan röportajlar, işletme ile ilgili haberler ve ilgili işlemlerin web sitelerinde elde edilen ikinci veriler kullanılmıştır.


4. BULGULAR VE TARTIŞMA
Yapılan araştırmanın sonucunda; Akbank, Abdi İbrahim İlaç, Borusan Holding, BSH Türkiye, DenizBank, Doğuş Otomotiv, LC Waikiki, Mercedes-Benz Türk, Migros, P&G Türkiye, PepsiCo Türkiye, SabanciDx, Schneider Electric Türkiye, TİAB Gıda, Yaşar Holding ve Yıldız Holding işletmelerinin dijital insan kaynaklarını uygulamalarına ait veriler elde edilmiştir. Söz konusu işlemlere ait bulgular Tablo 1’de görülmektedir.

Tablo 1: Dijital İnsan Kaynakları Uygulamaları Tablosu

<table>
<thead>
<tr>
<th>İşletme</th>
<th>Dijital İnsan Kaynakları Uygulamaları</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akbank¹</td>
<td>• Doğal dil işleme (NLP) tabanlı IK Chatbot “1Bilen” üzerinden çalışanların İK uygulamalarının çok kısa süre ile ulaşarak işlemlerini gerçekleştirebilmeleri sağlayarak,</td>
</tr>
<tr>
<td></td>
<td>• KOBİ’lerin İnsan Kaynakları Yönetimi “Kolay İK” projesi ile Dijital Dünya'ya Aktarıldı,</td>
</tr>
<tr>
<td></td>
<td>• “Kolay İK” projesi ile KOBİ’lerin maaş ödemesi, bordro, izin, eğitim, harcama, zimmet, özel bilgileri gibi birçok konuda şirket çalışanlarına dair süreçleri bilgisayar, akıllı telefon ya da tabletlerinden, güvenli bir şekilde yönetebilmeleri sağlayacak.</td>
</tr>
<tr>
<td>Abdi İbrahim İlaç²</td>
<td>• İşe alma süreçleri tamamen dijital olarak yürütülüyor,</td>
</tr>
<tr>
<td></td>
<td>• İşe almalıdır ön eleme yapay zekâ tarafından yapılar,</td>
</tr>
<tr>
<td></td>
<td>• Mavi yaka iş başvuruları internet üzerinden QR kod ya da bir linkle oluşturulan başvuru formu kullanılarak gerçekleştirilir,</td>
</tr>
<tr>
<td></td>
<td>• Çalışanlar izin, e-bordo gibi talep ya da dokümanları mobil uygulama üzerinden ulaşılabiliyor,</td>
</tr>
<tr>
<td></td>
<td>• Takdir ve ödüllendirme platformunda çalışanlar, puanlarını sistem üzerinden hediye çekilecek şekilde dönüştürebiliyor.</td>
</tr>
</tbody>
</table>

Kılıç Kirilmaz

Borusan Holding

- Tüm süreçlerin dijitalde olması hedefleniyor,
- Borusan İnsan Mobil Uygulaması kullanılıyor,
- Borusan’da tüm İK süreçlerinden çalışanlar, Borusan İnsan Mobil Uygulaması ile haberler olabiliyor. Ödüllü yaşamlar, anketler, eğlenceli, öğretici video ve içerikler bu uygulamada sunuluyor,
- Mobil uygulama desteği ile oyun oynamalarını destekleyen verileri veriliyor,
- Borusan İnsan Chatbot, gelen soruların yanıt verme yeteneği ile çalışanlarımıza destek oluyor,
- Borusan İnsan Chatbot, gelen soruların yanıt verme yeteneği ile çalışanlarımıza destek oluyor,
- Tüm süreçlerin dijitalde olması hedefleniyor,
- Yenilikçi yöntemler ile teknolojiyle beraber çalışanlarımıza destek oluyor,
- Borusan İnsan Dashboard ile veriye dayalı analizler, raporlamalar ve executive dashboard’ları ve teknolojiyle beraber çalışanlarımıza destek oluyor,
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Doğuş Otomotiv
- Eskiden İK departmanında manuel takip edilen ve operasyonel olarak işlem yükü yaratılan birçok süreç artık dijital platformlarda yürütülmektedir.
- Potansiyel Çalışan ve Yadekleme Süreci modülü olan D-İnsan 4.0 performans sistemine geliştirilmiştir. Bu modül ile birlikte yetenek yönetim süreçleri ve alt yapısını dijitalleştirenler, sistemle anlamda hem kurumsal hafıza yaratım hem de eğitim ve gelişim faaliyetlerinde faaliyet alan çok sayıda bir modül tasarlanmıştır.
- Yeni ise başlayan çalışanların Şirketi daha iyi tanımaları ve adaptasyonlarını hafifletmek için oyunlaştırma temelli Mobil Öryantasyon Programı olarak geliştirilmiştir.
- Yeni işe başlayan çalışanların Şirketi daha iyi tanımaları ve adaptasyonlarını hafifletmek için oyunlaştırma temelli Mobil Öryantasyon Programı olarak geliştirilmiştir.

LC Waikiki
- Doğru kişiyi işe almak için süreçler dijitalleştirilmiş durumdadır.
- İK metrikleri dijitalleştirilerek dashboardlara taşınmıştır.
- Çalışanlar önemli ölçek bilgilerini ve onay süreçlerini mobil uygulamalardan takip edebilirler.

Mercedes-Benz Türk
- Birlikte en güncel haberlere ve çalışanlara özel indirim oranlarına hızlıca ulaşılabilirler, birlikte günlük yemek menüsü ve servis saatleri ile ilgili güncel bilgi alabiliyorlar.
- Bunun yanı sıra, şirket öncelikli olarak iletişimi üzerinden çalışanlar tüm dünyadaki şirket çalışanlarıyla iletişim kurup ilgi alanlarını yönelik gruplarla iletişimi paylaşabiliyorlar.

P&G Türkiye
- VR içerikli kampüs aktiviteleri gerçekleştirilmiştir,
- Dijital işe alım süreçleri gerçekleştirilmiştir,
- Dijital eğitim programları kullanılıyor,
- Dijital ödüllendirme sistemleri bulunuyor,
- İK süreçleri dijital araçlarla gerçekleştirilmiştir.

PepsiCo Türkiye
- Değerlendirme merkezi uygulaması dijitalleştirilmiş durumdadır,
- İK içinde shared service (İK Çözüm Merkezi) yapısı kurulmuştur,
- İK üzerinden gelen tüm sorular dijital platformdan alınarak çalışanların ilgili cevaplara ulaşmasını sağlıyorlar ve bunlara takip edilecek raporlar hazırlanıyor.

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• SabancıDx, HR-Web ile dijital insan kaynakları ve bordrolama çözümü sağlar ve tüm İK süreçleri bu ürün aracılığıyla yürütülür,
• HR Web, robotik süreç otomasyonunu, işe alım-işten çıkış, eğitim ve sağlık kayıtları düzenleme, SGK teşvik hesaplamaları gibi süreçlerde kullanılır,
• Mobil destekli raporlama gerçekçleştiriliyor,
• Self servis özelliği ile HR-Web, çalışanlar, kendi işlemlerini kendilerine yapabilmesi avantajını sunuyor. Bu sayede, çalışanların iş süreçlerini benimsemeleri sağlar ve İnsan Kaynakları Departmanı’nın üzerindeki iş yoğunluğu azaltılıyor,
• 2018 yılında İnsan Kaynakların süreçlerinin dijitalizasyonu ve İK Analitiği uygulamanının hayata geçirilmesi amacı ile “HR-Next” projesi başlatılmıştır,
• Proje kapsamında ilk adımda, Topluluk şirketlerindeki tüm çalışanlara ait İK verilerinin ortak bir veri tabanına aktarılması sağlanan olkoy tabanı, hayata geçirilmiştir. 2019 senesinde de “HR-Next” projesinin 4 ana proje modülü olarak Performans Yönetimi, Sabancı Sosyal Ağ, Veri Analitiği, Organizasyonel Başı Planı projeleri yürütülmüştür.

• Yayaş zeka özelliği olan Açık Yetenek Pazarı platformu ile kurum içinde işlerin yanı sıra projeler ve mentörler foratları da paylaşılıyor,
• Açık Yetenek Pazarı platformu ile çalışanlar kendi yeteneklerini kendileri değerlendirirler ve amaçlarını ve hedeflerini paylaşır. Bir beceri alır olarak çalışanların yeteneklerini doğrudan ilgili yöneticilerine sunamalarını sağlar.

Schneider Electric Türkiye

• Montörler buralar veya yeteneklerini projeler aracılığıyla başka yöneticilerin kullanmasına sunarak kendilerini geliştirmeleri mümkün oluyor. Bu konuda İK’ya veya mevcut yöneticilerine bağımsız olmayan olup, yapa zeka teknolojisi aynı zamanda standart değerlendirme döngüsünde kalan ilgiç fireyatları çalışanlarına sunuyor,
• Çalışanlar hareket halinde yahudi kendine gelen doğrudan dijital öğrenmeyi kolyaçatramak amacıyla mobil öğrenme platformu hayata geçirilmiştir. Bu platform kurum döş dijital öğrenme işletmeleri ve Schneider Electric’i kurum içi özel öğrenme işletmelerine bağlı birlikte faydalanır,
• Dijital öğrenme yöntemleri, ‘Dijital Pasaport’ olarak adlandırılan yöntem ve diğer dijital konular kapsamında tüm çalışanların kullanılmasına sunuluyor. Böylece Schneider Electric çalışanları ‘Dijital Vatandaşlar’ haline gelir. Bu yaklaşım aracılığıyla çalışanlar, bilgi ve becerilerini güncellemeye, yenilemeye ve dijital trendlerle yakalamaya teşvik edilirler,
• Çalışanların dijital alandaki becerilerini artırma yönelik bu çabaları yanı sıra özel işler için belirli teknik konularda dijital öğrenme olanakları ve dünyaya en önemli 1000 lidere özel bir mobil platform sağlar. Bu mobil yaklaşım yeni trendleri öğrenme, bilgileri tazeleme ve liderlerin hayat boyu öğrenmek hep günlük kalmaması sağlar öğrenme yöntemlerini dönüştürür,
• Tüm İK veri tabanını bir platform üzerine taşıyor, verinin yöneticiler tarafından da görünebilirme becerilerini geliştirmek konusunda önemli koşumlar yapılmış durumda,
• Performans değerlendirmesi süreci ve ücret artış işlemleri bu platform üzerinden tamamlanmayı başlandı. Bu sayede yüksek performans kültürünü inisiyatifi doğrultusunda yöneticilerin ekip yönetimini çerçevesinde sorumlulukları genişletilmiş durumda. Yalanışlama ve dijitalleşme üzerine atılan bu global adım ile birlikte, iş birimleri ve İK’nın yakıt temas halinde olması sağlanmıştır durumda,
• Hedefler, gelişim planları ve yetenek yönetimi de bu platform üzerinden yönetilıyor; çalışanlar kendilerine ait bilgileri, güncellemeleri de dijital olarak yönetebilirler,
• Dijital platformlarla verinin yönetimini şirket global anlamda bulunabilir, görüntülenebilir ve açık pozisyonlar için erişilebilecek kılı kök form olmak da, zaten global roller ve topluluk iş süreçlerini yaratma güncel kalmaması sağlar.

TAB Gida

• Dijital platformların sağladığı kolaylıklar ile İK daha kıyemli uygulamalar ile ilgilenebilir,
• Eğitim tekniklerinde dijitalleşme ve online eğitimlere kavuşüyor.


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Yaşar Holding15

- Kâğıtsız dijital ortam kullanılır,
- SAP’yle entegre olan İK sistemi mobil uygulamaya da taşınıyor,
- İşe alımlar, aday havuzu işlemleri, iş ve staj başvuruları, Yaşar Kariyer Platformu üzerinden gerçekleştiriliyor,
- Çeşitli istihdam süreçleri dijital platform aracılığıyla yürütülebilir,
- Yönetim kademeleri süreçleri destekleyen SAP’den İK yönetim raporları oluşturuluyor.

Yıldız Holding16

- Paperless HR adında projesi başlığıstı ve bu proje ile 60’den fazla süreç formu dijital ortama taşınıyor ve sürdürülebilirlik politikası çerçevesinde ofislerdeki kâğıt kullanımı en aza indiriliyor,
- İK’nın bordro süreçlerinin önemi bir kısmi robotik süreç otomasyonu (RPA) teknolojisiyle yapılmaya başlanıldı,
- İşe alımlarda adayların performansının ve kurum kültüründe uyununun tahmin edilebileceği bir yapay zeka üzerinde çalışılıyor.

Akbank; bu işletmede, doğal dil işleme (NLP) tabanlı İK Chatbot “1Bilen” üzerinden çalışanların İK uygulamalarına çok kısa sürede ulaşarak işlemleri gerçekleştirebilmesi sağlanmaktadır. Akbank, KOBİ’lerin İnsan Kaynakları Yönetimi “Kolay İK” projesi ile Dijital Dünyaya Akıtmıştır ve “Kolay İK” projesi ile KOBİ’lerin maaş ödemesi, bordro, izin, eğitim, harcama, zimmet, özlük bilgileri gibi birçok konuda şirket çalışanlarına bilgisayar, akıllı telefon ya da tabletlerinden, güvenli bir şekilde ulaşarak işlemlerini yapabilmekte, tarih verilmektedir. Bu uygulama ile İK süreçleri ile ilgili 4 binden fazla soruya anında yanıt verilmektedir.

Abdi İbrahim İlaç; bu işletmede, işe alımların tamamen dijital olarak yürütüleldiği görülüyor. İşe alımlarda ön eleme yapay zeka tarafından yapılmaktadır, mavı yaka iş başvuruları internet üzerinden QR kod ya da bir linkle oluşturulan başvururu formu kullanılarak gerçekleştirilmektedir. Bu nedenle, çalışanlar izin, e-bordro gibi talep ya da dokümantolar mobil uygulama üzerinden ulaşılabilmekte, takdir ve ödüllendirme platformunda çalışanlar, puanları sistem üzerinden hediye çeklerine dönüştürilmektedir.


BSH Türkiye; bu işletmede, eski kadesi happy hour uygulamaları ve raporlamalar manuel veri girisi ile yapıldığı için dikkate değer bir iş gücü ve zaman kaybı yaşanırken bu süreçlerin dijital platformlara taşınması ile çok daha kısa zamanda ve daha az iş gücüyle hata minimuma indirilerek işlemler yapılmaktadır. Ayrıca dijital işlemler sayesinde, çalışanların potansiyel yeteneklerini ihtiyaçlar doğrultusunda katma değer yaratılabilecek olanaklar olabilmektedir.


Doğuş Otomotiv; bu işletmede, eskiden İK departmanına manuel takip edilen ve operasyonel olarak işlem yükü yaratan birçok süreç artık dijital platformlarda yürütülmektedir. Potansiyel Çalışan ve Yedekleme Süreci modülü olan D-İnsan 4.0 performans sistemini geliştirmektedir. Bu modül ile birlikte yetenek süreçleri ve altyapısı dijitalleştirilerek, sistemsel anlamda hem kurumsal hafıza yaratılmış hem de eğitim ve gelişim faaliyetlerinde faydalanılabilecek bir modül tasarlanmıştır. Yeni işe başlayan çalışanların Şirke’ti daha iyi tanımaları ve adaptaşyonlarını daha hızlı sağlayacak için oyunlaştırılmış temelli Mobil Oryantasyon Programı kullanılmaktadır ve aday işe giris sınav ve kişilik envanterleri süreçlerinin online sistem üzerinden gerçekleştirilmesine bağlı olarak oluşturulmuştur. Bu süreçle, her adımda dijitalleşmeye gidilmektedir. İşe alım ve yerleştirme, eğitim ve gelişim, çalışan hakları ve bilgilendirme süreçleri, adımlar ile dijitallaştırılmaktadır. İnsan Kaynakları süreçlerinin online olması yeni veri ve süreç yönetiminin de açılan raporlama araçlarında iyileştirilmektedir ve yeni raporlar tasarlanarak, dashboardlar oluşturularak devam edilmektedir. D-İnsan 4.0 performans yönetim sistemindeki süreçlerde yer alan parçaların depolama alanı öncelikli olarak ölçümülen kriterler ile yolluk performansları oluşturulacak şekilde D-İnsan 4.0 sistemine aktarılmaktır.

LC Waikiki; Doğru kişiye işe almak için süreçler dijitalleştirilmiş durumdadır. İlk metrikleri dijitalleştirerek dashboardlarda taşımması durumdadır. Ayrıca, çalışanların önemli metriklerini ve onay süreçlerini mobil uygulamalardan takip edebilmektedir.


Migros; eskiden mağazalarından alınan iş başvuruları, QR kodu adayları için pratik hale getirilmiş durumdadır. Bununla beraber çalışanların süreçlerini hızlandırmak için 2016 yılında İlk Mobil Uygulama hayatı gerçekleştirilmiş. İlk Mobil uygulaması ile ayrıca yöneticilerde çalışanlar için veri过于 işlemelerle ve departmanlara özel İlk Kariyer modülü erişebilmektedir.

P&G Türkiye; bu işletmede, VR içerkili kampüs aktiviteleri ve dijital işe alım süreci gerçekleştilmektedir. Ayrıca, dijital eğitim programları kullanılmaktadır, dijital ölçümler ve süreçlerini bulunmaktadır, dijital kariyer ve performans yönetim sistemi uygulanmaktadır. İlk Kariyer süreçleri dijital aracılığıyla gerçekleşmektedir.

PepsiCo Türkiye; bu işletmede, Değerlendirme Merkezi uygulaması dijitalleştirilmiş durumdadır. Bunun yanında, İlk Kariyerde, service (IK Çözüm Merkezi) yazılım geliştirilmiştir. Ayrıca, process üzerinden çalışanlarınponsive uygulamaları oluşturulmuştur.


Schneider Electric Türkiye; bu işletmede, yapay zeka özellikle dijital yararlı olacak şekilde dijital öğrenmek için kolaylaştırmak amacıyla mobil öğrenme platformu hayatına geçirilmiş durumlardır. Bu platform kurum dijital öğrenme içeriğindeki birlikte faydalananmaktadır. Dijital öğrenme yöntemleri, ‘Dijital Pasaport’ olarak adlandırılan yöntem ve diğer dijital programlar kapsamında tüm çalışanların kullanılabileceğini geliştirilmiştir. Bu platformun aracılığıyla, bilgi ve becerilerini güncellemeye, yentlemeye ve dijital trenleri yakalama yoluyla teşvik edilirler. Çalışanların dijital alandaki becerilerini artırma为目的, bu çabaların yanı sıra özel işler için belirli teknik

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konularda dijital öğrenme olanakları ve dünyadaki en önemli 1000 lidere özel bir mobil platform sağlanmaktadır. Bu mobil yaklaşım yeni trenleri öğrenme, bildiklerini tazeleme ve liderlerin hayat boyu öğrenci hep güncel kalmasını sağlama yöntemlerini dönenştürmektedir. Tüm İK veri tabanını bir platform üzerine taşıtma ve verinin yöneticiler tarafından da görüntülüp yönetilebileceği bir platform dönüştürmek konusunda önemli çalışmalar yapılmış durumdur. Performans değerlendirmeye süreci ve ücret artış işlemleri bu platform üzerinden tamamlanmaya başlanmıştır. Bu sayede yüksek performanslı çalışanların hızlı yüz yüze değerlendirme ve récup Sloan platformları sağladığı kolaylıklar, verilerin yönetimi için bir platforma dönüştürülme konusunda önemli bir başarı kaynakları uygulamaları aşağıda özetlenebilir.


Bu sistem sayesinde hem adaylar, hem de şirket, zaman tasarrufu sağlayan süreçler hızlandırılmıştır. Buna ek olarak stajyer gibi toplu alımlarda da aynı kanal üzerinden pek çok öğrenciye ulaşıp kısa zamanda etkileşim sağlanabilmektedir. Bu yöntemlerin uygulanarak süreçlerin hızlandırılması, veri yönetimi ve süreçlerin yönetimine de katkı sağlayarak süreçleri hızlandırmaktadır.

TAB Gıda; bu işletmede dijital platformların sağladığı kolaylıklar sayesinde İK daha kıymetli uygulamalar ile ilgilenebilmektedir. Ayrıca, eğitim tekniklerinde dijitalleştirme ve online eğitimler kullanılmaktadır. Yaşar Holding; bu işletmede Kâğıtça dijital ortam kullanılmaktadır, SAP'yle entegre olan İK sistemi mobil uygulamada da taşınmaktadır, işe alımlar, aday havuzu işlemleri, iş ve staj başvuruları, Yaşar Kariyer Platformu üzerinden gerçekleşir, süreçlerin yönetiminde dijital platform aracılığıyla yürütülmektedir ve süreçlerin yönetim kademeleri süreçleri dijital platform aracılığıyla yönetilebilmektedir. Yıldız Holding; bu işletmede, Paperless HR projesi başlatılmıştır ve bu proje ile 50’den fazla süreç formu dijital ortama taşınmıştır. İşe alım süreçlerinin internet üzerinden QR kodlarla birbirine bağlanışı, strategik bir strateji olarak kabul edilmektedir.

Yukarıda yapılan açıklamalar doğrultusunda, araştırma kapsamında incelenen 16 (onaltı) işletmenin belli başlı dijital insan kaynakları uygulamaları aşağıdaki gibi özetlenebilir:

- İnsan Kaynakları’na gelen soruların cevaplanmasına Chatbotların kullanımı,
- İşe alım süreçlerinin tamamen dijital olarak yürütülmesi,
- İşe alım süreçlerinde video ve online mülakatların yapılması,
- İşe alımlarda ön elemanların yapay zeka tarafından yapılmaması,
- İş başvurularının internet üzerinden QR kodlarla birbirine bağlanması, 
- Çalışanların izin, e-bordro gibi taleplerini mobil uygulama üzerinden gerçekleştirmeleri,
- Takdir ve ödüllendirmelerinin dijital platformdan yapılması,
- Tüm İK süreçlerinin mobil uygulamalarla taşınması,
- Mobil uygulama desteği ile olaytanışın eğitimi yapılması,
- Dijital eğitim programlarının gerçekleştirilmesi,
- Dijital ödüllendirme sistemlerinin uygulanması,
- Mobil uygulama desteği ile çalışanlara onlineeri bildirim verilmesi,
- Dashboard ile veriye dayalı analizler, raporlamalar yapılabilmesi,
- Kadro hesaplamaları ve raporlamaların dijital ortamda yapılması,
- Performans yönetimi, terfi, tayin, çıkar vb. kariyer yönetimindeki iş süreçlerinin tamamen online ortamda gerçekleştirmesi,
- Performans ve çalışan değerlendirmelerini mobil çözümlerle anlık olarak yapması
- Online staj programları gerçekleştirilmesi,
- İşletme ile ilgili bilgilerin ve duyuruların çalışanlara mobil uygulamalar aracılığı ile hızlı bir şekilde ulaştırılması,
Yapay zekâ özelliği platform sayesinde kurum içinde işlerin yanı sıra projeler ve mentörlük fırsatları da paylaşılabilmesidir.

5. SONUÇ


İnsan Kaynakları Yönetimi günümüzde Yapay Zeka özellikli platform sayesinde kariyer içinde işlerin yanı sıra projeler ve mentörlük fırsatları da paylaşılabilmesidir.

5. SONUÇ


Sonuç olarak, günümüzde teknolojik gelişmeler iş yaşamında dijitalleşmeye ve dijital bir dönüşüm yol açmaktadır. İnsan Kaynakları Yönetimi ve uygulamaları bu dijital dönüşümünden oldukça fazla faydalananmaktadır. Neredeyse tüm insan kaynakları uygulamaları dijital ortamlarda ve dijital araçlar ile gerçekleştirilir. Tüm işlemlerin bu değişim ve dönüşümün farkındaları olarak kendi işlemlerinin insan kaynakları uygulamalarını yaşamakta olan bu dijital dönüşümü uyarlaması gerektirmektedir.


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