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Factors Affecting the Internal Audit Effectiveness: A Research of the Turkish Private Sector Organizations

Ahmet ONAY[1]

ABSTRACT

The aim of present study is to examine the factors that have an impact on internal audit effectiveness (IAE) in Turkey. The datas of research were obtained from 187 internal auditors who are members of The Institute of Internal Auditors-Turkey, working in private sector organizations through the questionnaire prepared as a result of the item pool assessment. The relationship between the IAE and six main factors revealed by applying Principle Component Analysis was tested with Multiple Regression Analysis. The results supported that specifications of internal audit had a direct impact on IAE. The results of study showed that the factors that have an impact on IAE are management's support, competence, independence, participation in risk management activities and cooperation with external auditor, respectively. This study has replaced one of the missing pieces of the literature. The results would underpin executives and academics to focus on IAE in Turkish private sector.

Keywords: internal audit effectiveness; internal audit in developing countries; private sector audit; principle component analysis; regression analysis.

1. Introduction

Corporate scandals that have shaken the world in last 30 years have increased internal audit function to a much more prominent position within the organizations than before. Due to its unique position within organizations, internal audit has become an integral component of the corporate governance mosaic today (Soh & Martinov-Bennie, 2011, 605). Nowadays, internal audit is considered as the most prominent cornerstone of corporate governance (Gramling et al., 2004, 196). Effectiveness is one of the most prominent issues that internal auditors should consider in order to establish good governance both in terms of their functions and organizations. The prominence of internal audit's role in the field of corporate governance causes internal audit effectiveness (hereafter IAE) to remain a topic of constant interest (Endaya & Hanefah 2016, 161).

Internal audit is a dynamic profession that needs to constantly update itself in order to respond to today's conditions of changing business environment. In addition to providing assurance services to business operations, internal audit profession has also to provide consultancy services to senior management as a strategic mind co-partner to meet its changing needs. By taking on a consultancy role, internal auditors reach the potential to bring their professions to a respectable position that adds value to their businesses. Beyond its traditional role, focusing on internal control and financial compliance, internal audit can establish good governance in organization by undertaking a broad consultancy role within the scope of risk management activities. Today's ever-changing business environment has made it more prominent to explore how effectively internal audit fulfills its objectives (Alzeban & Gwilliam, 2014).

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Conflict of interest disclosure: The authors declare that they have no conflict of interest.

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As stated in current definition made by The Institute of Internal Auditors (IIA), "internal audit acts with a systematic and disciplined approach to evaluate and improve effectiveness of organization's risk management, control and governance processes" (IIARF, 2013, 2). The current definition of internal audit points to existence of a future-oriented paradigm that supports those who are audited to conduct their activities more effectively and efficiently (Goodwin, 2004). The main purpose of internal audit is to provide organizational effectiveness and efficiency by bringing constructive criticism (Cohen & Sayag, 296, 2010). According to Chambers (1992), effectiveness means "doing the right thing"; efficiency means "doing well". Effectiveness is more prominent than efficiency. It is not prominent how efficiently service is provided if internal audit is not effective (Lenz et al., 2018, 3).

Internal audit, which is a dynamic profession whose scope and boundaries change in line with new business needs, deserves concern and attention of more future academic research (Lenz et al., 2018, 1). Many studies (Arena & Azzone 2009; Mihret et al. 2010; Coetzee & Erasmus, 2017) point out that studies focusing on the factors affecting the effectiveness of internal audit and their relationship with each other should be conducted. The literature needs extensive empirical studies that examine more variables that have a potential impact on IAE. The narrow literature dealing with IAE in private sector enterprises has shown that factors affecting effectiveness and possible relationships are not fully examined. There is a need to conduct further research in this specific fields.

The vast majority of researches in literature to determine the factors that have an impact on IAE are focused on public sector. When examining sector on which current studies focused, research method, sampling, and hypotheses in previous studies, it is clear that factors directing IAE need more research (Erasmus & Coetzee, 2018, 93). Many of studies for public sector have suggested that researches should be repeated for private sector in future studies (Coetzee & Erasmus, 2017, 238). The lack of consensus on factors affecting IAE in the previous studies for private sector indicates the gap of research area. There are not enough studies in the international literature to meet the importance of the subject, and many academics (Mihret & Yismaw, 2007; Ahmad et al., 2009; Mustika, 2015; Endaya & Hanefah, 2016; Salehi, 2016; Erasmus & Coetzee, 2018) recommend further research, especially focusing on developing countries. This situation makes IAE a field of study that should be focused in private sector businesses operating in developing countries. For these reasons listed above, it is aimed to contribute to the elimination of existing gap in the research area in this study.

2. Literature and Hypothesis Development

2.1. Internal Audit Effectiveness

The effectiveness of internal audit function plays a major role in the success of organization. In order to determine factors that have an impact on IAE, many studies have been conducted on samples consisting of participants of both parties demanding and supplying internal audit service. International Standards for theProfessional Practice of Internal Auditing (ISPPIA) has been used as a basic guide in selection of variables that should be tested in order to determine IAE. In addition, factors such as economic conditions of countries, directives of regulatory public institutions and sector in which the enterprise operates, influenced determination of variables in the models developed by researchers.

Sarens (2009) recommended that characteristics of internal auditors and internal audit functions be examined as prominent study topics for future studies on IAE as a result of the academic examination made on papers presented at the Internal Audit and Corporate Governance Conference held in Netherlands.

Arena & Azzone (2009) analyzed the data obtained from participants by dividing them into three in their study on sample of internal auditors in Italy. In the study, quality of internal audit procedures, characteristics of internal audit and outcomes of internal audit activity have been associated with IAE. According to results of the study, IAE is affected by characteristics of audit team, audit process and organizational relationships. IAE is measured by level of execution of the internal audit's recommendations by managers.

Alzeban & Gwilliam (2014) examined relationship between IAE and five independent variables with multiple regression analysis on data collected from internal auditors and business managers working in Saudi Arabia. The results showed that support of management is variable that has the most positive effect on IAE. Similar studies have been suggested to be carried out especially in developing countries.

Drogalas et al. (2015) collected data from the participants consisting of employees of a few companies listed

on the stock exchange in Greece in order to determine factors related to IAE. The findings of study showed that quality of internal audit activity, competence of audit team, independence of internal audit and support of management are main factors that positively affect IAE. The results of study reveal that independence of internal audit is the most prominent factor. In future studies, it has been proposed to test variables such as cooperation with external auditor or to examine opinions of different parties.

Coetzee & Erasmus (2017) obtained a 92-item scale by applying exploratory factor analysis on data obtained from employees of public organizations operating in South Africa in order to determine variables that steer and measure IAE. In the study, the literature was reviewed to determine factors that steer IAE. The independent variables that are predicted to affect IAE in the literature are classified as separate structures. One of the prominent purposes of the study is to form basis for future studies. It has been suggested that the research methodology should be repeated in future studies for private sector.

Current issues affecting the business world have led to study of different variables in different periods. While the literature on IAE is more focused on characteristics of internal auditor, such as competence, independence and performance, then it has focused on relations with external auditor, senior management and board of directors. In the table below, a summary of prominent studies conducted for private sector in the literature on IAE is presented.

Table 1: Summary of literature on IA effectiveness in private sector companies.

Year	Authors	Independent Variables	Method	Region
2003	Al-Twaijry et al.	Competence, Size/Structure of IAF, Management Support, Independence, Scope of Work, Organizational Characteristics	Descriptive Statistics	Saudi Arabia
2008	Yee et al.	Competence, IA and EA Relationships, Independence, Quality Work/Measure Performance, Professional Proficiency	Descriptive Statistics	Singapore
2009	Arena & Azzone	Competence, Size/Structure of IAF, Organizational Status/Characteristics	Regression Analysis	Italy
2010	Cohen & Sayag	Management Support, Independence, Professional Proficiency, Quality Work/Measure Performance	Regression Analysis	Israel
2011	Soh & Martinov-Bennie	Competence, IA and EA Relationships, Organizational Status/Characteristics, Size/Structure of IAF	Qualitative	Australia
2012	Abu-Azza	Competence, IA and EA/Other Relationships, Management Support, Independence, Scope of Work, Organizational Status/Characteristics	Qualitative, Descriptive Statistics	Libya
2014	Lenz et al.	Competence, IA and EA Relationships, Management Support, Organizational Status/Characteristics, Size of IAF	Quantitative	Germany
2015	Drogalas et al.	Competence, Independence, Management Support, Quality Work/Measure Performance	Regression Analysis	Greece
2015	D'Onza et al.	Competence, Management Support, Independence, Professional Proficiency, Organizational Status/ Characteristics	Regression Analysis	Many Countries
2016	Salehi	Competence, IA and EA/Other Relationships, Size/Structure of IAF, Management Support, Independence	Regression Analysis	Iran
2018	Azzali & Mazza	Organizational Status/Characteristics, Scope of Work, IA and EA/Other Relationships, Size/Structure of IAF	Structural Equation Model	Italy

Current approaches that impose responsibilities on internal auditors such as governance, internal control and risk management, which affect level of achieving business objectives, have influenced variables included in developed researching models. The perspective provided by the previous studies underlined that internal auditors and chief audit executives, as well as senior management, have responsibilities to ensure IAE. This perspective is aware of the responsibilities of all parties that strive to achieve objectives of business, which have an impact on IAE, and supports focus on the right areas. However, IAE is a dynamic workspace and should be supported by more future studies. The change in business environment directly affects internal audit, which is already a dynamic profession. IAE is directly affected by professional regulations and business needs. Although ISPPIA has adopted factors that have an impact on IAE as current standards for both organizations and internal auditors (IIA, 2018), number of comprehensive studies examining private sector companies operating in developing countries is limited. Previous studies emphasized precisely that new studies are needed. The present study will make a unique contribution to the literature, as it is first comprehensive experimental study that addresses Turkish private sector in the field of IAE.

2.2. Independence of Internal Audit

The first condition for IAE is to provide conditions that guarantee independence within organization. The definition of internal audit emphasizes that it is an independent and objective activity. The concept that is closely related to independence is objectivity (Stewart & Subramaniam, 2010, 330). ISPPIA has defined independence as being free from conditions that threaten objectivity and objective appearance. Such a threat should be managed both at the level of internal auditor in individual context and at the level of internal audit department in the functional context. Independence is an inevitable requirement for internal audit profession. ISPPIA has expressed independence of internal audit as the most prominent indicator of IAE. Internal auditors should not have a position within their organization where their independence can be questioned and cannot continue their activities with their objective professional judgment (Vanasco, 1994).

Previous studies have tested opinions of participants on whether internal audit departments can achieve effectiveness in private sector organizations that do not have conditions that ensure independence of internal audit function (Yee et al., 2008; Cohen & Sayag, 2010; Abu-Azza, 2012; D'Onza et al., 2015; Drogalas et al., 2015). The results of previous studies have not been able to reach full consensus on whether independence is the most prominent factor in the effectiveness of internal audit. For example, Yee et al (2008) provided evidence that the independence of internal audit function is not the most prominent factor for IAE in the results of research that it restricted to Singapore private organizations. On the other hand, Drogalas et al (2015) discovered in their research in Greece that the most prominent factor affecting IAE is independence of internal audit department. Considering previous discussions, following hypothesis is formulated:

H_1. Independence of internal audit positively affects IAE.

2.3. Size of Internal Audit Department

In order for internal audit to assume its responsibilities properly, it must first of all have a sufficient number of qualified staff (Arena & Azzone 2009, 44). According to ISPPIA 2030, Chif Audit Executive is responsible for providing necessary, appropriate and sufficient resources for implementation of audit plan, effectively managing resources, reporting resource needs to senior management, and supporting senior management in resource allocation. As stated in Practice Advisory 2030-1, one of the resources needed to fulfill internal audit responsibility is employment of a sufficient number of internal auditors.

The size of internal audit department greatly affects structure of internal audit function. While large internal audit department s are more likely to have a more hierarchical management structure, auditors are more autonomous in small departments (Prawitt, 2003, 178). The fact that auditors will have to take on a wider range of different types of tasks in internal audit departments with insufficient staff indicates a potential hazard that threatens IAE. On the other hand, size of internal audit department directly affects time required for audit activity. In internal audit departments that do not have enough staff, auditors face time pressure to fulfill their duties on time. In addition, internal audit department, which has a sufficient number of staff, can rotate more auditors to achieve more objectivity. By rotating more auditors, conflicts of interest that damage auditor objectivity can be avoided.

Previous studies have shown that when there is a sufficient number of internal auditors, probability of internal audit's effectiveness is high. For example, the results of Salehi (2016) showed that research participants listed

the fact that internal audit departments have sufficient number of internal auditors in Iranian private sector organizations among factors that positively affect IAE. Many studies show that there is a positive correlation between having sufficient number of internal auditors and performance of internal audit departments (Al-Twaijry et al., 2003; Soh & Martinov-Bennie, 2011; Lenz et al., 2014). For example, Al - Twaijry et al. (2003) reported that the CAE of a company operating in Saudi private sector commented that relatively small internal audit departments were unable to perform all tasks, neglected many tasks, and focused only on a broad perspective. Based on previous discussions, following hypothesis is formulated:

$H_{2.}$ The size of internal audit department positively affects IAE.

2.4. Competence of Internal Audit

Technical competence is essential for effectiveness of internal audit function (Mihret et al. 2010). The standards published by IIA demand competence of internal auditors. ISPPIA 1210 states that internal auditors must have knowledge, skills and other competencies required to fulfill their individual responsibilities. In addition, it is one of the leading responsibilities of top managers to equip internal audit departments with competencies required to fulfill their responsibilities collectively or acquire them. Many academic studies (Messier & Schneider 1988; Maletta, 1993; Selim & Mcnamee, 1999) have confirmed that competence is an prominent component of internal audit.

According to ISPPIA 1230, it is imperative that internal auditors develop their competencies through continuous professional development. Internal auditors must take into account continuous professional development in order to have the competencies needed to sustain their activities in a changing business environment (Selim & Mcnamee, 1999). In order for the internal audit profession to assume new roles in risk management and corporate governance, internal auditors need to create a new set of skills (Arena & Azzone 2009). In addition, the internal auditors are expected to have the knowledge and skills to assume responsibilities that do not conflict with the characteristics of their profession in areas such as corporate risk management, governance, compliance and information technologies (Onay & Erdoğan, 2019).

According to Al - Twaijry et al., (2003), competence of staff and managers of internal audit departments is vital to effective functioning of internal audit activities, and if they do not have necessary competence, IAE will decrease. When internal auditors do not have sufficient knowledge and skills, their recommendations are ignored by senior management and IAE is damaged (Peursem, 2005). On the other hand, competence of internal audit is one of the most prominent criteria that affect the level of trust of external auditors in internal audit activities (Gramling et al., 2004; Al-Twaijry et al., 2004; Lenz et al., 2018). Previous studies (Yee et al., 2008; Arena & Azzone 2009; Soh & Martinov-Bennie, 2011; D'Onza et al., 2015; Drogalas et al., 2015) have focused on competence of internal audit departments as one of the criteria that internal audit function should have in order to achieve high efficiency in private sector organizations. For example, Arena & Azzone (2009) determined that insufficient knowledge and skills of internal auditors in Italy private sector companies had a negative impact on IAE. In accordance with existing support in the literature, following hypotheses have been formulated:

$H_{3.}$ The competence of internal audit positively affects IAE.

2.5. Management Support

Internal audit, which is positioned as strategic mind co-partner of senior management in organizational hierarchy of enterprise, must be supported by management in order to maintain its activities with optimum performance. Senior management is responsible for establishing conditions that allow the internal audit function to perform its duties within the organization. The ability of internal audit to maintain its independence depends on meeting these conditions, that is, on support of management. The prominence of the relationship between internal audit and senior management is clear in determining independence and objectivity of internal auditor (Al-Twaijry et al. 2003). The support of senior management therefore plays a vital role in effectiveness of audit process. Internal audit managers and auditors should gain support of senior management in order to improve audit effectiveness. Support of senior management and board of directors for internal auditing is developed with relationships based on mutual trust and significant interaction (IIA, 2018).

Previous studies (Cohen & Sayag 2010; Lenz et al., 2014; Drogalas et al. 2015; D'Onza et al., 2015) confirmed that IAE depends on support of management. Albrecht et al. (1988) argue that open support of management is variable that has the greatest impact on IAE. According

to Sarens & De Beelde (2006), internal audit needs support of senior management in order to gain the general acceptance and recognition of its organizational structure. For this, internal audit should try to gain support of management by showing its potential to add value to organization. Cohen & Sayag (2010) determined the prominence of senior management's support in their research in Israel organizations to discover factors of IAE. It has been emphasized that decisions such as recruitment of specialized internal auditors, providing career opportunities for audit staff and providing organizational independence to audit activities have a positive effect on IAE. Arena and Azzone (2009) measured IAE based on how well recommendations were taken into account by senior management. Sarens & De Beelde (2006) classified implementation of internal audit's recommendations by senior management as one of the indicators of management support for internal audit. Lenz & Hahn (2015) has confirmed that relationship between internal audit and management, which is its principal client, is still an area of study that is worth investigating. The lack of empirical studies reflecting situation in this field, especially in developing countries, is one of the motivations of our study. With this motivation, following hypothesis is formulated:

$H_{4.}$ Management support positively affects IAE.

2.6. Cooperation with External Auditor

Together with internal and external audit, audit committee and senior management, they are considered as the four basic cornerstones of corporate governance. Internal and external audit are leading representatives of business stakeholders (Gramling vd., 2004, s. 196). They fight together against danger of moral hazard and adverse selection caused by information asymmetry and conflict of interest between managers and stakeholders (Jensen & Meckling, 1976). Internal auditors and external auditors should be in coordination in their activities, respect each other and make use of each other's abilities (Sawyer vd., 2005, s.8). By improving coordination and cooperation among internal and external auditors, they can both increase effectiveness and efficiency of audit activities and benefit from each other's work (Wood, 2004: 2). When client business has an effective internal audit function, external auditors can identify control risk low and narrow scope of their testing. Based on performance of internal auditors in audit tests, external auditors can complete their audit in less time and at less cost. Because of activity advantages provided by effective cooperation between the parties, audit costs and therefore audit fees are reduced when external auditors deem it appropriate to benefit from internal audit activities (Felix et al., 2001; Wood, 2004; Suwaidan & Qasım 2010; Mat Zain et al., 2015).

Many professional standards guide cooperation and coordination between internal and external audit. ISA 610 (2013) published by IFAC and SAS 65 (1991) published by AICPA guide external auditors when they plan to benefit from direct assistance or work of internal audit function to narrow scope of their audit procedures. ISPPIA 2050-1 (2013), published by IIA, guides internal auditors to prevent unnecessary repetition of same work when collaborating with the external auditor. As stated, professional standards emphasize the contribution that internal and external audit can provide to each other. Coordination and cooperation between the two functions positively affects IAE. Time and resource savings by reducing unnecessary repeated efforts create opportunities for internal auditors to focus on other responsibilities. Many academic studies have confirmed that lack of coordination between internal and external auditors and absence of collaboration affects performance of internal audit in the private sector organizations of developing countries negatively. Moreover, studies in the literature (Yee et al., 2008; Soh & Martinov-Bennie, 2011; Abu-Azza, 2012; Lenz et al., 2014) have determined that collaboration with external auditor increases IAE in private sector enterprises. For example, Abu-Azza (2012) reported that majority of internal audit managers in Libya organizations have view that collaboration with external auditors is beneficial for internal audit. With the orientation of previous studies, following hypothesis is formulated:

$H_{5.}$ Cooperation with external auditor positively affects IAE.

2.7. Risk Management Activities

Internal audit is a function that serves organization. IAE is a risk-based concept that contributes to organization's achievement of its purposes by improving corporate governance quality. An effective internal audit function is expected to review key risk areas to contribute to organization's purposes (Lenz & Hahn, 2015, s.7). Corporate governance is included in definition of internal audit as an umbrella concept that covers risk management and internal control. Corporate management and risk management saddle internal audit function with a responsibility of being a part of their activities to ensure its organization achieves its purposes. IIA's position reports and current COSO Enterprise Risk

Management Framework require a risk-based internal audit. IAE in today's complex business environment is associated with ability to assume these responsibilities. The effectiveness of internal audit function becomes possible only when audit activities are conducted on a risk-based basis. As a result, success level of internal audit function's contribution to organization is directly related to its impact on enterprise risk management.

Modern internal audit activities must be carried out on a risk-based basis. Internal audit should be at center of potential threats and problems facing its organization. It is supported by the literature that being a part of enterprise risk management and that internal audit activities focus on more risky and prominent issues has a positive effect on its effectiveness (Allegrini & D'Onza, 2003; Spira & Page, 2003; Sarens & De Beelde, 2006; Arena & Azzone, 2009; Castanheira et al. 2010; Sarens et al., 2012; Coetzee & Lubbe, 2013; Lenz & Hahn, 2015). Sarens & De Beelde (2006) reported that risk-based internal audit activities increased effectiveness of internal audit function in qualitative study they conducted on Belgian and American companies. Participants of their study stated that internal auditors are worried about effectiveness of internal audit in cases where internal auditors are not able to participate adequately with increase of their enterprise risk management activities (2006, p.76). Castanheira et al. (2010) stated that lack of risk-oriented conduct of internal audit activities in many private sector enterprises caused negative results. It can be said that more internal audit function contributes to control of primary risks to which organization is exposed, more it increases its effectiveness. In the light of previous studies in the literature, final hypothesis is formulated:

$H_{6.}$ Carrying out risk-based activities of internal audit positively affects its effectiveness.

3. Methodology

3.1. Population and Sample of the Study

Our study population working in the private sector company in Turkey and is also designated as internal auditors who are members of IIA-Turkey. According to the annual report 2019, IIA-Turkey has 2731 members. By reaching entire target universe during data collection process, internal auditors willing to participate in our research were contacted. The questionnaire forms were sent to target population by e-mail three times at two-month intervals. In addition, in order to increase number of participants, many internal auditors were contacted face to face and via telephone. This process was completed between second half of 2019 and first quarter of 2020.

At the end of data collection process, 194 participants were provided to answer our questionnaire. In calculating sufficient sample size, n> 50 +8 m (where m = number of variable) formula is recommended (Tabachnick & Fidell, 2013). Since there were 7 variables in our research model, 187 participants were found sufficient. Demographic characteristics of our participants are presented in Table 2.

Table 2: Professional demographics of the participants.

		Frequency	Percentage
Gender	Female	83	44%
	Male	104	56%
Age	37 and less	50	27%
	Between 38-44	45	24%
	Between 45-53	51	27%
	54 and more	41	22%
Number of internal auditors in the IAD	3 and less	54	29%
	Between 4-5	25	13%
	Between 6-9	44	24%
	Between 10-12	30	16%
	13 and more	34	18%
Work Experience	4 and less	55	29%
	Between 5-8	44	24%
	Between 9-15	52	28%
	16 and more	36	19%

3.2. Measurement Tool Development

In the process of compiling measurement tool of our study, opinions of 10 academicians working in the field of internal audit and 10 internal auditors with a high level of professional experience were consulted. First of all, a comprehensive pool of 173 items was formed, consisting of expressions that are included in questionnaires used in many studies (Arena & Azzone 2009; Cohen & Sayag 2010; Alzeban & Gwilliam 2014; Drogalas et al. 2015; Salehi 2016; Endaya & Hanefah 2016; Coetzee & Erasmus 2017) dealing with IAE, and suggested by the authors of present study as a result of detailed literature review. Then, an item pool assessment study was conducted with field experts consisting of academicians and internal auditors. The question items cannot serve purposes of the study if there is an

insufficient reflection of concept under investigation or if it goes beyond its limits (DeVellis, 2003, s.64). Each question item was evaluated by the specialist team in terms of how suitable it was for purposes of the study and its understandability.

The extent to which the measurement tool or each item serves purposes of the study is expressed as content validity. Lawshe (1975) technique was used to determine the content validity. In this technique, content validity ratios (CVR) are obtained from opinions of the specialist regarding any item. The content validity ratio of an item is calculated by the following formula: $CVR = \frac{N_A - (N/2)}{N/2}$. N indicates the total number of specialist, and indicates the number of specialist who express an appropriate opinion on the item.

Significance of items is tested with statistical criteria. As in our study, with data obtained from 20 experts, the lowest acceptable value for an evaluation at level of α=0.05 significance is 0.42 (Veneziano & Hooper, 1997). Items below this value are removed from the measuring tool. As a result of the item pool assessment study, question statements whose consensus statistics were below the threshold value were eliminated and a questionnaire consisting of 39 items was obtained. The content validity index of obtained questionnaire is 0.86. This ratio shows that the questionnaire is suitable for purposes of the study and has high comprehensibility.

3.3. Measurement of Variables

In the design of questionnaire, which is measurement tool of our study, the factors that negatively affect data collection were taken into consideration. An optimum balance should be established between number of items in questionnaire and the sample size that is intended to be reached (Fowler, 1995). For this, variables of our research model were measured with an optimum number of questions. Five point likert type rating scale was preferred in design of the questionnaire (1=strongly disagree to 5=strongly agree). In addition, there are four open-ended questions in our measurement tool aiming to determine number of auditors that internal audit departments has and demographic characteristics of participants such as gender, age and professional experience. The variables in our model were measured by analyzing answers of internal auditors to questions in measurement tool. The question statements included in the questionnaire for measuring each variable are listed below.

Internal Audit Effectiveness (IAE): The dependent variable of our model was measured with 10 items: (1) IA ensure that it adds value to the business. (2) IA improves organizational performance. (3) IA determines adequacy and effectiveness of organization's control systems. (4) IA evaluates the accuracy and reliability of financial reports. (5) IA reviews compliance with policies, plans, procedures and regulations. (6) IA reviews means of safeguarding assets. (7) IA reviews economical, effective and efficient use of resources. (8) Recommendations in the internal audit report are implemented in a timely manner. (9) IA develops controls to ensure that corrective actions are implemented and effective. (10) Suggestions put forward by internal auditors are largely implemented.

Independence of Internal Audit (IND): This variable was measured with 7 items: (1) Internal auditors can submit their reports from bottom to senior management in organization. (2) Internal auditors can freely audit all departments within the organization and specifically employees without additional permissions and can examine related documents. (3) Internal auditors have the indispensable independence to fulfill their professional obligations and duties. (4) Internal auditors are exposed to the intervention of top management while conducting their audits. (Reverse Scored). (5) The chief audit executive has first-hand contact to board of directors. (6) Internal auditors are not required to perform work that does not relate to their profession. (7) Terminating work of internal audit requires approval of audit committee, and/or board of directors.

The Size of Internal Audit Department (SIZE): This continuous independent variable was measured through an open-ended question to determine number of internal auditors.

Competence of Internal Audit (COMP): This variable was measured with 6 items: (1) The professional knowledge of internal auditors is at the level to fulfill their responsibilities in the best way. (2) Internal auditors attend educational seminars for continuous training. (3) Internal auditors have sufficient professional qualifications to perform mandatory and voluntary rotations. (4) The vast majority of internal auditors have necessary certifications such as CIA, CFE and CPA. (5) Internal audit function has right mix of competencies in areas of expertise such as data security, taxation, audit software, new business technologies. (6) Internal auditors have relevant training that enables them to audit all systems of the organization.

Management Support (MS): This variable was measured with 5 items: (1) Top management supports

internal audit to fullfil its tasks and liabilities. (2) IA function has the financial resources required for its audit-related tasks. (3) The response to internal audit reports by senior management is reasonable. (4) Senior management has open communication with chief audit executive. (5) IA function employs the necessary number of auditors and employees to undertake its tasks.

Cooperation with External Auditor (CEA): This variable was measured with 7 items: (1) There is effective communication between internal and external audit. (2) External auditors are tolerant and positive towards internal auditors. (3) External auditors allow internal auditors to express concerns about audit work. (4) External and internal auditors reach a consensus on the timing of their work in the areas they cooperate for their common interests. (5) External auditors discuss their audit plans with internal auditors. (6) External auditors meet regularly with internal auditors. (7) Both external and internal auditors make their working papers available to each other.

Involvement of internal audit in Risk Management (RM): This variable was measured with 4 items: 1) IA strives to improve risk management and evaluates its effectiveness. (2) A considerable part of work of internal auditors consists of risk assessment activities. (3) Internal auditors implement control risk self-assessment techniques (CRSA). (4) IA determines whether the organization's risk responses match the risk appetite.

3.4. Data Analysis

Before applying statistical analysis, the normality that was prerequisite for both factor analysis and regression analysis was tested. Kolmogorov-smirnov test statistics that measure normality, skewness-kurtosis values and histogram graphs show that our data shows normal distribution and normality assumption is not violated.

Firstly the principle component analysis (PCA) was applied in order to obtain factors consisting of a more steerable number of the data obtained with measurement tool prepared to measure dependent and independent variables in our research model. By means of PCA analysis, measurable and observable items are gathered under a small number of variables that are not directly observable, while the construct validity of our questionnaire is measured. In addition, internal consistency, which is the degree to which the expressions in the data compilation tool can measure the same intended feature for each measurement, is an prominent indicator of reliability and has been tested with the Cronbach Alpha (CA) coefficient. PCA was preferred to obtain an empirical summary of the experiment set for use in subsequent analysis (Stevens, 1996, p.363) and to overcome problems arising from factor uncertainty (Tabachnick & Fidell, 2013, p.640). For the factor rotation, promax was carried out from oblique approaches acting with the assumption that there was a correlation between variables. The factors obtained as a result of this analysis are defined as the variables of multiple regression analysis carried out later.

Before testing our model on which we tested effect of independent variables on IAE, the assumptions of multiple regression were checked. In addition to normal distribution, it has been confirmed that multicollinearity and singularity assumptions are not violated and have sufficient sample size. As stated earlier, outliers were eliminated at beginning of data scanning process. Ordinary least squares (OLS) multiple regression was performed to test our hypotheses that deal with relationship between IAE, which is the dependent variable of our model, and six predictive variables we discussed in detail in the previous section.

4. Findings and Discussion

4.1. Principle Component Analysis

The results obtained from Kaiser-Meyer-Olkin (KMO) and Bartlett tests evaluating the suitability of the data for factor analysis were interpreted before PCA was performed in order to reveal factor structures of scale and to measure construct validity. The $p<0.001$ significance level was calculated as KMO Value 0.957 and Bartlett Value 6517. The calculated values show that the datas are suitable for factor analysis. In order to reach the most suitable factor structure, factor extraction criteria were taken into consideration while making analyzes. According to this; (1) only factors with eigenvalues above 1 were retained, (2) items with factor loads less than 0.50 were excluded, and (3) having higher loads under more than one factor, and those with a difference below 0.10 items were removed from the scale. Five items (IAE5, IND4, COMP5, CEA5, CEA6) were removed from the measurement tool, taking into account the factor extraction criteria. As a result of the analyzes, six interpretable factors explained 78% of total variance were obtained.

Factors consisting of items related to each other were named in a manner consistent with the model

of our research. According to this, the first factor explained 52% of the variance is named as "internal audit effectiveness". The second factor explained 9% of the variance is named as "independence". The third factor explained 5% of the variance is termed "risk management", the fourth factor explained 5% of the variance is termed "collaboration with the external auditor" and the fifth factor explained 4% of the variance is termed "competence". The last factor included five items that explained 3% of the variance is named as "management support". Descriptive statistics of the items, factor loads, Cronbach's Alpha coefficients and explained variance rates are shown in Table 3.

Table 3: Descriptives statistics and factor structure

Factor	Item	Mean	SD	Loading	Cronbach's Alpha	Explained Variance (%)
Internal Audit Effectiveness (IAE)	IAE3	4,18	0,717	0,884	0,947	51,56
	IAE7	4,05	0,774	0,865		
	IAE1	4,18	0,710	0,846		
	IAE4	4,18	0,700	0,802		
	IAE9	4,17	0,698	0,793		
	IAE2	4,23	0,720	0,783		
	IAE6	4,23	0,684	0,742		
	IAE10	4,13	0,744	0,732		
	IAE8	4,21	0,679	0,730		
Independence of IA (IND)	IND2	3,99	0,741	0,919	0,957	8,808
	IND1	4,01	0,748	0,913		
	IND5	4,04	0,736	0,893		
	IND6	4,00	0,726	0,881		
	IND7	3,98	0,758	0,848		
	IND3	4,00	0,751	0,841		
Risk Management Activities of IA (RM)	RM3	3,91	0,781	0,964	0,979	5,422
	RM1	3,92	0,796	0,960		
	RM2	3,93	0,804	0,951		
	RM4	3,94	0,794	0,949		
Cooperation between IA and external auditors (CEA)	CEA7	3,94	0,756	0,850	0,905	4,857
	CEA3	3,85	0,809	0,799		
	CEA4	3,85	0,789	0,788		
	CEA1	3,87	0,775	0,781		
	CEA2	3,87	0,826	0,774		
Competence of IA (COMP)	COMP4	4,01	0,779	0,931	0,898	4,389
	COMP1	3,98	0,718	0,819		
	COMP3	3,93	0,729	0,800		
	COMP2	4,01	0,726	0,762		
	COMP6	3,98	0,729	0,733		
Management Support for IA (MS)	MS3	4,01	0,773	0,920	0,933	3,246
	MS2	3,99	0,783	0,853		
	MS1	4,02	0,776	0,793		
	MS4	4,06	0,798	0,772		
	MS5	4,00	0,786	0,711		
KMO: 0.957; Bartlett: 6517; Total Variance explained: %78						

The average scores of each statement in the questionnaire are included in Table 3. The average scores obtained with the five-point likert scale show that level of participation in statements of independent variables is approximately 4 and level of participation in statements of the dependent variable (IAE) is slightly above 4. Statements for each variable have averages close to each other. It is understood from the averages of statements that perception of participants in the Turkish private sector firms regarding IAE audit and related variables is quite high. Average scores are higher than those obtained in many similar studies in developing countries (Arena & Azzone, 2009; Cohen & Sayag, 2010; Alzeban & Gwilliam 2014; D'Onza et al., 2015; Drogalas et al., 2015; Coetzee & Erasmus, 2017).

The CA coefficient calculated to determine how compatible statements in measurement tool perform together is presented in Table 3. IAE variable consisting of 9 items has 0.947, IND variable consisting of 6 items has 0.957, RM variable consisting of 4 items has 0.979, CEA variable consisting of 5 items has 0.905, COMP variable consisting of 5 items has 0.898, and MS variable consisting of 5 items has 0.933 CA reliability coefficient. CA coefficients calculated for variables indicate a high level of reliability.

4.2. Regression Analysis

The hypotheses developed in the previous section were tested with the following regression model:

$$IAE = b_0 + b_1 SIZE + b_2 IND + b_3 COMP + b_4 MS + b_5 CEA + b_6 RM + e_i$$

In order to obtain reliable results from the regression analysis, it is desirable to have a correlation of more than 0.30, preferably between dependent and independent variables, while a very high correlation level of more than 0.90 between independent variables leads to a multicollinearity problem (Pallant, 2016). Firstly correlation analysis was performed in order to evaluate that independent variables of the model are related to dependent variable at least to a certain level and the probability of multicollinearity problem arising. Correlation between variables is presented in Table 4. Correlation was determined between IAE dependent variable and all independent variables except SIZE. In addition, a high correlation was found among all other independent variables except SIZE. However, the correlation level is among the acceptable limits mentioned above.

Table 4: Correlation coefficients for the variables in the model.

Variables	Mean	SD	1	2	3	4	5	6	7
1 IAE	4,174	0,598	1						
2 SIZE	7,818	5,131	0,076	1					
3 IND	4,005	0,674	0,689*	0,105	1				
4 COMP	3,981	0,621	0,674*	0,059	0,620*	1			
5 MS	4,014	0,696	0,745*	0,031	0,681*	0,596*	1		
6 CEA	3,876	0,674	0,623*	-0,079	0,618*	0,577*	0,655*	1	
7 RM	3,924	0,769	0,489*	0,135	0,365*	0,278*	0,432*	0,444*	1

N= 187 * Correlation is significant at the .01 level.

To determine whether a multicollinearity problem exists, tolerance value and variance inflation factor (VIF) are commonly used criterias. These criterias have been examined to evaluate the possibility of multicollinearity in depth. To ensure that the regression results are not overshadowed by multicollinearity problem, tolerance values must be above 0.10 and VIF value below 2.5 or at least 4 (Pallant, 2016; Hair et al., 2010). The tolerance and VIF values, which are among the acceptable limits presented in Table 5, support that regression analysis results are not suspected due to multicollinearity.

Table 5: Results of regression analysis

Variable	B	Std. Error	β	t	p-value	Tolerance	VIF
Constant	0,558	0,190		2,929	0,004		
SIZE	0,001	0,005	0,009	0,201	0,841	0,924	1,082
IND	0,170	0,056	0,191**	3,021	0,003	0,432	2,314
COMP	0,265	0,055	0,275**	4,804	0,000	0,528	1,892
MS	0,300	0,056	0,349**	5,397	0,000	0,415	2,407
CEA	0,037	0,056	0,041*	0,660	0,510	0,444	2,251
RM	0,134	0,038	0,173**	3,569	0,000	0,742	1,348

Predictors: (constant), size of the IAD, independence of IA, competence of IA, management support for IA, cooperation between IA and external auditors, risk management activities.

R=0,829; R^2 *= 0,688; Adjusted* R^2 *= 0,677; F = 66,085; *p ≤ 0.1; **p ≤ 0.01*

The regression analysis results in Table 5 provide a comprehensive and precise review of the our research's hypotheses. Ordinary least squares (OLS) multiple regression was used to assess ability of six independent variables to predict IAE. A statistically significant effect of SIZE variable on the dependent variable could not be determined. It was determined that IND, COMP, MS, RM independent variables had statistically effect on the dependent variable at the level of p ≤ 0.01 significance. In addition, it was found that CEA had a statistically effect on IAE at the level of p ≤ 0.10 significance. 68.8% of the total variance related to IAE dependent variable was explained by the independent variables. Variance explanation rate corrected according to degree of freedom was measured as 67.7%. It is determined that rate of dependent variable is explained by independent variables at a high level.

The value of F=66.085 reached by ANOVA test evaluating significance of the model as a whole was found statistically significant at the level of p <.001. The significance of the F value in Table 5 confirms that independent variables in the regression model generally explain IAE. In other words, IAE can be explained in a meaningful way with independent variables included in the model.

The findings obtained as a result of the analysis of the regression model showed that the most contributing factor to IAE is the support of the management. Management support is the primary factor in determining IAE. Because the potential factors that are expected to have an impact on IAE are theoretically dependent on management support (Sarens & De Beelde, 2006). The findings obtained in the research definitely support this situation. On the other hand, the findings confirm that the independence and competence of internal audit has a strong influence on IAE. The high significance of these two variables has empirically demonstrated that the two theoretically necessary features of internal audit have a strong influence on IAE. International standards strongly emphasize the importance of independence and competence in conducting an effective internal audit activity (Prawitt, 2003). In addition, significant positive results were obtained in terms of RM and COMP variables included in the model to determine how to carry out the internal audit activity more effectively in practice. These findings show that internal audit is an activity that should be carried out with a focus on risk management in today's risk-surrounded business environment, and cooperation with the external auditor should be ensured in order to obtain benefits such as not repeating the same efforts unnecessarily. Finally, no relationship has been found between the number of auditors working in the internal audit department and IAE. This finding can be interpreted as the qualitative characteristics of internal audit are much more important than quantity, when the whole model is taken into account.

5. CONCLUSION

The founder of modern Turkey, Mustafa Kemal Ataturk's reforms, have today reached a different level of economic and cultural development of Turkey in the Middle East. After the proclamation of republic in 1923, the value given to science and rational thought is basic cause of gaining different specifications from other countries in the region. The results of our research have made a unique contribution to existing literature by revealing the factors that determine IAE in a country with characteristics of Western and Eastern civilization. A role model for developing countries with many features that our research conducted in Turkey, offers

unique results for academics and practitioners. This study completed a missing piece of the international literature mosaic on IAE.

In this study, independent variables, which are estimated to have an impact on IAE in previous studies, are examined on the sample obtained from Turkish private sector organizations. These are the variables of independence of internal audit, necessary professional competence of internal auditors, support of management for internal audit, cooperation with external auditor, number of auditors working in internal audit department and participation of internal auditors in risk management activities. The results revealed that the most prominent driving force of IAE is management support. The results of the study showed that the factors that have the greatest impact on the of IAE after management support are competence, independence, participation in risk management activities, and collaboration with external auditor, respectively. On the other hand, the number of auditors working in the internal audit department has no effect on IAE. When this finding is evaluated together with the finding that competence is one of the most prominent variables explaining IAE, it is concluded that quality is more prominent than quantity in terms of human resources in internal audit units of Turkish private sector organizations.

The results of the study showed that two variables with the most positive support on IAE are management support and independence. This result is compatible with previous studies. In many of the previous studies (Mihret & Yismaw, 2007; Yee et al., 2008; Cohen & Sayag, 2010; Alzeban & Gwilliam 2014; Drogalas et al., 2015), the most influential variable was management support or independence. Again, as in our study, these two variables have positive correlations with other variables in most previous studies. ISPPIA and IIA reports have determined the independence of internal audit and management support as indispensable factors for internal audit activities to be carried out as desired. Internal Audit should have an organizational status that can carry out its activities objectively, and it should be able to make its decisions unaffected, including management, and also gain management support in order to obtain access to the resources it needs to carry out its activities and to avoid audit restrictions within the organization.

Collecting research data through questionnaire causes some methodological limitations by nature. IAE and related independent variables were measured through responses of participants to the questionnaire. Participants may tend to convey different opinions than they actually are. Although making the data collection process more difficult, measuring variables in research model with more provable indicators other than opinions of participants will weaken these limitations. The average of responses given to the questionnaire is higher than that obtained in many similar studies on samples from developing countries (Arena & Azzone, 2009; Cohen & Sayag, 2010; Alzeban & Gwilliam 2014; D'Onza et al., 2015; Drogalas et al., 2015; Coetzee & Erasmus, 2017). These findings differ from other countries to status of internal audit in Turkey and explained by showing the development of internal audit activities over the years. On the other hand, the fact that participants of our research consist only of internal auditors reveals possibility of bias. It is natural that internal auditors offering audit services tend to see their activities positively. This bias can be eliminated by repeating our research on participants who received audit services in future studies.

In this study, internal audit departments of private sector organizations in a developing country, which has characteristics of both western and eastern culture, were examined. When considering Turkey's unique economic and cultural characteristics, the results of the study show it is clear that future studies with similarity. This includes future studies in both developing countries in the Middle East and developed countries of Europe. Limited literature on IAE should be enriched with future research that examines private or public sector in both developed and developing countries. In addition, the limitations of our research in terms of the selection of model variables can be eliminated by including different variables that affect internal audit in the model. As a result of the item pool assessment study, the questionnaire obtained in our research can be used completely or partially according to selection of variables in future research.

Despite the many limitations mentioned earlier, this study has revealed relationship between IAE in Turkish private sector organizations and the most emphasized factors in previous studies and ISPPIA. Internal audit is an virgin area with a large number of research questions, which requires more scientific research. This study was supported by the international literature with an example from Turkey. This study supports more research from Turkey and other developing countries from having the potential to overcome its own limitations.

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Fuzzy Based Failure Mode and Effect Analysis Towards to Risks of Autonomous Maintenance Activities: As a TPM Implementation

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ABSTRACT

Manufacturing companies attach importance to Total Productive Maintenance (TPM) applications to extend equipment life and increase efficiency. The recommended applications with TPM are carried out under the pillar activities. Autonomous Maintenance (AM) pillar manage the assignments of the operators to undertake routine maintenance work on machine maintenance. Cleaning, lubrication and control activities are one of the steps of AM pillar and operators need to do them daily. However, there are a number of occupational health and safety risks that operators may face during these activities. Safety (S) pillar which serve as another TPM pillar, deal with occupational accidents and possible situations during TPM applications. AM and S pillars work together to assess the risks that may occur during AM applications. Failure Mode and Effect Analysis (FMEA) is also frequently utilized for risk assessment, but this is criticized in terms of the difficulty in reaching the common point of decision-makers' risk assessment and equal weighting of risk factors. Therefore, it is appropriate to support with the fuzzy logic approach. In this study, the entropy-weighted fuzzy based FMEA method was utilized for identify and prioritize potential risks that may be encountered during the AM activities. Potential risks were revealed and evaluated with the FMEA team. Eleven potential risks were identified in the study. The risk factors of the assessment were weighted by the entropy method. The risk of hand injuring during cleaning the oil below material cutting saw has the highest risk priority.

Keywords: TPM, FMEA, Fuzzy-Logic, Entropy, MCDM

Jel Classification Codes: M10, L62, C02

1. Introduction

Manufacturing companies, to maintain the existence under the conditions of competition, are looking for leading strategies as cost reduction, quality improvement, correct and timely delivery. The Total Productive Maintenance (TPM) introduced by Nakajima (1988) is one of the most commonly used implementing models for equipment managegement. TPM application focuses on increasing the availability ratio, quality ratio and performance ratio of equipment used in the production area. To achieve these objectives, TPM is gathered with autonomous and planned-preventive maintenance operations. Autonomous maintenance (AM) contains activities that improve equipment efficiency (Tajiri and Gotoh 1992; Nakajima 1988, cited in: McKone, and Weiss, 1998: 340). In TPM applications, autonomous activities are carried out by machine operators, and maintenance work is not considered independent from the operator (Eti et al., 2004: 389). Safety is also crucial in TPM structure, and the risk assessment is a priority issue for the implementation of TPM. The identification of the risks of autonomous maintenance practices are applied by the operators is also a prerequisite for the realization of the company's activities in the world class (Chen, 2013: 5405). These studies require risk analysis for the risks encountered in autonomous maintenance activities.

In the literature and the industrial cases, there are many risk analyzes that have been examined and applied. Risk analyzes are divided into two as qualitative and quantitative approaches. Failure Mode and Effects Analysis (FMEA) is one of the quantitative methods. In

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risk analysis, FMEA is commonly used to prevent occupational accidents and to eliminate possible problems. Many risk analysis methods such as Fault Tree Analysis, Expected Value Analysis, Sensitivity Analysis only assess the probobility and severity criteria of the failures. The FMEA method also uses the previously recognizable value of negativities, unlike other methods. FMEA is a technique that aims to determine the errors and dangers in the system without causing an accident and to start to improvement from the top priority (Liu, et al., 2012: 12297). In determining the degree of probability, severity and detectability, fuzzy logic can be applied to the FMEA method in order to treat subjective or qualitative information in a coherent and logical manner (Sharma, 2005: 991). Fuzzy based FMEA method is used to improve quality and maintenance work (Souza, et al., 2008; Sharma, et al., 2010; Selim, et al., 2016).

In this article, to determine the risks that may occur during autonomous maintenance activities, the opinions of experts were taken. The risk assessment team consisting of occupational health and safety specialist, autonomous maintenance officer, maintenance manager and machine operator have been identifed as experts. In the second part of the article literature studies are given. The third chapter describes the fuzzy based FMEA methodology. In the fourth chapter, the application work and the results obtained are shared and the improvement steps of these failures are decided. In the last part, conclusion and recommendations are presented.

2. Literature Review

Total Productive Maintenance (TPM), is an evolution of the methodology that obtained after years of researches on reactive-protective-preventive works on equipment maintenance and reliability (McKone, and Weiss, 1998: 337). The main objective of TPM, which is to increase the availability and overall equipment efficiency, is based on the application pillars shown in Figure 1 (Wakjira, and Singh, 2012: 29; Venkatesh, 2007: 7, Rodrigues, and Hatakeyama, 2006: 277).

Autonomous maintenance is referred to as the Japanese "Jishu Hozen " as one of the TPM pillars and is depend on the idea that if operators are involved in minor maintenance work, there will be more free time for capable maintenance staff to attend to more technical repairs and value-added works. With autonomous maintenance, operators are obliged to perform simple daily activities such as cleaning, lubrication, visual inspection, tightening of loosened bolts, etc. to prevent equipment failure. (Wakjira, and Singh, 2012: 29; Singh, et al., 595).

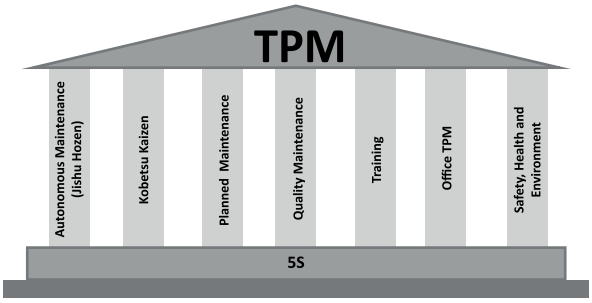

Figure 1: TPM Temple and Pillars

Safety, Health and Environment pillar has an important place in TPM structure. Shirose (1992) uses the term "the maintenance of peace of mind" when describing this pillar (Pomorski, 2004: 62). Safety, Health and Environment pillar which aims the zero accidents, focuses on creating and managing a secure workplace. For this purpose, it works interactively with other pillars of TPM (Venkatesh, 2007: 18).

The TPM studies which is conducted with a systematic methodology, are closely related to the reliable operations of manufacturing. The reliability and availability of the operational systems depend on the TPM studies which is continued as reliability, availability and maintainability themes. In the studies supported by TPM, some quality control tools such as Root Cause Analysis (RCA), Failure Mode and Effect Analysis (FMEA) are also utilized for the equipment control (Sharma, et al., 2007: 526). In their study, Sharma, et al. (2007) proposed that RCA and FMEA methods could be used for maintenance or replacement decisions under cost constraints. Zeng, et al., (2010), examined FMEA method within the scope of integrated management systems. Keay, and Borycki, (2010), used FMEA method to evaluate the security. Chen (2013) developed an autonomous preventive maintenance program by using RCA and FMEA. Chong, et al. (2015) aimed to improve the Overall Equipment Efficiency (OEE) by applying FMEA for maintenance activities. Jamshidi, et al. (2015) used the FMEA method for fuzzy risk – based maintenance framawork for prioritization of medical devices. The risk crietia for these devices are listed as visibility, detection via automatic diagnostic aids, detection after an inspection and scheduled inspection. Bao, et al. (2017) applied FMEA integrated with AHP method for evaluating the risks of occupational health and safety.

FMEA is an approach, which is associated with proactive regulation, and it is used to emphasize the avoiding to the problems rather than finding solution after failure. The FMEA method is implemented by establishing a risk priority number (RPN) to determine the importance of the situation or the rating of risks. However, various methods have been proposed in the literature to determine the occurrence, severity and detectability degrees used to construct the RPN of risk or error. Some approved techniques like Grey theory (Chang, et al., 1999; Chang, et al., 2001), AHP (Braglia, 2000), TOPSIS (Braglia, et al., 2003), DEA (Garcia, et al., 2005; Chin, et al., 2009), DEMATEL (Seyed-Hosseini, et al., 2006), AHP & PROMETHEE (Ozveri and Kabak, 2015), Fuzzy VIKOR (Liu, et al., 2012), Fuzzy TOPSİS (Kutlu and Ekmekçioğlu, 2012) Fuzzy AHP (Kutlu and Ekmekçioğlu, 2012; Ilangkumaran, et al., 2014), were used with FMEA. In addition, Liu (2016) have studied FMEA using uncertainty theories and MCDM methods. In addition, in the FMEA studies occurrence, severity and detectability values may not be crisp numbers. In these case, fuzzy FMEA is applied.

In the literature, there are many applications of fuzzy FMEA. Immawan, et al., (2018) used fuzzy FMEA for the assesment of operational risks of book production services. Dağsuyu, et al., (2016) applied fuzzy FMEA in sterilization unit risk analysis. Tay, and Lim, (2006) constituted fuzzy RPN process. In this study, fuzzy- based FMEA method will be used to evaluate the risks that may occur during autonomous maintenance activities in TPM implementation. The use of fuzzy approach is important for the purpose of promoting the FMEA method, which is frequently referred to in the studies, in also uncertanity conditions. In addition, FMEA has been used in conjunction with several multi-criteria decision-making techniques, but not with fuzzy entropy for autonomous maintenance activity safety risks. For this reason, this study differs from the previous studies. The next part was created to explain methodology.

3. Methodology

3.1 Failure Mode and Effect Analysis

Failure Mode and Effect Analysis (FMEA) is an analysis method that develops proactive solutions to take precautions by predicting the risks. FMEA which developed by the US Army and first used in the development of flight control systems in the early 1950s, has focused on system and equipment failures. Then the method that used by some state institutions such as NASA, has become widespread in industrial applications with the use of fuel tanks by Ford Motor Company in 1980s for design faults (Chang et al. 1999: 1072; Sankar, and Prabhu, 2001: 325). FMEA is used to eliminate the losses that may occur as a result of the error to the customer. Potantiel failures can be arising from design, system, process and service are revealed, later occurrence, severity, detection values of these failures are determined, then the risk is evaluated and finally is prioritized (Stamatis, D. H., 2003: 5-10; Chin, et al., 2009: 1769).

Traditional FMEA is a crucial method for detecting and eliminating potential failures to improve the reliability of systems. An inter-functional expert FMEA team is set up to analyze a specific product or system. The initial step of the FMEA is to detect all feasible defect types of product or system. Then, the process is performing on the defect modes defined by taking into account the risk factors and the Occurrence (O), Severity (S) and Detection (D) values are determined. An integer scale of 1 to 10 is used to evaluate three risk factors in traditional FMEA. And risk factors are multiplied to obtain the Risk Priority Number (RPN) as shown in Equation 1 (Stamatis, 2003: 47);

$$RPN=OxSxD, \quad (1)$$

In general, the failures which have higher RPN are considered to be more considerable. According to the RPN values, failure modes (FM) are separated and then corrective actions are taken in to them with high risk levels.

FMEA is an effective and systematic method that can increase the reliability of systems, but this method is criticized in the literature because of its limitations (Braglia, et al., 2003; Sharma, et al., 2005; Tay, and Lim, 2006; Wang, et al. , 2009; Liu, 2016). The common points of these criticisms can be listed as; the relative weight of the risk factors is not considered, and the uncertainty of data does not allow for the computation of the absolute values. In order to overcome these deficiencies of the traditional FMEA some revisions apply like that, the integration of FMEA with fuzzy logic approach and using the factor weighting methods.

3.2 Fuzzy Logic

Fuzzy set theory is a tool that was developed by Zadeh (1965) and can be used to describe mathematically complex and ambiguous systems that have difficulty in expressing exact numbers (Yadav, et al., 2003: 660). The application of fuzzy set theory in FMEA ensures several advantages such as the use both quantitative

and qualitative data together, the direct interpretation of failure modes using linguistic variables. In addition, fuzzy logic is considering the uncertainty of a system affected by many factors (Sharma et al., 2005; Liu, 2016).

The fuzzy set is a set of elements that do not have definite boundaries, have gradual transitions, and have certain membership degrees. This cluster describes a convex structure of fuzzy numbers, each with a membership degree between 0 and 1 (Hu, et al., 2009: 708). The membership function represents the degree of truth in fuzzy logic and the membership functions characterize fuzziness, whether the elements in fuzzy sets are discrete or continuous (Zadeh, 1975). In the definition of membership functions, the proximity of the numbers is used, and the membership functions are usually represented by triangular membership functions and trapezoidal membership functions according to the situation of this neighborhood (Sanayei et al., 2010: 26). In applications, triangular membership functions are preferred mostly for ease of calculation. In this study, triangular membership function is used.

Triangle membership function is defined by three parameters a_1, a_2 and a_3. Here, a1 and a3 respectively, the lower and upper limit values and a2 is the mean value of fuzzy numbers. (Salehi and Tavakkoli-Moghaddam, 2008). Triangle membership function is defined in equation 2 and the triangular form is shown in the Figure 2.

Another important feature of the fuzzy logic approach is that it allows to give meaning to difficult situations with quantitative values. The concept of linguistic variable is very practical in dealing with situations that are too complex to be reasonably defined by traditional quantitative expressions (Zadeh, 1975; cited in: Liu, et al., 2015: 581). A linguistic variable is a factor whose values are words in language and fuzzy numbers are used for expressing these linguistic variable values. Linguistic variables and the conversion the fuzzy numbers are explained in table 1.

Table 1: Linguistic Variables and Triangular Fuzzy Numbers

Linguistic Variables	Triangular Fuzzy Numbers
Very Low	(0,0,1)
Low	(0,1,3)
Medium Low	(1,3,5)
Medium	(3,5,7)
Medium High	(5,7,9)
High	(7,9,10)
Very High	(9,10,10)

Ref: Zadeh, 1975, cited in: Liu, et al., 2016

One of the most important steps of fuzzy logic approach is the process of defuzzication. Defuzzification is performed to obtain a best non-fuzzy performance (BPN) value. Between the techniques like as center of area (COA), mean of maximal (MOM), and a-cut; the COA has practical process and is calculated with equation 3 (Alcan, et al., 2013: 628).

$$\overline{x}_0(\tilde{a}) = a_1 + \left[(a_3 - a_1) + (a_2 - a_1)\right] / 3$$

Following the defuzzication process, it would be appropriate to study another issue called the weak aspect of the traditional FMEA method in the resulting non-fuzzy decision matrix. This issue is about weights of risk factors.

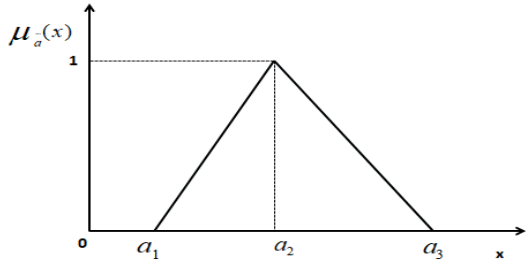

Figure 2: Triangle Membership Function

$$\mu_{\tilde{a}}(x) = \begin{cases} \dfrac{x - a_1}{a_2 - a_1}, & a_1 \le x \le a_2 \\ \dfrac{a_3 - x}{a_3 - a_2}, & a_2 \le x \le a_3 \\ 0, & otherwise \end{cases} \qquad (2)$$

3.3 Shannon Entropy

Entropy method is one of the objective weighting methods that can be used to determine the importance order of the criteria. There are various weighting methods that can be used to determine the priority of risk factors. They can be subjective methods like nominal group technique, Pairwise comparison (AHP), Delphi method, Simple Multi-attribute Ranking Technique (SMART) or can be objective methods like Entropy method, Criteria Importance Through Inter-criteria Correlation (CRITIC), mean weight ans so on. In this study objective Entropy method is used.

Shannon Entropy (Shannon, and Weaver, 1947), which is defined as a measure of uncertainty in the knowledge generated in terms of probability theory, is very suitable for measuring the relative contrast densities of the criteria representing the average intrinsic information transmitted to the decision maker (Liu, 2016: 186). Entropy method is one of the objective weighting methods that can be used to determine the importance order of the criteria. The steps of the method are described as follows (Sarı, E..B., 2017: 66)

X_{ij}; represents the value of alternative i according to the criterion j.

Step 1: $P_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} X_{ij}}$, i = 1, 2, … , m ; j = 1, 2, … ,n.

Step 2: $e_j = -\frac{1}{\ln\ m} \sum_{i=1}^{m} P_{ij}\ \ln\ P_{ij}$

Each criterion has an entropy value. Here e_j shows the entropy value of the criterion j.

Adım 3: $W_j = \frac{1-e_j}{\sum_{p=1}^{n}(1-e_p)}$ The weight values of the criteria are assigned. The sum of the weights is equal to 1. $\sum_{j=1}^{n} W_j = 1$.

After the explanation of the methods to be used in the study, the steps to be applied in the research study have been transformed into a model. The steps of the proposed FMEA model supported by fuzzy and entropy are shown in Figure 3.

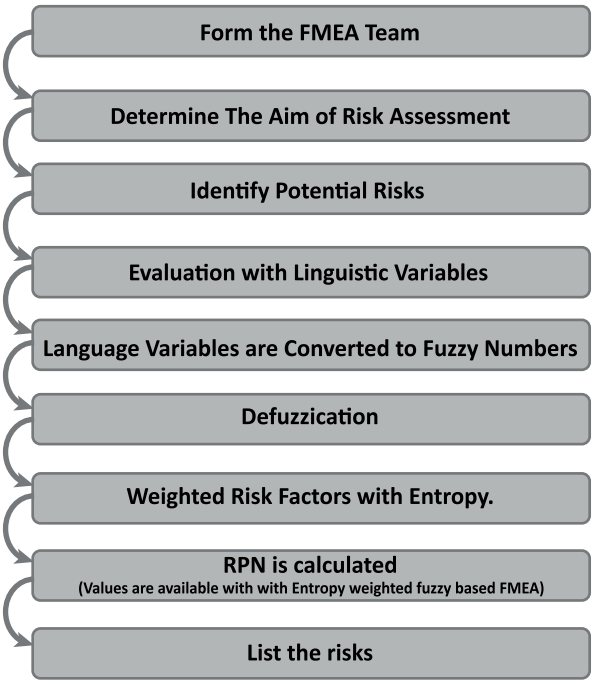

Figure 3: Entropy Weighted Fuzzy Based Failure Mode and Effect Analysis

The first step of the application is the establishment of the FMEA team. The leader of the maintenance team, the autonomous maintenance pillar leader, the machine operator and safety pillar leader are members of FMEA team. Potential risks are revealed according to aim of risk assessment. Linguistic variables are evaluated, and linguistic expressions are transformed into fuzzy numbers. Defuzzication step calculations are applied to fuzzy numbers. Risk factors are weighted by the entropy method. RPN value calculations are made. Risks are listed by prioritizing.

4. Research Study

In this section, the proposed approach is implemented in a manufacturing company operating in Izmir. The company produces a speed of 200pcs/min (machine speed depending on the part form) on multi-station machines that make mass production with cold forming method. For an enterprise that produces at this high speed, equipment management and maintenance is very important. The company implements Total Productive Maintenance (TPM) in this regard. Within the scope of the study, Autonomous Maintenance (AM) pillar activities carried out within the framework of TPM implementation are examined. As an Autonomous control step in the planned AM activities, cleaning lubrication and control operations are carried out. In this context, AM checklist was created in the enterprise

and equipment maintenance services were separated as professional maintenance and autonomous maintenance. The operator is responsible for the operations to be performed with AM. Each operator follows their own autonomous schedule. The operators are likely to encounter some occupational health and safety risks when performing the procedures in the autonomous schedule. For this reason, the Safety (S) pillar formed within the scope of TPM studies should also make an inspection. The leader of the maintenance team, the autonomous maintenance pillar leader, the machine operator and safety pillar leader formed the risk map shown in Figure 4 for the risks that may occur during the cleaning lubrication and control operations of the machine.

After reveal of the risk map, it is required to conduct a study on which risks are more important. The first step is to determine the purpose of the risk assessment team. The risk assessment team agrees to identify high priority risks, but first of all, there is a need to identify the areas of potential risk. The potential risks that may be encountered during the cleaning lubrication and control operation of the machine with the risk map above are explained in Table 2.

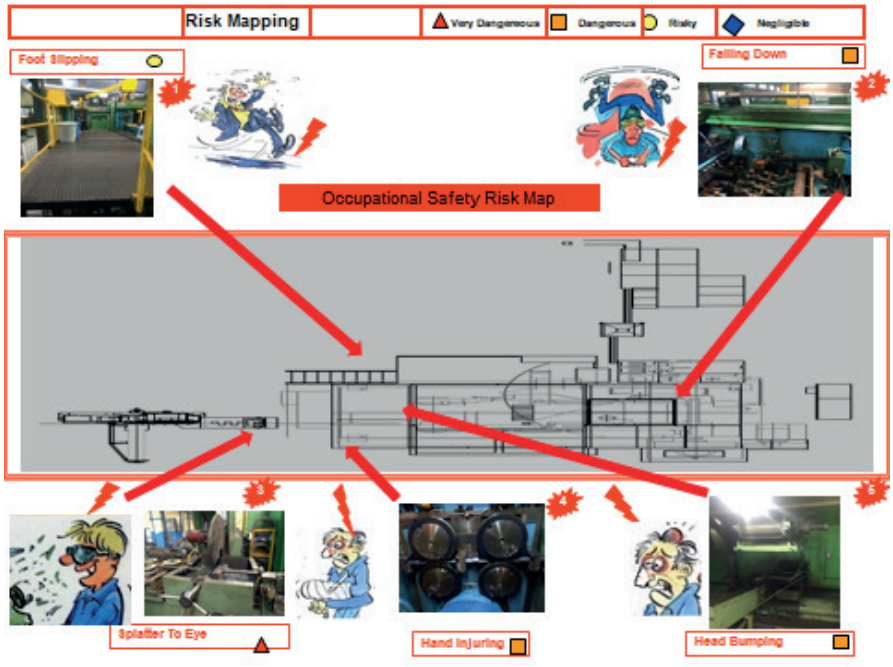

Figure 4: Risk Map of AM Activities on Machine

Table 2: Potential Risk of AM Activities

NO	Potential Risk of AM Activities
FM1	Falling during cleaning of the transparent surveillance cover of machine
FM2	Finger jam during cleaning transfer system
FM3	Falling during cleaning of the side walls and panels of machine interior part
FM4	Head bumping during manipulator cleaning
FM5	Foot slipping during cleaning of machine outer protection covers and top
FM6	Foot slipping during machine control panel cleaning
FM7	Foot slipping when cleaning measuring stand next to the control panel
FM8	Hand injuring during cleaning the oil below material cutting saw
FM9	Hand jam when cleaning drive rollers
FM10	Head bumping when discharging the canister under the product collection stand
FM11	Foot slipping during draining the canister under the product collection stand
FM12	Hand injuring during cleaning of oil deposits under the product collection table

The leader of the maintenance team, AM pillar leader, the machine operator and S pillar leader have expressed their opinions in determining the potential problems. However, there are differences due to different areas of expertise of the decision-makers in determining the risk factor of the identified potential problems. Therefore, the priorities stated by the decision makers on the risks should be taken into consideration with linguistic variability. Fuzzy logic approach is appropriate in this regard. Table 3 presents the responses of the decision makers to the risk factors with linguistic variables.

The linguistic values were first converted to triangular fuzzy numbers. Then, the triangular fuzzy numbers in the form of " a_1, a_2, a_3" were calculated as " Min a_1, ¼ a_2, Max a_3" to evaluate the values of four decision makers together and the fuzzy matrix was obtained and is shown in Table 4.

In order to defuzzication the total fuzzy matrix, the Center of Area (COA) method was used as described in the methodology chapter, and the decision matrix was reached shown as Table 5.

Table 3: Decision Makers' Answers to Risks Factors of Failure Modes

FM NO	Severity				Occurrence				Detection			
	DM1	DM2	DM3	DM4	DM1	DM2	DM3	DM4	DM1	DM2	DM3	DM4
FM1	ML	L	L	ML	M	M	ML	MH	L	ML	M	M
FM2	MH	MH	M	MH	M	MH	M	MH	ML	ML	ML	M
FM3	ML	ML	L	M	ML	M	M	MH	ML	ML	ML	ML
FM4	M	M	M	MH	M	ML	M	M	L	M	L	M
FM5	L	ML	L	ML	ML	M	M	M	L	L	ML	M
FM6	L	ML	L	M	L	L	ML	ML	ML	M	M	ML
FM7	ML	ML	L	M	L	ML	L	ML	L	L	ML	M
FM8	M	M	M	MH	MH	M	M	MH	H	MH	H	M
FM9	ML	ML	L	ML	L	ML	M	M	ML	M	M	M
FM10	M	M	ML	MH	ML	ML	M	M	MH	M	ML	MH
FM11	H	MH	M	H	ML	L	M	M	H	MH	H	H
FM12	ML	M	ML	M	L	ML	M	M	ML	M	M	M

Table 4: Total Fuzzy Decision Matrix

	Severity	Occurrence	Detection
FM1	(0,2,5)	(1,5,9)	(0,3.5,7)
FM2	(3,6.5,9)	(3,6,9)	(1,3.5,7)
FM3	(0,3,7)	(1,5,9)	(1,3,5)
FM4	(3,5.5,9)	(1,4.5,7)	(0,3,7)
FM5	(0,2,5)	(1,4.5,7)	(0,2.5,7)
FM6	(0,2.5,7)	(0,2,5)	(1,4,7)
FM7	(0,3,7)	(0,2,5)	(0,2.5,7)
FM8	(3,5.5,9)	(3,6,9)	(3,7.5,10)
FM9	(0,2.5,5)	(0,3.5,7)	(1,4.5,7)
FM10	(1,5,9)	(1,4,7)	(1,5.5,9)
FM11	(3,7.5,9)	(0,3.5,7)	(5,8.5,10)
FM12	(1,4,7)	(0,3.5,7)	(1,4.5,7)

Table 5: Decision Matrix

	Severity	Occurrence	Detection
FM1	2,333	5,000	3,500
FM2	6,167	6,000	3,833
FM3	3,333	5,000	3,000
FM4	5,833	4,167	3,333
FM5	2,333	4,167	3,167
FM6	3,167	2,333	4,000
FM7	3,333	2,333	3,167
FM8	5,833	6,000	6,833
FM9	2,500	3,500	4,167
FM10	5,000	4,000	5,167
FM11	6,500	3,500	7,833
FM12	4,000	3,500	4,167

Entropy method was used in order to prevent risk factors from being taken equally in prioritization and the weights of the risk factors were calculated as WS = 0.418, WO = 0.257, WD = 0.325. Fuzzy FMEA values, which are formed with the idea that uncertainty and risk priority will change, are associated with entropy weights. Failure Mode (8) "Hand injuring during cleaning the oil below material cutting saw" has emerged as the most important risk. FM8 is also the most crucial risk of classical FMEA. In the table 6, results of entropy weighted fuzzy FMEA and classical fuzzy FMEA is compared.

Table 6: Risk Priority Results

	Fuzzy FMEA		Classic Fuzzy FMEA	
Priority	**FM**	**Entropi weighted RPN**	**FM**	**RPN**
RPN1	FM8	6,201	FM8	210
RPN2	FM11	6,163	FM11	147
RPN3	FM2	5,366	FM2	144
RPN4	FM10	4,797	FM10	100
RPN5	FM4	4,593	FM4	90
RPN6	FM12	3,926	FM1	60
RPN7	FM3	3,653	FM3	60
RPN8	FM1	3,397	FM9	48
RPN9	FM9	3,298	FM12	48
RPN10	FM6	3,224	FM5	24
RPN11	FM5	3,075	FM6	24
RPN12	FM7	3,022	FM7	18

When the classical fuzzy FMEA method and Fuzzy FMEA method were compared, the first 5 failure modes that should be prioritized among the all problems are same. The fact that different decision makers have similar views in linguistic expressions used for these risks contributes to these results. However, the classical method and fuzzy FMEA results do not show any similarity between the problem types with less priority. Because, the rate of neglection for decision makers are different in the situations that are considered to be less hazardous. So that, the results vary from the most to least prominence.

On the other hand, the risk factors are considered to be of equal importance when performing RPN calculation in classical fuzzy FMEA method. However, in this study, the risk factor values were weighted by Shannon Entropy method. The weight of severity risk factor is 0.418 and it is the highest weight between the factors, this is leading to the prominence of fatal defect types in ranking. So, severity risk factor has a decisive role in this study. However, it is still not effective enough to be made prioritized by evaluating alone. Therefore, the effect of other risk factors appears in the calculations.

Identifying the failure modes and prioritizing them is certainly crucial, but the main objective of all these studies is to prepare groundwork for precautions and improvements of failures. Following the Fuzzy FMEA study, the results were evaluated by decision makers. And for all twelve potential risk, action list have been initiated. In addition, there are issues that should be done in common for all risks. Table 7 shows what requires to be done for prevention and improvement.

Table 7: Precaution and Improvement of Failure Modes

Failure Mode	Precaution and Improvement
FM1	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM2	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used
FM3	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM4	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used
FM5	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM6	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM7	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM8	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used
FM9	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used
FM10	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used
FM11	Visual warning form is hanged on the line. Protective work shoes and gloves will be used. Make sure that the ground is dry.
FM12	Visual warning form is hanged on the line. Protective work shoes glasses and gloves will be used

Informing the employees and increasing their awareness are important in all occupational health and safety issues. For this reason, a training program for operators has been established. During the training, protective equipment and their importance are repeated and the importance of using equipment for potential risks is discussed. In order to increase the awareness of the employees and to keep in mind the importance of the subject, visual warning forms were hung on various parts of the line. In order to maintain improvement work on occupational health and safety issues, it was decided to obtain management support to provide regular information about near miss, close accidents and unsafe acts parameters from employee data to the leader of S pillar.

5. Conclusion

The TPM is a common philosophy that addresses the methods that many manufacturing enterprises take into account while managing their operations in a systematic manner. Tasks performed during TPM applications are managed with the help of pillars and these pillars are in an interactive relationship with each other. AM and S pillars describe two of the eight application pillars in the TPM structure and are the subject of this study.

The TPM is based on the activities to be done to increase the effectiveness of the equipment on the basis of the application. AM pillar manage the activities that involve daily maintenance repairs by machine operators. With the guidance of AM pillar, machine operators perform cleaning lubrication and control operations for the equipment. This process makes easier to detect when equipment problems are visible, and so the life of the equipment increases. However, there are some occupational health and safety risks where operators are likely to encounter during the realization of these activities. S pillars are activated at this point and perform risk analysis for tasks defined by AM pillar.

There are many techniques for risk assessment. FMEA is a more preferable method because it takes into account the severity, occurrence and detection values. The main area of use of the FMEA method is the detection of product, process and service failure encountered in the production area, but is also used in risk assessment processes.

Fuzzy-based FMEA is a method that can be applied if decision makers are affected by linguistic factors in determining risk factors. In this study, the opinions of four different decision makers were taken to determine the occupational health and safety risks that may be encountered during the AM activities, including the maintenance manager, the AM pillar leader, the machine operator and the S pillar leader. Fuzzy based FMEA method is used for the answers of these decision makers.

The matrix, which is the linguistic variables created by fuzzy logic, was first converted to fuzzy numbers and then a total fuzzy matrix was obtained. Then, after defuzzication of the total fuzzy matrix, the decision matrix was reached. In order to determine the weights of the risk factors in this matrix, entropy technique which is the objective weighting method has been applied. The results were determined as entropy weighted fuzzy FMEA and classical fuzzy FMEA and compared with each other.

The results of the modifications made in order to eliminate the disadvantageous points of the classical fuzzy FMEA method have similarities in the high priority types of errors. However, in cases where uncertainty is more common and less priority situations are differentiated. Therefore, it is seen that fuzzy logic approach is effective in uncertainty environment and in situations where decision makers cannot agree.

The use of fuzzy approach is important for the purpose of promoting the FMEA method, which is frequently referred to in the studies, in also uncertanity conditions. In addition, FMEA has been used in conjunction with a number of multi-criteria decision-making techniques, but not with fuzzy entropy for autonomous maintenance activity safety risks. For this reason, this study differs from the others, in terms of enabling the use in the industry while being a new application study in the field. In order to improve the study and to see more reflections of the effect of the fuzzy approach on the results, it is recommended to carry out applications by taking into consideration the opinions of the decision makers who are contradictory in the future studies. In addition, it can be said that more uncertain results will be obtained and the differences will be determined cases where uncertainty is higher.

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Comparative Analysis of Factors Affecting Employee Performance According to Job Performance Measurement Method: The Case of Performing Artists*

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ABSTRACT

There are many factors that may affect employees' job performance such as psychological, sociological, anthropological, demographic and similar. However, related literature was mainly focusing on psychological and demographic ones, which were often analyzed through different job performance measurement methods such as self-evaluation and supervisor (or superior) evaluation. The main goal of the current study is to define and compare the factors affecting employee's job performance according to the above mentioned measurement methods, as well as their level of importance. For the purpose of this study, data were collected through survey conducted in the Antalya region in Turkey among 305 participants coming from seven countries and consisting of both employees and supervisors working for a performing artists organization company. Data were analyzed by using CHAID analysis through classification algorithms. Results show there is a difference between variables explaining the job performance of the employees when they do self-evaluation of their own performance than when the same is done by their supervisors. Nationality is one of the factors affecting performance in both evaluation forms. While the performance of individuals with extraversion personality traits was high in case of self-evaluation, the performance of the men who were second-born or after was high in the evaluation by the supervisors. These results demonstrated the problematic nature of measuring job performance and making accurate evaluations based on it.

Keywords: Individual job performance, personality traits, demographic variables, CHAID analysis, job performance measurement

1. INTRODUCTION

Due to its abstract and complex structure, it is impossible to consider individual job performance (IJP) as only a physical indicator, as there is no single indicator comprehensive enough to define such constructs. Thus, this implies that there is no unique and tangible manner to evaluate performance in this context. Often used IJP measurement methods are those based on subjective evaluations and organizational records, which are considered as the objective ones without involving human judgment. Organization records keep track of direct productivity measures expressed in number of units produced and personal data such as absenteeism, work accident, being late on work and similar. Subjective evaluations can be done through rating or ranking by the employees themselves or by their supervisors, subordinates, colleagues, customers, and other related groups. On the other hand, there are different criteria for these assessments. These are "immediate criteria" outlining measured performance over a specified time, "intermediate criteria" made for the defined moment and "ultimate criteria" performance made throughout the whole period of time in the organization (Thorndike, 1949). These criteria can be used in both subjective and objective (organization records-based) evaluation methods. With such a multifaceted and complex assessment structure, it is reasonable to expect that there will be differences between the assessments in the measurement of IJP, depending on the evaluation method.

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Because of the possible judicial and biased observing situations involved with subjective evaluations, it is possible to prefer measurement based on organizational records due to its advantage of storing numerical values. However, inefficient use of the three above mentioned criteria or risk of manipulation can negatively affect the validity of the organizational records as well. In light of these assumptions, companies tend to use and benefit from both types of performance measurements (Bracken, Rose & Church, 2016). Nevertheless, in the literature, there are low relationships between subjective evaluations such as grading and ranking in which evaluations are performed in the form of employee-himself, customer, subordinate, parent, colleague, and 360-degree.

When analyzing studies in the field of IJP, it can be stated that the correlation analysis between various evaluation methods was in focus. According to meta-analysis study conducted by Harris and Schaubroeck (1988), low correlation of 0.35 between self-evaluation, evaluations from colleagues and supervisors was observed. Similarly, meta-analysis studies conducted by Conway and Huffcutt (1997), and Heidemeier and Moser (2009) both showed correlation of 0.22 between these different evaluation methods, emphasizing the problematic nature and importance of this topic in the academic field. According to knowledge of the researchers, analytical methods such as CHAID analysis using classification and segmentation processes in decision trees are lacking in the field of IJP.

Nowadays in many organizations employee's low performance brings high damages to the employee himself/herself, to the working team and overall company, causing decline in the global economy and organizational liquidation. Due to the broad impact on these areas, realistic measurements of IJPs of the employees have become a matter of great importance. Therefore, the current study is conducted with the goal to define and compare the factors affecting employee's job performance according to the self-evaluation and supervisor measurement methods, as well as the level of importance of these factors. It is considered that the study conducted in this manner will have several contributions. The first one is the fact that the current study is conducted among participants of different nationalities where the effect of this variable is tested together with other demographic variables of co-workers in the same organization. Second, this study provides another perspective on the relational studies between IJP and personality. Finally, it elaborates on how different analytical methods, such as CHAID analysis and algorithms, can contribute to the study on IJP. In this context, the study aimed to investigate the variables that predict performance and their severity according to different measurement methods.

In the first part of this paper, literature review on definitions, dimensions, and indicators of individual job performance measurement will be presented together with references to several evaluation models discussed in the field. Second part of the literature review will be devoted to revision of the studies that had the effect of several demographic and psychological factors on IJP in their focus. Current paper will continue with the description of the methodology approach adopted in answering to research questions, followed by the presentation of the study results. Lastly, discussion of the obtained results, as well as final conclusions on theoretical and practical implications of the current study will be provided.

2. LITERATURE REVIEW

2.1. Defining and Measuring Job Performance

Job performance is defined as behaviors related to meeting expected, identified or formal role requirements of organization members (Campbell, 1990). The important element of this definition is that performance is the characteristic of group or individual behavior that occurs during a certain period of time. Defining and understanding the basic structure of individual job performance (IJP) have represented a very interesting topic in industrial and organizational psychology field. First of all, IJP is important because of the ongoing globalization of the economy. It represents one of the basic indicators of working groups' and company's performance and it significantly contributes to company's efficiency and competitiveness (Koopmans, 2014). On the other hand, industry and organization psychologists were interested in investigating the effects of determinants such as participation, satisfaction, and personality on IJP (Judge, Bono, Thoreson & Patton, 2001).

Generally, it is assumed that IJP differs from one job to another. Evaluations of IJP found in the literature were mainly focused on objective criteria of job productivity or on the qualitative and quantitative judgments taken by the employee himself/herself, his/her colleagues or supervisors. Job performance can be considered as an abstract, hidden structure that cannot be directly marked or measured. It consists of multiple components or dimensions which further include directly

measurable indicators. In order to conceptualize and functionalize the IJP area, it is necessary to describe and define dimensions and indicators of this performance in organizational settings. While dimensions can be generalizable, full list of indicators may vary between jobs.

Conceptualization of job performance received considerable attention in psychology field. Viswesvaran and Ones (2000) defined IJP as employees' connection or contribution to organizational goals or measurable actions, behaviors and outcomes. It is important to make a difference between causal variables and indicators of job performance. While causal variables serve to define or predict one's job performance, indicators are considered as reflections of this performance (Fayer & Hand, 2002). For example, while job satisfaction is regarded as determinant of job performance, job quality is seen as its indicator.

Based on the conceptual classification of IJP dimension found in the literature, four broad dimensions can be proposed (Sinclair & Tucker, 2006; Koopmans, Hildebrandt, Buuren, Van der Beek, & De Vet, 2013, Hashmi, Ameen & Soroya, 2019; Nadatien, Handoyo, Pudjirahardjo & Probowati, 2019, Dåderman, Ingelgård & Koopmans, 2020): task performance, contextual performance, adaptive performance and counterproductive work behavior. The first dimension, task performance, is about which central work tasks should be performed. Contextual performance expresses the behaviors that support the organizational, social and psychological environment in which the technical core should function. Adaptive performance, as a third dimension, was added to cognitive framework. Adaptive performance refers to employee's ability to adapt to the changes that may occur to the organizational working system or working role. Sinclair and Tucker (2006) provided social, conceptual, and empirical reasons for distinguishing adaptive performance as a separate dimension. Final dimension, counterproductive work behavior, assumes all types of behavior that may damage welfare of the organization. Proactive and creative performance were considered as two separate dimensions. Although proactive and creative performance can be considered as a part of task performance for some jobs, these categories are assumed to be more appropriate to contextual performance due to their contribution to a positive organizational, social, and psychological work environment (Viswesvaran, 2002).

Allen (2008) and Escorpizo (2008) were focused on only counterproductive work behavior dimension, more specifically, to presenteeism and absenteeism categories. On the other hand, Hassan, Nevo and Wade (2015), examined innovative job performance, habit and cognitive and relational social capital under the contextual performance. Most of the previous studies were focusing on task and contextual performance dimensions (Aboagye, Dai & Bakpa, 2020; Akca & Yurtcu, 2017; Uppal,2014; Alfes,Truss, Soane, Rees & Gatenby, 2013; Mael, O'Shea, Smith, Burling, Carman, & Haas, 2010; Tett, Guterman, Bleier & Murphy, 2000; Borman & Motowidlo, 1993, Zhao, Liu & Zhou, 2020). However, some of these studies were examining these dimensions in relation to organizational citizenship behavior, managerial behavior, developing self and others, orientation, reliability, professional intelligence, emotional control and communication.

The most prominent among contemporary used frameworks in measuring IJP is the one by Campbell, McHenry and Wise (1990) who proposed eight performance components: job-specific task proficiency, non-specific task proficiency, written and oral communication, effort, maintaining personal discipline, facilitating peer and team performance, supervision/leadership, and administration/management. Generally, this study created an infrastructure for the measurement of IJP. Furthermore, a set of interconnected frameworks focusing on various forms of behavior such as citizenship behavior (Smith, Organ & Near, 1983), social behavior (Brief & Motowidlo, 1986) and contextual performance (Borman & Motowidlo, 1993) can be traced in the related literature. What is common for most of these frameworks is that they focus on positive behaviors that contribute to organizational effectiveness, while these do not reflect basic work tasks. These positive behaviors include helping others, persevering and making extra efforts and supporting the organization. Although there are differences of these frameworks in terms of their focus, the areas of covered behavior are largely overlapping. This was supported by the literature which differentiates and compares the field of task performance and the field of citizenship / pro-social / contextual performance (Motowidlo & Van Scotter, 1994).

By adding counter productive work behavior domain in his study, Allen (2008) allowed for a broader understanding and effectiveness of the three main areas of performance, finalizing the definition of a heuristic framework of the IJP consisting of four dimensions: task performance, contextual performance, adaptive performance, and counter productive work behavior.

These four dimensions can be considered to capture all forms of behavior that define the IJP in almost every job.

In the field of work and organizational psychology, traditionally the main focus of the IJP structure is on task performance which can be defined as the individual's competence to perform basic or technical tasks central for his/her work. In addition to task performance, the IJP structure consists of contextual performance, adaptive performance, and counterproductive work behavior, which should also be examined when trying to assess individual's job performance. Accordingly, work and organizational psychologists have developed numerous scales (Van Scotter&Motowidlo, 1996; Bennett & Robinson, 2000; Podsakoff &MacKenzie, 1989), to measure task performance, contextual performance, adaptive performance, or counterproductive work behavior.

Despite its importance and popularity, it is hard to reach compromise on how to define and measure the IJP. Naturally, there are many tools available to measure the IJP or related structures, but after analyzing the studies of IJP in different research areas, it can be seen a lack of a clear definition and conceptual framework. This prevents the creation of precise measurements for assessing this topic. As a result, it is difficult to establish the effectiveness of interventions, procedures and strategies to maintain, improve or optimize the IJP. Current study hopes to benefit greatly from a short, but comprehensive, measurement scale in order to address this structure.

2.2. Factors Affecting Job Performance

There are numerous factors affecting job performance. One of them is personality. Personality plays an important role in defining how an individual will behave in different situations (Yeşilyaprak, 2012). Personality can be defined as the pattern of characteristics and behaviors that reflect the unique arrangements of the individual towards his/her environment. Main characteristics include interests, values, motivations, attitudes, "self" concept, abilities, behavioral, and emotional patterns. All of these factors are affecting job performance (Craik, 1993). In some of the studies that were investigating the relationship between personality characteristics and performance, a direct relationship between these two variables was found (Barrick, Mount &Strauss, 1993). Blickle (1996), proposed that there are many work situations were only the effort itself will be efficient and enough for satisfactory performance, but also many others where, solely, the same effort will not be sufficient. One person can work for many hours and may be in a situation where he/she has to make various decisions. Despite all the time spent at work, he/she may be using ineffective strategies and may not work as well as someone who makes the right decisions and uses the right strategies. These propositions are constantly being expanded in order to understand personality as an important predictor of IJP (Pallegama, Ariyasinghe & Perera, 2007) with the tendency for a continuous research on personality-performance relation.

In order to obtain more information about characteristics and actions from a broader perspective, Mumford and Gustafson (1988) focused on three points of relationship between personality traits and performance. First, personality traits may facilitate or prevent the effective use of strategies. In addition, personality may create motivational effect for performance increase. Finally, success or failure of an individual can be attributed to the personality traits. These situations, especially related to decision-making, are important to understand how personality causes different behavioral patterns leading to variations in job performance. In general, personality theories are discussed from psychodynamic, humanistic, social-cognitive and trait perspectives. From the trait perspective, several theories were proposed such as: trait theory (Allport, 1966), factor analytic trait theory (Cattel, 1979), the Big Five personality traits theory (Costa & McCrea, 1992) and biological traits theory (Eysenck, 1967). Eysenck's three-dimensional biology traits theory is one of the most often used theories, especially among employees of different culture. This is proven by its application in more than 35 countries such as the USA, Sweden, China, Nigeria, Japan etc. (Schultz & Schultz, 2017). Biological traits theory was applied in the current study because the order of birth was among examined variables and because it also comprises the 'lie' sub-dimension, used to test how honest and sincere the respondents were while evaluating items in the research questionnaire.

Studies from the related literature found a negative correlation between neuroticism, psychotism and IJP, and a positive correlation between extraversion and IJP (Rothmann & Coetzer, 2003; Premuzic & Furnham, 2003; Poropat, 2011; Gözel, Atmaca, & Durat, 2017). According to these studies people with neuroticism tendency are weaker and less creative than those who are emotionally determined. At the same time, positive effects of extraversion tendencies in relation to task performance and creativity were put forward.

Social scientists have examined the relation between birth order and various outcomes for more than a hundred years (Galton, 1874). Results of the conducted studies showed that the first-born children have tendency to reach more resource, attention and higher level of cognitive warnings (Hertwig, Davis, & Sulloway, 2002; Price, 2008). First-born child enters into interaction with parents alone and he/she is exposed to an environment with comparatively higher level of cognitive maturity. On the other hand, second-born child interacts both with parents and elder siblings which means that the level of cognitive warning is lower on average. There are empirical evidences showing that later-born children have lower success in education and cognitive development (Barclay, 2015). In addition, focus of research studies in this context was on examining the relationship between individual's birth order, intellectual development and educational outcomes. Time parents spend with the children, mother's age and educational level, as well as the fact that the child was the first born in the family were considered as effective factors on the future outcomes of the child's life. According to the study conducted in Norway among the fifth-grade students, where the relation between academic performance and birth order was measured (Bonesrønning & Massih, 2011), results showed that with families that have more than one child, first-borns had the significant advantage. There are additional studies proving that first-born children are better in academic performance (Iacovou, 2008).

Besides personality and birth order, gender was also examined as a factor with potential influence on job performance. In the study conducted in the Turkish city of Diyarbakir among 320 participants, Demirok (2018) found that there is no significant difference in IJP according to gender. In the same way, Keleş (2017) has not detected difference between gender and IJP on 122 people in the study conducted in another Turkish city-Sivas. Finally, in one study conducted in international company in Japan with 643 participants (Sekiguchi, Bebenroth, & Li, 2011) and in another one with 300 American and Lebanese participants (Diab & Hazer, 2012), the significant difference between nationality and IJP was found.

The goal of the above-mentioned literature review was to define the dimensions of IJP and to review different methods of its evaluation. In addition, it examines the relation between dependent variable such as IJP and independent variables such as psychological and demographic factors. What have not been discussed in the previous literature yet is the adequate clustering of these independent variables and their level of importance on IJP. Guided by the following research questions, current study tries to address this literature gap.

1. Is there a difference between the performance averages of the employees according to the performance evaluation method (the self-evaluations and supervisor's evaluations)?
2. How are employees classified according to independent variables (personality traits and demographic traits) in terms of their performance?
3. What is the importance of independent variables in classifying employees in terms of their performance?
4. Does the effect and significance of the independent variables change in the classification of employees in terms of their performance according to the performance evaluation method (self-evaluations and supervisors' evaluations)?

Figure 1 illustrates the research design adopted in the current study. Further explanation of the adopted research method will be presented in the continuation.

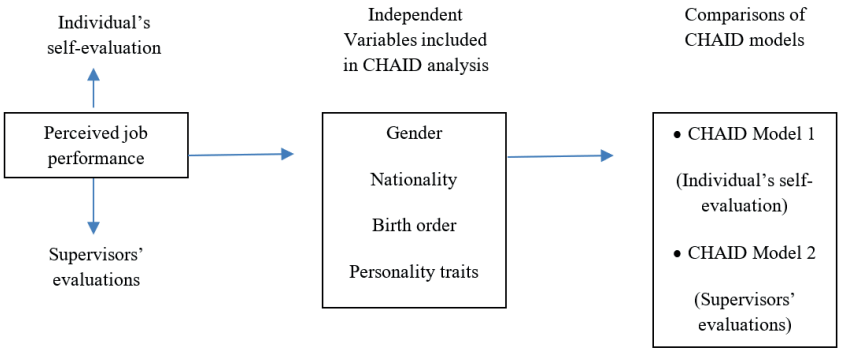

Figure 1: Study Research Model

3. METHOD

The study group consists of stage performers of different nationalities who are employed in performing arts organization company operating in Turkish city of Antalya. Antalya is a well-known touristic region which attracted more than 12,5 million international visitors in 2018 (TUROFED, 2019). Besides sun, sand and beach tourism concept, there are a lot of opportunities to involve in alternative tourism forms in the area. In this manner, various types of events and show performances are taking place throughout the region, such as Adrenalin shows, which are able to attract attention among both tourists and local community. Due to the increased interest in these events and benefits they may have on various stakeholders in the area, it is important to pay attention to the performance of the artists as they have a vital role for a successful show. This is the reason why this group of employees was selected for the current study.

Prior to conducting a research, necessary permissions were obtained and, in total, 305 foreign employees coming from seven countries working in three different companies voluntarily accepted to participate in the study. The three companies in the study were selected according to their ability to perform in ultra luxury five star hotels in Antalya. In the current study quantitative method was used and data were collected through questionnaires that were distributed between February to April 2018 in English, Russian and Spanish. Items of the measurement scale in the questionnaire were composed based on the reviewed literature. In addition to demographic questions "Individual Job Performance Survey" and for personality traits "Eysenck Personality Survey" was used. Employees' performance was evaluated in two methods (self and supervisor's evaluations). For performance measurement, scale proposed by Koopmans et.al (2013) was used. Validity and reliability of the measurement was empirically tested by several studies (Abubakar, Pangil, & Othman, 2016; Ceschi, Sartori, Dickert, & Costantini, 2016, Metin, Peeters, & Taris, 2018). All of the items included in the measurement tool used for performance measurement are scored in the 5-point Likert type with *Strongly Agree* = 5, *Agree* = 4, *Neutral* = 3, *Disagree* = 2, and *Strongly Disagree* = 1.

In the study, the reliability coefficient (Cronbach's alpha) of the 23-item scale used for performance measurement was determined to be 0.93. In the validity study of the scale, explanatory factor analysis was applied to the items. According to these results, it was found that the 23-item subscale had a five-factor structure and 66.189% of the total variance was explained by the scale items. After conducted factor analysis, the following statements were being removed from the proposed structure due to the fact that these disrupt factor structure: under "interpersonal performance" dimension P6 number *I take the initiative at my job*, "adaptive performance" dimension P14 number – *I show resistance to stress and tough situations* and P17 number – *I keep my business skills up to date*.

When analyzing Table 1, it can be concluded that "task performance" dimension has the highest variance explanation rate with %17.998. Dimension with the least variance explanation rate is counterproductive work behavior with %9.387. As can be seen from Table 1, the total variance explanation rate of the IJP scale is 66.189%.

In the current study, Eysenck Personality Questionnaire was used to measure the personality characteristics. First time it was used by the Francis, Brown, and Philipchalk (1992), while reliability and validity of this measurement was tested in several future studies (Sato, 2005; Maltby, Talley, Cooper & Leslie, 1995; Karancı, Dirik & Yorulmaz 2007). This measurement scale consists of 24 items of four factors structure (extraversion, neuroticism, psychoticism and lie). The lying subscale is intended to prevent bias during the implementation of the questionnaire and to check its validity. In this questionnaire, where each factor was evaluated with six items, participants were asked to answer 24 questions in the format Yes (1) - No (0). The score for each personality trait varies from 0 to 6.

Lie dimension in Table 2 was used as a sub dimension in order to test how honestly and sincerely the items in the questionnaire were answered. These sub-dimensions question the behaviors that are assumed to be socially / morally wrong, but can be seen from time to time, and therefore also reflect and trigger sensitivity to social desirability (Karancı et. al, 2007). In this sense, one is able to question the behaviors that are thought to be morally wrong but that are possible for everyone in general. In the current study, higher scores indicate the desire of participants to reflect themselves more positively. It shows the probability of having personality above 3.00 in scores taken between 1-6. As can be seen in Table 2, the lie subscale was the highest at 1.00. This result shows that participants do not try to show themselves differently in terms of evaluating behaviors that everyone can exhibit, but which is supposed to be morally wrong on a global

level. They do not have any thoughts about reflecting themselves more positively in other dimensions, which can be interpreted as giving closest answers to reality. The Kuder-Richardson 20 method was used to measure reliability because the items of the 24-item personality inventory were evaluated with the dual answer option and there were no continuous variables (Gliner, Morgan & Leech, 2017).

Table 1: Factor Analysis Results for IJP Measurement

		Factors				
		B1	B2	B3	B4	B5
	Task Performance					
P1	I am doing a high quality job.	.723				
P2	I am making a good plan and organization of my job	.656				
P3	In my job I am result oriented.	.624				
P4	My job is a priority for me.	.724				
P5	I work at my job efficiently.	.618				
	Interpersonal Performance					
P7	I accept the feedback of the job I have done and I learn from it.		.573			
P8	I collaborate with my managers and colleagues.		.813			
P9	I establish effective communication with my managers and colleagues.		.790			
	Organizational Performance					
P10	I take the responsibility for the work I do.			.642		
P11	I am customer-oriented at my job.			.492		
P12	I am creative at my job.			.579		
P13	I accept hard tasks at my job.			.625		
	Adaptive Performance					
P15	I find creative solution for new and hard problems.				.550	
P16	I keep my job-related information up-to-dated.				.513	
P18	I can cope with unknown and unpredictable work situations.				.691	
P19	I can adjust my working goals when needed.				.744	
	Counterproductive Work Behavior					
P20	I do not show negative behavior at my job (complaining, exaggerating my problems etc.)					.600
P21	I do not involve in behavior that can harm my working place (disobeying the rules, revealing secret information. etc.)					.786
P22	I do not do anything that can harm my colleagues and managers.					.800
P23	I do not intentionally make mistakes at my job.					.697
	Eigenvalues	3.598	2.954	2.487	2.322	1.877
	Variance description rate (%)	17.998	14.770	12.434	11.611	9.387
	Cumulative Variance (%)	17.998	32.758	45.192	56.803	66.189
	KMO			.917		
	Bartlett' Test			2895.026		

Table 2: Eysenck Descriptive Statistics of Personality Questionnaire

	The Lowest	The Highest	Average	SD
Extraversion	1,00	6,00	4,16	1,56
Neuroticism	0,00	6,00	1,73	1,60
Psychoticism	0,00	6,00	1,68	1,14
Lie	0,00	1,00	0,65	0,27

Kuder-Richardson alfa values were presented with extraversion, psychoticism and neuroticism dimensions having the 0.71, 0.66, 0.68 values respectively. Reliability of each dimension is above 0.60 and is being under certain limitations.

In the continuation of the study CHAID analysis was used in order to examine the variables that are effective in the classification of employees in terms of their

performance according to the evaluation method. In accordance with the research goal, CHAID analysis was used to determine the relative effects and significance of independent variables on the IJP, which was determined as dependent variable. The reason for using decision tree methods, such as CHAID analysis, is the possibility to easily observe the order of significance of the predictor variables on the dependent variable. In addition, it allows for derivation of clear and understandable visual structures of the examined variables. With the help of CHAID analysis, it is possible to determine how stage performers are classified according to their personality characteristics, gender, nationality, marital status, order of birth, and the importance of each independent variable on the dependent one. Besides, frequency and percentage values related to the classification of the independent variables and the stage at which the classification will end are given.

4. RESULTS

Among 305 participants coming from seven different countries and working in a performing arts organization companies, 41.96% of the participants are female (n = 128) and 58.04% are male (n=177). When looking at the employees nationalities 59.34% are from Ukraine (n=181),17.7% are from Russia (n=54), 10.49% from Columbia (n=32), 8.85% from Cuba (n=27), %1.64 from Ethiopia (n=5) and Italy (n=3) and Uzbekistan (n=3) with 0.98% rate each. When looking at the birth order, 54.1% of participants are first-born children of whom 68 female and 97 male, while from the 45.9% of the later-born children 60 were female and 80 are male. In addition, it will be suitable to emphasize that 165 of the first-born individuals 42 female and 55 male in total 97 were the only child.

t-test was used to examine the difference between two performance evaluation models. Based on the data presented in Table 3, it can be concluded that there is a significant difference (p<.001) between employee's self-evaluation of performance than the one done by supervisors. Results showed that employees tend to score their performance higher than their supervisors.

In the study, the overall average of the IJP ($\bar{x} = 4.24$) was taken and this value was determined as the cut-off score, the ones above the average were classified as 1 for success and those below the average were categorized as 0. In the study, variables such as personality traits, gender, nationality, marital status, and birth order were categorically included as independent variables.

Table 3: t Test Results According to Performance Evaluations Models

Performance Average	N	$\bar{x}$	S	Sd	T	p
Self-evaluations	305	4,24	0,497	608	2,432	,001*
Supervisors' evaluations	305	4,13	0,598			

*p< .001

Important assumptions of many statistical methods such as normality, linearity, homogeneity of variance are not of the same significance in CHAID analysis. At the same time, although the CHAID analysis collects the missing values in a separate group, a regression equation to be obtained by this analysis is kept independent of the known classical assumptions since it can divide the whole universe into stable sub-nodes with a mean shift algorithm (Horner, Fireman & Wang, 2010). Statistical test used in CHAID analysis depends on the target variable or dependent variable: if it is continuous F and if it is categorical chi-square ($\chi 2$). The assumption required in CHAID analysis is to specify the scale types for the variables used. In addition, for categorical variables, it is necessary to specify how many categories the target variable is divided into and what these are. The limitation of the analysis is that the dependent variable should be categorical (Aksu & Güzeller, 2016). In the current study, all dependent and independent variables are categorical variables. Personality types were analyzed in three categories.

Results of the CHAID analysis model were summarized in Table 4. According to this, while IJP is dependent variable, personality characteristics, gender, nationality, marital status, and birth order are independent variables. In the first CHAID analysis IJP evaluation is based on employee's self-evaluations. In case when an individual evaluates his / her own work performance, it is determined that only the nationality and personality type as independent variables are included in the analysis as these significantly predicts the individual's job performance.

As can be seen in Table 4, 40 of the 146 individuals (27.40%) with low IJP were correctly classified by the program, but 106 (72.60%) were classified as high performances despite the fact that they were actually low performers. Similarly, 17 of the 159 high-performing individuals (10.69%) were classified as low, despite their high performance. In this study, it is seen that overall success percentage in the classification of high and low performance employees is 59.7%. The risk value of the study in addition to the classification table was determined to be 40.3%.

Table 4: Classification Table Regarding IJP Status

Observed	Predicted			
	Low	**High**	**Percentage of Success**	Method: CHAID
Low	40	106	27,4%	Dependent variable: Individual Job performance (Individual's self-evaluations)
High	17	142	89,3%	
Total	18,7%	81,3%	59,7%	

Figure 2 shows which countries are decisive for classifying employees, who are high and low, based on their own performance evaluation scores and the order of their importance.

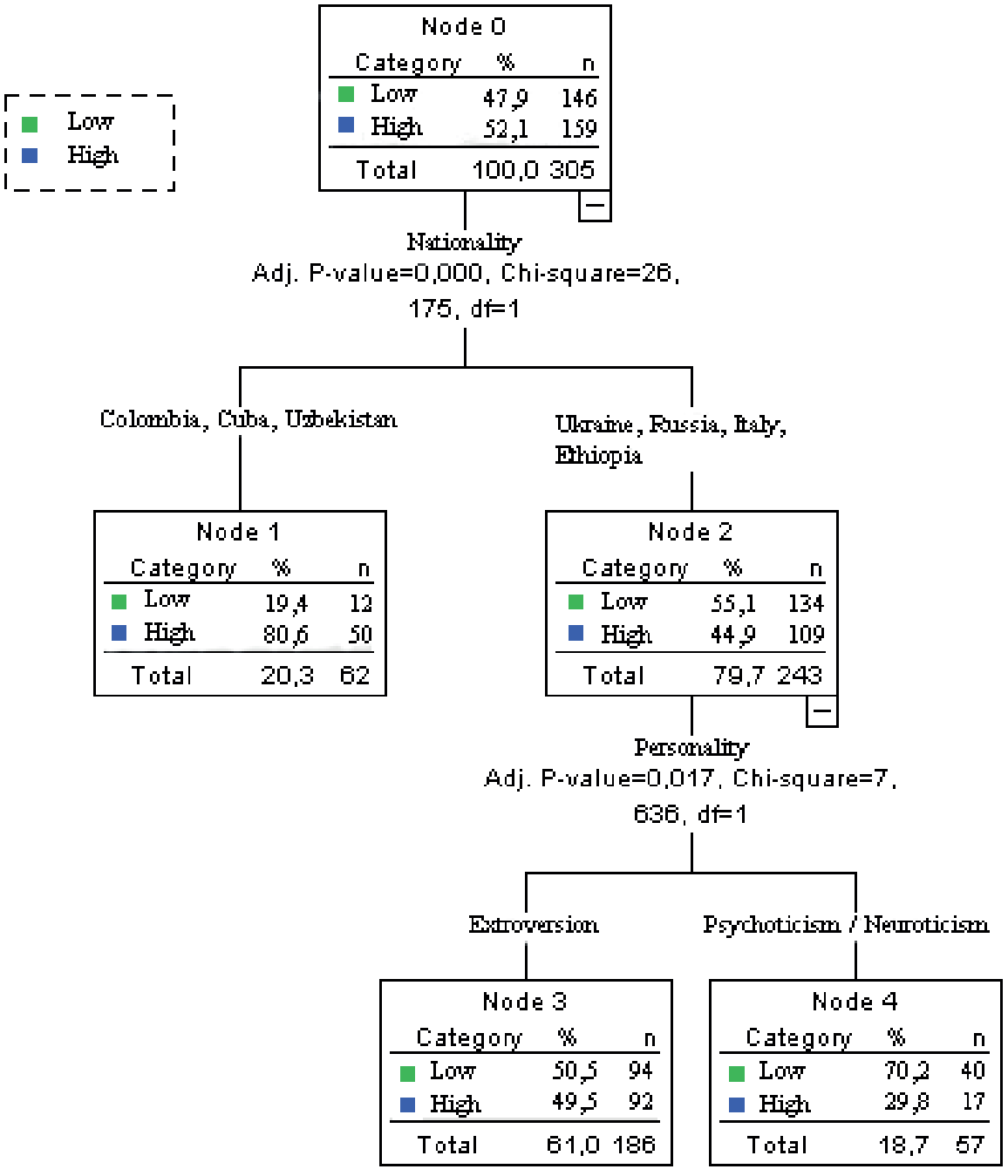

Figure 2: Decision Tree Model of IJP Based on Employees' Self-Evaluation

When examining Figure 2, it is seen that 47.90% of the 305 stage artists are classified as low and 52.10% as high. It is seen that the independent variable that best describes the performance is nationality with two sub-levels (χ2=26.2, p<.05). When the sub-categories of the independent variable with the highest impact on performance are examined, it can be observed that 62 performers (50 high, 12 low) from Colombia, Cuba and Uzbekistan constitute node 1. Second node consists of those employees coming from Ukraine, Russia, Italy and Ethiopia. In this second node with a total of 243 individuals (109 high, 134 low), a sub-branch was characterized by personality traits and two different nodal points, and psychoticism-neuroticism (χ2 = 7.6, p <.05). In a sub-branch for the second node, the extraversion is extracted as the third node (94 low, 92 high), and the psychoticism and neuroticism as the fourth node (40 low, 17 high). When the chi-square value is analyzed, it is seen that the best independent variable for explaining success is the country from where the employees come from (χ 2 = 26.2, p <.05) and the next one is the personality type (χ 2 = 7.6, p <.05). It is seen that the extroversion personality type is more effective in the classification of employee performance as high. As a result, it was determined that the performances of the extrovert employees coming from Ukraine, Russia, Italy and Ethiopia were higher.

Based on values from Table 5, first node was found to be the best node to distinguish between low and high-performance workers (n = 50, 31.4%). This is a cluster of 62 employees from Colombia, Cuba, Uzbekistan and 80.6% of which are classified as accurate. In order to determine the second-best node in the study, the gain values were examined and the third node was observed to be remarkable in terms of working performance (n = 92, 57.9%). This is the cluster in which 186 of the employees from Ukraine, Russia, Italy, Ethiopia with extrovert personality trait are classified as accurate by 49.5%.

Table 5: Success Values Related to IJP

Node	Node		Success		Response Rate	Index
	n	%	n	%		
1	62	20,3	50	31,4	80,6	154,7
3	186	61,0	92	57,9	49,5	94,9
4	57	18,7	17	10,7	29,8	57,2

In the second model, where the individual's job performance is evaluated by their supervisors, summary information about the CHAID analysis is given in Table 6. According to this model, the dependent variable is IJP and independent variables are personality traits, gender, nationality, marital status, birth order. In this model, the assessment of IJP was conducted by the employees' supervisors. In cases where individual job performance is evaluated by the supervisors, results showed that nationality, gender and birth order can significantly predict the job performance as independent variables.

Table 6: Classification Table for Supervisor's Evaluations of IJP

Observed	Predicted			
	Low	**High**	**Success Percentage**	Method: CHAID
Low	40	89	31,0%	Dependent Variable: Individual Job Performance (Supervisor's Evaluations)
High	20	143	87,7%	
Total	20,5%	79,5%	62,7%	

As can be seen from Table 6, according to the supervisors, 40 (31.0%) of 129 people with low employee performance were correctly classified by the study, while 89 (68.99%) were actually classified as high performance despite poor performance. Similarly, 143 out of 163 people (87.7%) were correctly classified by the program, but 20 people (22.27%) were classified as unsuccessful despite being actually high performing. The overall success of our study in the classification of low- and high-performance employees is 62.7%. The risk value of the system is 37.3% (1-62.7).

According to the supervisor's evaluation, the results of the analysis regarding the importance of the classification of the low and high-performance employees and their order of importance are shown in Figure 3. According to supervisors, 44.2% of employees are of low performance while 55.8% are with high performance (χ2=18.9,p<.05). According to this, two sub-levels of nationalities can be derived. When we look at the sub-categories of the independent variables that best explain the performance situation, 232 people (143 high, 89 low) from Colombia, Ukraine, Cuba, Italy constitute the first node. The second node is Russia, Ethiopia, Uzbekistan consisting of 60 participants (20 high, 40 low). The first node performed a different sub-branch and gender was the determinant of this (χ2 = 5.4, p<.05). At this level, the third node appeared as male with 134 persons (90 high, 44 low) and the

fourth node as female with 98 persons (53 high, 45 low). Subsequent sub-branching occurs in the third node and the order of delivery was decisive here ($\chi 2 = 4.3$, $p<.05$). At this level, the fifth node shows 76 people (45 high, 31 low) who are first-born child, while the sixth node shows 58 people (45 high, 13 low) being later-born. When the chi-square value is analyzed, it is seen that the most independent variable explaining success is country from where participants are coming ($\chi 2=18.9$, $p<.05$) followed by gender category ($\chi 2= 5.4$, $p<.05$). The third node is the birth order ($\chi 2 = 4.3$, $p <.05$). It is seen that the performance of the employees who are born in the second and subsequent places is more effective in the classification as high. As a result, it was determined that the performances of male workers coming from Colombia, Ukraine, Cuba and Italy were higher than those who were later-born.

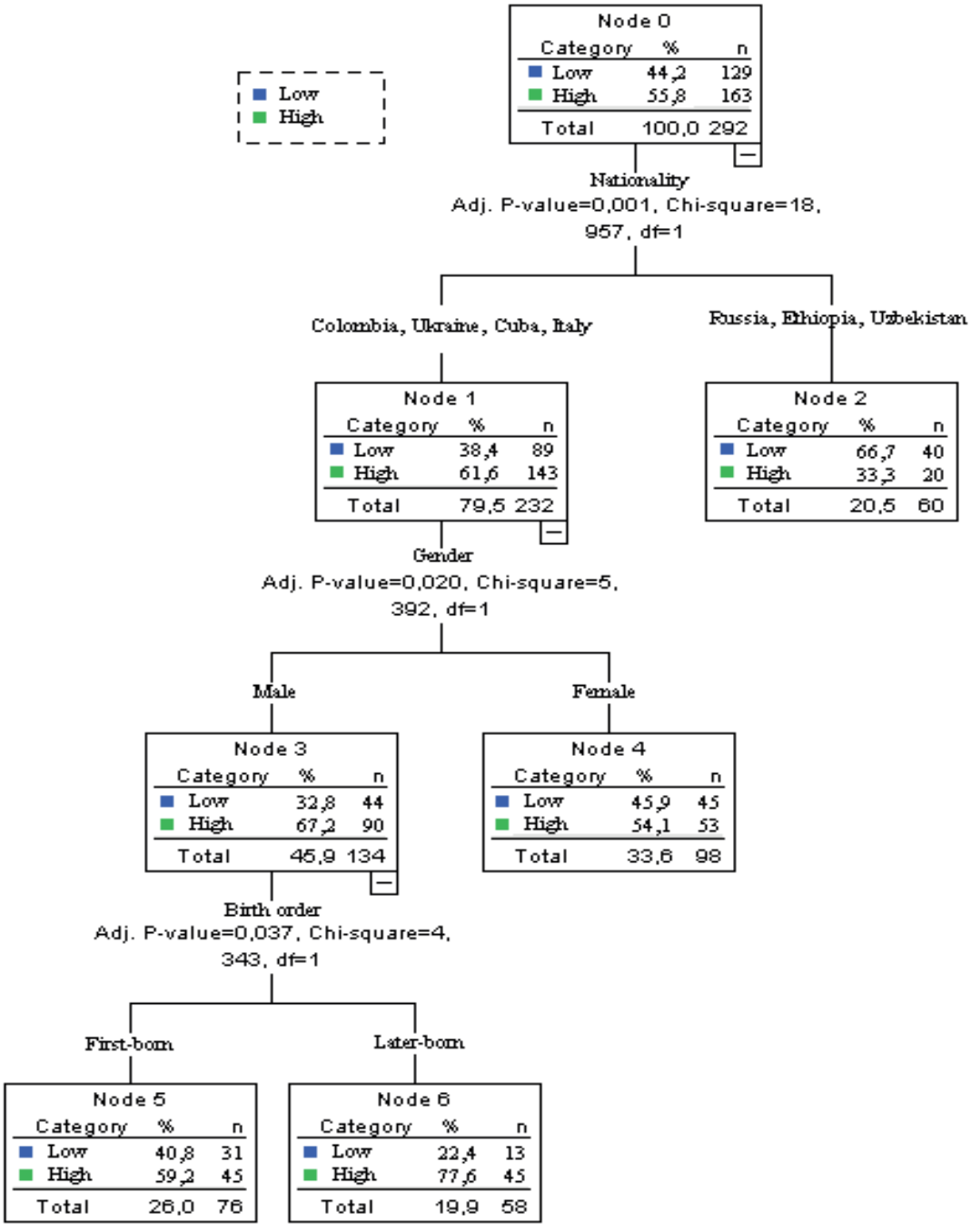

Figure 3: Decision Tree Model of IJP Based on Supervisor's Evaluation

From the Table 7 it can be concluded that sixth node (n=45, %27.6) is the best in differentiating low and high performing employees based on their supervisor's evaluations. This is a cluster of 58 employees who were later-born children coming from Colombia, Ukraine, Cuba, Italy with correct classification at 77.6%. In order to determine the second best node, the gain values were examined and the fifth node was found to be remarkable in terms of working performance (n = 45, 27.6%). This is a cluster of 76 male workers from Colombia, Ukraine, Cuba, Italy, who were first-born children, and were correctly classified at 59.2%. In addition, it is seen that the node that gives the least information in distinguishing employees' performances from supervisors' perspective is the second node (n = 20, 12.3%). This group consists of 60 people from Russia, Ethiopia, Uzbekistan and 33.3% of them are classified correctly.

Table 7: Success Values Related to Supervisor's IJP Evaluations

Node	Node		Success		Response Rate	Index
	n	**%**	**n**	**%**		
6	58	19,9	45	27,6	77,6	139,0
5	76	26,0	45	27,6	59,2	106,1
4	98	33,6	53	32,5	54,1	96,9
2	60	20,5	20	12,3	33,3	59,7

Results show there is a difference between variables explaining the job performance of the employees when they do self-evaluation of their own performance than when the same is done by their supervisors (Figure 4).

5. DISCUSSION

Results of the CHAID analysis in the current study reveal that the effectiveness of certain factors and their importance levels differ according to the performance evaluation method. In case of self-evaluation, it can be concluded that employees with extrovert personality traits coming from Ukraine, Russia, Italy, and Ethiopia perform the best. When individual job performance is evaluated by the employee himself/herself, nationality can be considered as one of the factors affecting performance. Based on the analysis results it can be seen that the node where employees from Columbia, Cuba, Uzbekistan are clustered is successful in diversifying employees with high performance. In terms of job performance, second group of employees consists of those coming from Ukraine, Russia, Italy and Ethiopia with extraversion personality trait.

Based on the supervisors' evaluations, it can be concluded that highest performing employees come from Columbia, Ukraine, Cuba, and Italy, while male employees are performing better than female employees. In both supervisors' and employees' self-evaluations, employees from Columbia and Cuba are showing the highest performance levels. This finding showing the performance differences according to nationality is similar to the results of previous studies in the literature (Sekiguchi et.al., 2011; Diab & Hazer, 2012). In addition, current study results showed there is the relation between birth order and performance according to supervisors' evaluation, indicating that later-born individuals are performing better.

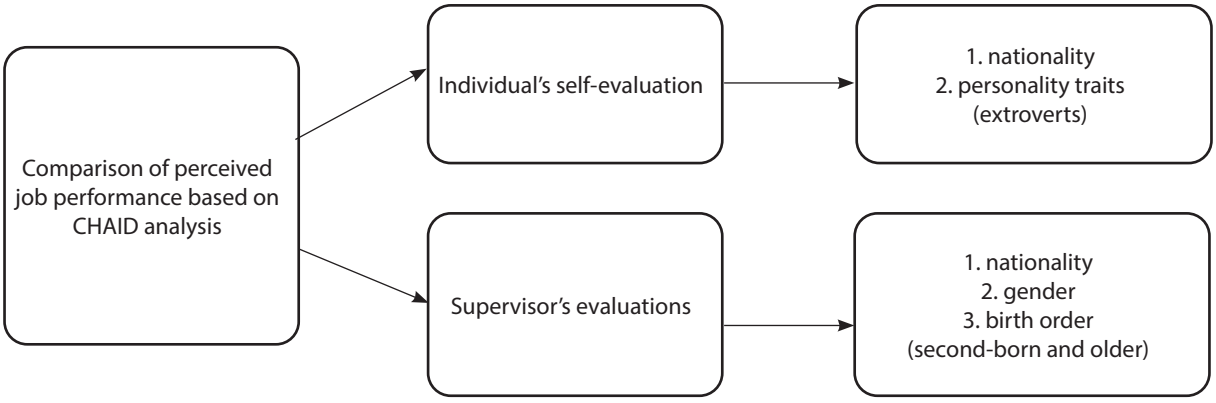

Figure 4: Model of CHAID Analysis

The results of the study show that the variables that explain the performance of the individuals when they evaluate their own performance and the variables that explain the performance when evaluated by their supervisors are different. This result is consistent with three different meta-analysis studies in the related literature that found very low correlation between supervisor's and employees' self-evaluations of job performance (Harris & Schaubroeck, 1988; Conway & Huffcutt, 1997; Heidemeier & Moser, 2009). Similarly, when we examine the importance of the variables explaining the performance, it turns out that there is a changing order according to the evaluator. When the importance order of the independent variables in the employees' self-evaluation is examined, personality differences come after the nationality, while this order in supervisors' evaluations starts with the nationality followed by gender and the order of birth variable respectively. This finding indicates that it is not easy to measure performance and make an accurate assessment.

Results of the current study prove the problematic nature of measurement of job performance. Goal of evaluating the individual's job performance is to obtain a multi-faceted perspective by evaluating the employees' performance as a whole and with all aspects.

Theoretical implications

Current study provides a significant contribution to the theoretical knowledge on IJP as it proved that use of biology traits theory is useful in the context of artists' performance, enhanced with the relevant propositions related to the effect of independent variables such as nationality, gender and birth order. CHAID analysis was used in revealing these variable results of different job performance measurement models. This innovative model, from which future studies on IJP can benefit on, is considered useful due to its possibility to easily observe the order of significance of the predictor variables on the dependent variables while deriving clear and understandable visual structures.

Practical implications

From practical managerial perspective the current study is valuable as it revealed that there may be differences in methods of measuring employee performance from different stakeholders' position. For this reason, multiple evaluation system can be proposed by using different methods in the same process in measuring and evaluating the performances of employees. Moreover, current study verifies that the personality dimensions of the employees should be taken into consideration in the selection of the employees in the performing arts companies, as well as in prediction of creativity and managerial performance during their career development. It is foreseen that the current study will contribute to the body of research conducted in the context of Turkey in the field of labor economy and psychology in organizations, allowing for its implementation in the other sectors as well. Similar studies among performing arts companies in other countries and/or other sectors, with a larger sample size and groups, will be useful in understanding the compatibility of the proposed theoretical frameworks in the context of global culture. The study will be beneficial for human resource professionals, employers and managers as it uncovers the relationship between the employee's personality traits and job performance. In addition, it shows that productivity can be achieved when the necessary measurements are used to address the effective performance of the employees.

Limitations of the study

There are several limitations of the current study as well, as this study is conducted in the specific region and among specific group of participants. Therefore, it is advisable to repeat this research design across several areas and, potentially, nationalities, in order to reach more generalizable results. The performance evaluated in this study is subject to an abstract evaluation since it is based on the artistic work. Therefore, the evaluation is complex as it differs from that evaluation of, for example, employees in the production process at a factory. At the same time, it is considered wrong for the supervisors to give the note 3 out of 5 at the Likert scale. This is due to the tendency of the chefs to give an average score instead of a high or low score because the employees do not deserve very low or very high scores during the evaluation (Lunenburg, 2012).

In addition, due to the nature of the current study, it is not possible to address the existence of the potential bias that evaluators, especially supervisors, may have when assessing employees' performance. The main purpose of this study was to determine the differences in IJP according to personality traits. In this way, the point of view that tends to see everyone below or below the average leads to measurement errors. On the other hand, when conducting evaluations, supervisors may tend to consider the time of evaluation rather than the whole process, as individuals do. The recall of the supervisors' recent performance and the tendency of employees to improve their performance

during the evaluation periods affect the evaluation result (Lunenburg, 2012). Halo effect occurs when a general impression of the event or a person is created on the basis of a single characteristic (Phillips & Gully, 2011). Accordingly, such supervisor's evaluations based on the appearance, personality traits or behaviors of the employees, can lead to the misleading impression that the performance of the employees is very good. In addition, in order to deeper analyze the reasons behind the founded differences in performance evaluation, several theoretical frameworks and assumptions may be used such as Hofstede's cultural dimension (Hofstede, Hofstede, & Minkov, 2010) to explain the variability of results among different countries, or knowledge from social psychological field related to prejudice related-theories, actor-observer bias and similar (Aronson, Wilson, Akert, & Sommers, 2016) can be applied.

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An Empirical Perspective on the Relationship Between Innovation Performance and Sustainable Development

Sema YİĞİT[1]

ABSTRACT

In 2015, almost all member states of the United Nations adopted seventeen Sustainable Development Goals (SDGs), which provide specific objectives and timelines to promote inclusive prosperity. Innovation is crucial for achieving sustainable development. Innovation itself is one of the SDGs (Goal 9) and also a means for achieving the others.

It is aimed to reveal the multidimensional relationship of innovation with the pillars of sustainable development in this study. The dataset of the study consists of 35 OECD member countries and statistics of these countries between 2007-2019 years. Global innovation scores of countries were used for innovation. Human Development Index was used for the social dimension, CO_2 emission values were used for the environmental dimension and GDP per capita was used for the economic dimension. The balanced panel was resolved through Eviews and STATA software packages programs.

According to the results of the analysis, innovation has a positive and significant relationship with the social and economic pillars of sustainable development. It also has a significant but negative relationship with CO_2 emission, which negative relationship is a positive situation for the environment. Therefore, the main result of the study is innovation has a positive effect on sustainable development. According to the causality test results, it was determined that there are both short and long-run relationships between the three dimensions of innovation and sustainable development.

Keywords: Innovation performance, Sustainable development, Three pillars of sustainable development, OECD countries, Panel data analyses, Causality test

1. INTRODUCTION

Environmental, social and economic trends, such as population growth, resource depletion, and growth in an imbalance in income distribution, are among the biggest challenges facing today's society. Sustainable development has received increasing attention among both academicians and policymakers driven by these challenges. Sustainable development is a concept as the result of increased awareness of global links between increased environmental problems and of concerns about the quality of life for today and future (Smedt, 2006, p. 2).

The view that innovation is a key driving force for sustainable development is widely accepted among researchers, industry professionals, and policy makers (Silvestre & Ţîrcă, 2019, p. 325). Innovation as a process of creating novelty and more importantly, spreading it, can be considered an integral part of the transformation towards sustainable development (Praetorius et al., 2009, p. 4).

Also, the 2030 Sustainable Development Agenda sets out an extensive and ambitious agenda for global action on sustainable development. The scale and focus of SDGs require innovation in development and innovation for development. Innovation involves new or improved technological products and processes, as well as new forms of social implementation and organization, is not only a focus of Goal 9 (industry, innovation, and infrastructure) also it enables reaching most of (if not all) goals (UNCTAD, 2017, p. 1).

In the 2030 Agenda, Science, technology, and innovation have been recognized as one of the main driving forces behind productivity gains and long-term key leverage for economic growth and prosperity, and are vital for environmental sustainability (Giovannini et al., 2015, p. 12). In a broader sense, implementation

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of SDGs will require an agile, flexible and integrated global innovation system, consciously connect regions around the world, link actors in research and society, and facilitate joint production and transfer of locally relevant information and technology (Stafford-Smith et al., 2017, p. 913).

In this study, it is aimed to empirically test the argument that innovation is a driving force of sustainable development. To fully reveal the relationships, the relationship between the three dimensions of sustainable development and innovation performance has been examined, in accordance with the multi-dimensional structure of sustainability. Firstly, the concept of sustainable development, which is the subject of the study, has been defined. Afterward, the relationship between sustainable development and innovation has been examined for building background to test the main assumption of the study.

2. SUSTAINABLE DEVELOPMENT

Although the modern sustainability or environmental movement can be traced from Henry David Thoreau (1854) to Rachel Carson (1962), it did not come to the fore until the Brundtland Report published in the 1980s (Garren & Brinkmann, 2018, p. 6-10).

The aim of the Brundtland Commission, also known as the World Commission on Environment and Development (WCED), is to guide the world nations towards sustainable development and has been active from 1984 to 1987. They published the results of their work in the 1987 Brundtland report. This report has made it possible for sustainable development to become an important concept in the glossary of politicians, practitioners, and planners.

Sustainable development can be explained in several ways, but the most widely accepted and quoted definition was expressed by the Brundtland Commission in (1987):

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

According to Munier (2005), this definition consists of three basic components. Development as the first means advancement in economic growth, social progress, and environmental protection. The present as a second element refers to the need to act in the present time with the responsibility of future generations. Lastly, the future refers to the long-term future inhabited by our descendants (Munier, 2005, s. 10-11).

Usually, sustainable development is modeled/operationalized and understood in several so-called "pillars" or "dimensions", commonly as economy, environment, and society/social (Waas, et al., 2011, p. 1650).

2.1. Pillars of Sustainable Development

Sustainable development has three main pillars: economic, environmental, and social. To realize sustainable development, it is necessary to focus on economic, environmental and social sustainability together. These pillars often shown as three overlapping-circles and sometimes shown as literal pillars:

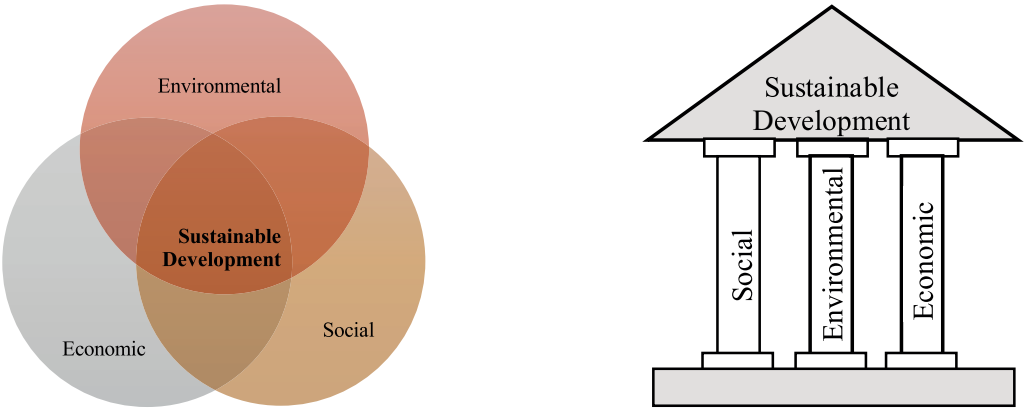

Figure 1: The Three Pillar Model and Literal Pillars Approach of Sustainable Development
Source: (Purvis, Mao, & Robinson, 2019, p. 682).

According to the Brundtland report, social sustainability is defined as the building of long term, stable and dynamic societies where basic human needs are fulfilled. Social sustainability is partly a sustainable economy and partly a problem of culture and values. Economic sustainability focuses on the importance of healthy economies that provide a high quality of life to its citizens. Besides, economic sustainability often involves identifying alternative economic development paths that provide a safer future without compromising the long-term ecological sustainability of natural systems (Batie, Sedjo, & Fedkiw, 2008, p. 13). Environmental sustainability defines an existing boundary to meet the current needs of people without sacrificing the quality of the environment or ecosystem so that the needs of future generations can be equally met (Kaswana et al., 2009, p. 493).

3. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Innovation is a desirable phenomenon for both economic and sustainable growth. However, each of these points of view highlights the importance of innovation for many different reasons. If an invention brings success in the market, innovation is considered positive for economic growth. However, from a sustainable development perspective, positive effects are only taken into account in the development of all three dimensions, namely ecological, economic and social innovations (Hauff & Jörg, 2010, p. 38). Although the relationship between economic development and innovation is frequently the subject of research in the literature, few studies are addressing the relationship between sustainable development and innovation.

Innovation is an ongoing process, and it happens every day and builds a future for the next generations to live. Innovation includes not only new technology, but also new forms of organization, new practices, new dissertations and new ideas about global and local concerns. So innovation is highly intertwined with sustainable development (Praetorius et al., 2009, p. 1).

Santana et al. (2015) have assessed the relationship between sustainable development and investments in technological innovation. They made comparisons for BRICS and G7 countries. Their results demonstrate that technological innovation has a significant impact on all sustainable development pillars for the BRICS countries. However, in G7 countries, technological innovation was found significant only for the social dimension of sustainable development (Santana et al., 2015, p. 425).

Constantinescu and Frone (2014) have shown that technological innovation is crucial for advancing sustainable development. It has an impact on three pillars as economic vitality, environmental sustainability and efforts to promote social progress (Constantinescu & Frone, 2014). Similarly, Mulder (2007) also mentioned the importance of technological innovation for sustainable development (Mulder, 2007, p. 253).

In this context, the hypothesis of the study is that the innovation performance of countries is related to the dimensions of sustainable development. This assumption will be empirically tested in the following section.

4. DATA AND METHODOLOGY

The dataset of the study consists of 35 OECD member countries and the statistics of these countries between 2007-2019 years. In the balanced panel data created, four basic variables were handled. The OECD countries and variable set discussed in the study are presented in the tables below.

Table 1: Countries Included in the Study

Country	Code	Country	Code	Country	Code	Country	Code
USA	1	France	10	Italy	19	Poland	28
Germany	2	South Korea	11	Iceland	20	Portugal	29
Australia	3	Netherlands	12	Japan	21	Slovakia	30
Austria	4	United Kingdom	13	Canada	22	Slovenia	31
Belgium	5	Ireland	14	Latvia	23	Chile	32
Czech Republic	6	Spain	15	Luxembourg	24	Turkey	33
Denmark	7	Israel	16	Hungary	25	New Zealand	34
Estonia	8	Sweden	17	Mexican	26	Greece	35
Finland	9	Switzerland	18	Norway	27		

Table 2: Variables Description and Data Sources

Variables	Description	Measurement	Period	Source
INNOV	Global Innovation Index (GII) score	It is measured with values between 0-100.	2007-2019	Global Innovation Index
CO_2	CO_2 emission per capita	Metric tons / person	2007-2019	World Bank, International Energy Agency, World Population Review (WPR)
GDP	per capita GDP	Constant 2010 US$ / person	2007-2019	World Bank, Statista
HDI	Human Development Index (HDI) score	It is measured with values between 0-1.	2007-2019	United Nations Development Program, World Population Review (WPR)

Throughout the study, separate regression models were established for each variable. The estimated panel data models in this study are summarized below.

$$InINNO_{it} = \alpha_{it} + \beta_1 InGDP_{it} + \beta_2 InCO2_{it} + \beta_3 InHDI_{it} + u_{it}$$

$$InGDP_{it} = \alpha_{it} + \beta_1 InINNO_{it} + \beta_2 InCO2_{it} + \beta_3 InHDI_{it} + u_{it}$$

$$InCO2_{it} = \alpha_{it} + \beta_1 InINNO_{it} + \beta_2 InGDP_{it} + \beta_3 InHDI_{it} + u_{it}$$

$$InHDI_{it} = \alpha_{it} + \beta_1 InINNO_{it} + \beta_2 InGDP_{it} + \beta_3 InCO2_{it} + u_{it}$$

Some preliminary tests are required for variables before proceeding with the analysis. First, cross-sectional dependence will be investigated. Pesaran's (2004) CD test calculates the presence of possible correlations between units by the following formula (Pesaran, 2004).

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} p_{ij}\right)$$

The null hypothesis of this test is the non-existence of cross-sectional dependence. In the panel unit root test context, two generations of tests have been developed: a first-generation (Levin, Lin and Chu (2002); Im, Pesaran, Shin (2003); Breitung, (2000); and Hadri, (2000)) whose main limit is the assumption of cross-sectional independence across units; a second-generation Multivariate Augmented Dickey-Fuller (MADF), Seemingly Unrelated Regression Augmented Dickey-Fuller (SURADF) and Pesaran CIPS 2007 (Cross-sectionally Augmented IPS) of tests that rejects the cross-sectional independence hypothesis. In this study, the Pesaran CIPS test, one of the second-generation unit root tests, will be used since there is a correlation between cross-section units. In this test, Cross-sectional Augmented Dickey-Fuller (CADF) values are calculated for each variable in the model. Then, the CIPS statistical value of each variable is calculated by taking the arithmetic average of the CADF values. CIPS test statistics are calculated with the help of the formula presented below (Pesaran, 2007).

$$CIPS = CADF = \frac{1}{N}\sum_{i}^{N} CADF_i$$

Then, the panel cointegration test developed by Pedroni (1999) will be used to determine whether there is a stable long-term relationship among the variables. Pedroni (1999) proposed seven basic statistics to test the cointegration relationship in heterogeneous panels. With the help of these basic statistics, the long-term relationship between the variables will be tested. After the cointegration test, the coefficient estimates of the variables interacting in the long term will be determined by using FMOLS and DOLS techniques (Phillips & Hansen, 1990). The formula of FMOLS is given below:

$$\beta^{\lambda} = N^{-1}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}(y_{it}-\bar{y})^2\right)^{-1}\left(\sum_{t=1}^{T}(y_{it}-\bar{y})\right)z_{it}^{*} - T_{ni}$$

The formula of DOLS is given below (Saikkonen, 1991):

$$\beta = \frac{1}{N}\sum_{i=1}^{N}\left[\left(\sum_{t=1}^{T}(Z_{i,t}Z_{i,t})\right)^{-1}\left(\sum_{t=1}^{T}Z_{i,t}W_{i,t}\right)\right]$$

Finally, the Vector Error Correction Model (VECM) will be used to identify short-term relationships between variables. It is a test that produces effective results for both the short term and the long term, the causality relationship between the variables was examined with the help of Granger causality tests developed by Dumitrescu and Hurlin (2012).

All analyses will be made by using Eviews and STATA software packages.

5. FINDINGS

Descriptive statistics and correlation matrix for the four basic variables used in the analysis are presented below.

Table 3: Descriptive Statistics

	INNO		CO_2		GDP		HDI	
Country	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
USA	43,08	26,30	16,44	1,40	51739,03	4499,96	0,91	0,01
Germany	40,90	25,07	9,03	0,36	44185,74	2347,95	0,93	0,01
Australia	37,60	23,27	16,64	1,13	53791,17	1851,34	0,93	0,01
Austria	37,53	23,16	7,53	0,48	48133,22	1096,52	0,90	0,01
Belgium	36,75	22,63	8,76	0,77	45006,27	1077,15	0,91	0,01
Czech Republic	35,35	22,10	10,01	0,84	20976,62	1384,83	0,87	0,01
Denmark	41,72	25,83	6,82	1,35	60070,83	1944,81	0,92	0,01
Estonia	36,68	23,02	12,88	1,48	17559,74	2361,02	0,86	0,02
Finland	42,68	26,58	9,27	1,53	47220,34	1504,49	0,91	0,01
France	37,98	23,41	4,96	0,50	41640,83	916,87	0,88	0,01
South Korea	39,83	24,66	11,33	0,63	24090,86	3130,49	0,89	0,01
Netherlands	43,42	27,09	9,89	0,85	51992,15	1354,39	0,92	0,01
United Kingdom	43,56	27,00	6,85	1,11	41120,08	1356,73	0,91	0,01
Ireland	41,04	25,64	8,05	0,98	58511,03	11534,91	0,91	0,02
Spain	34,47	21,41	5,78	0,87	30796,63	1304,51	0,88	0,01
Israel	39,35	24,54	8,20	0,91	32867,14	3440,90	0,89	0,01
Sweden	45,04	28,07	4,52	0,76	54129,46	2331,42	0,92	0,02
Switzerland	47,67	29,91	4,70	0,41	76527,07	2637,57	0,93	0,01
Italy	32,78	20,35	6,14	0,94	35244,64	1534,53	0,87	0,01
Iceland	39,23	24,30	6,18	0,48	47673,63	3944,53	0,91	0,02
Japan	38,29	23,44	9,23	0,39	45645,14	2224,74	0,90	0,01
Canada	39,68	24,47	15,58	0,67	49022,38	1644,46	0,91	0,01
Latvia	31,53	19,84	3,57	0,15	13973,48	1957,33	0,83	0,01
Luxembourg	40,09	24,95	18,38	3,29	107333,99	3614,20	0,90	0,01
Hungary	32,16	20,11	4,73	0,42	14442,24	1396,77	0,83	0,01
Mexican	25,23	15,54	3,99	0,32	9784,33	422,84	0,75	0,01
Norway	38,51	23,81	9,15	2,13	88750,86	3589,98	0,95	0,01
Poland	28,97	18,03	7,90	0,35	13799,51	1605,67	0,85	0,02
Portugal	32,41	20,19	4,71	0,42	22426,52	804,52	0,83	0,01
Slovakia	30,09	18,55	6,15	0,49	18021,53	1593,99	0,84	0,01
Slovenia	33,52	20,91	7,03	0,74	24387,62	1361,47	0,89	0,01
Chile	28,37	17,43	4,51	0,24	13933,14	1131,87	0,83	0,02
Turkey	26,52	16,35	4,27	0,24	12195,91	1962,84	0,77	0,04
New Zealand	38,40	23,96	7,18	0,64	36011,40	2370,95	0,91	0,01
Greece	27,31	16,90	6,88	1,17	24613,01	3141,93	0,86	0,01

Note: SD indicates Standard Deviation.

Table 4: Pearson Correlations

	INNO	GDP	CO_2	HDI
INNO	1,000			
GDP	0,2075*	1,000		
CO_2	-0,052	0,442*	1,000	
HDI	0,395*	0,727*	0,376*	1,000

*significance at the level of 0.05

A correlation was found between the series, and stationarity analysis of the series was initiated using the second-generation unit root tests.

Table 5: Panel Unit Root Tests

Variables	Pesaran CD (2004)	Pesaran (2007) CIPS	Pesaran (2007) CIPS (Δ)
INNO	87,871* (0,000)	-2,577*	-3,968*
CO_2	42,531* (0,000)	-1,957	-2,776*
GDP	42,373* (0,000)	-0,847	-2,88*
HDI	81,396* (0,000)	-2,077	-3,968*

*0,01 expresses significance at the level of 0.01. Δ expresses the primary difference of the series.

According to the table, when cross-sectional dependence test results are examined, it is concluded that contains there is a correlation of 0.01 significance level in each series in the panel, that is, the countries in cross-sections are not independent of each other. The results reported in Table 5 indicate that all the series considered are non-stationary at their level except innovation. However, all the series are stationary at first difference.

Table 6 reports the results of the panel cointegration tests developed by Pedroni (2004). Pedroni used seven basic statistics (four within-dimension and three between-dimension) to reveal the cointegration relationship in heterogeneous panels.

According to the results of the within-dimensions tests and the between-dimensions tests indicates that the null hypothesis of no cointegration is rejected. When the probability values within-dimensions are examined, it is observed that Panel PP and Panel ADF statistics are significant at the level of 0.01. Besides, when the results of the between-dimensions are analyzed, it is seen that the Group PP and Group ADF statistics are significant at the level of 0.01. This situation proves the existence of a long-term co-integration relationship between the relevant variables. In other words, it was determined that the variables of Innovation, GDP, CO_2 and, HDI are in a long-term relationship based on the countries discussed.

Table 6: Pedroni Cointegration Results

		t- Statistics	Probability
Within-dimension	Panel v-stat	0,931	0,9393
	Panel rho-stat	1,269	0,9103
	Panel PP-stat	-8,413	0,0000*
	Panel ADF-stat	-4,598	0,0000*
Between-dimension	Group rho-stat	4,112	1,000
	Group PP-stat	-12,566	0,000*
	Group ADF-stat	-5,720	0,000*

*0,01 expresses significance at the level of 0.01. H0: There is no cointegration in the series.

The existence of a long-term relationship found as a result of the cointegration test was estimated by established regression models. FMOLS and DOLS estimators were used to estimate the regression coefficients.

Table 7: FMOLS and DOLS Results

Panel	INNO	CO_2	GDP	HDI
INNO=ƒ(CO₂, GDP, HDI)				
FMOLS	-	-2,829* (0,000)	1,365* (0,000)	4,664* (0,000)
DOLS	-	-2,674* (0,001)	1,374* (0,000)	5,518* (0,000)
CO2=ƒ(INNO, GDP, HDI)				
FMOLS	-0,007* (0,001)	-	0,125* (0,000)	-7,240* (0,000)
DOLS	-0,008* (0,025)	-	0,126* (0,000)	-6,990* (0,000)
GDP=ƒ(INNO, CO₂, HDI)				
FMOLS	0,306* (0,000)	4,563* (0,000)	-	-2,489 (0,514)
DOLS	0,298* (0,000)	4,384* (0,000)	-	-5,810 (0,256)
HDI=ƒ(INNO, CO₂, GDP)				
FMOLS	0,005* (0,000)	-0,076* (0,000)	0,000 (0,656)	-
DOLS	0,005* (0,000)	-0,070* (0,000)	-0,000 (0,806)	-

**It expresses significance at the level of 0.05. Values in parentheses represent probability values. In the DOLS model, the lag length is selected automatically. No trend and grouped method was preferred in FMOLS technique.

According to Table 7 for the first equation, the coefficients of CO_2 are -2,829 for the FMOLS estimator and -2,674 for the DOLS estimator. Accordingly, CO_2 has a negative and statistically significant effect on innovation performance at 5% level. The coefficients of GDP are 1,365 for the FMOLS estimator and 1,374. GDP has a positive and significant effect on innovation performance at 5% level. Similarly, the coefficients of HDI are 4,664 for the FMOLS estimator and 5,518 for the DOLS estimator. HDI has a positive and significant effect on innovation performance at 5% level.

For the second equation, the coefficients of innovation are -0,007 for the FMOLS estimator and -0,008 for the DOLS estimator. It can be seen that innovation performance has a negative and statistically significant effect on CO_2 at 5% level. The coefficients of GDP are 0,125 for the FMOLS estimator and 0,126 for the DOLS estimator. GDP has a positive and statistically significant effect on CO_2. On the other hand, the coefficients of HDI are -7,240 for the FMOLS estimator and -6,990 for the DOLS estimator. HDI has a negative and statistically significant impact on CO_2.

When the third equation is examined, it is observed that the coefficient is 0,306 for the FMOLS estimator and the coefficient is 0,298 for the DOLS estimator for innovation performance. Innovation performance has a positive and statistically significant impact on GDP per capita. Coefficients of CO_2 emissions are 4,563 and 4,384, respectively. The effect of CO_2 on economic growth is positive and statistically significant. Coefficients of HDI are -2,489 and -5,810, respectively. The HDI variable was found to have a positive and statistically insignificant impact on GDP per capita.

Finally, in the fourth equation coefficients of innovation performance is 0,005 for the FMOLS estimator and the DOLS estimator. Innovation performance has a positive and statistically significant impact on HDI. Coefficients of CO_2 emissions are -0,076 and -0,070, respectively. CO_2 has a negative and statistically significant effect on HDI. Finally, the GDP variable was found to have a positive and statistically insignificant impact on HDI for the FMOLS estimator. Also, it has a negative and statistically insignificant impact on HDI for the DOLS estimator.

Vector Error Correction Model (VECM) was used to reveal the long-run causality relationship between the variables. As a result of the model, the causality relationships between the variables were defined with the help of the Granger causality test. The long and short-run causality relationships formed as a result of VECM are presented in the table.

Table 8: Panel Granger Causality and VECM

Dependent Variables	*Independent Variables (Short-run)*				*Long-run*
	ΔINNO	*ΔCO_2*	*ΔGDP*	*ΔHDI*	*ECT*
ΔINNO	-	3,582* (0,000)	9,320* (0,000)	4,060 (0,415)	-0,491* (0,000)
ΔCO_2	4,521 (0,962)	-	1,062 (0,287)	2,682* (0,007)	-0,913* (0,001)
ΔGDP	-0,679 (0,496)	3,522* (0,000)	-	11,957* (0,000)	-0,002 (0,108)
ΔHDI	4,358 (0,542)	1,859***** (0,063)	2,811* (0,004)	-	0,002* (0,0023)

Short-run causality was analyzed by Dumitrescu & Hurlin (2012) causality test. Relevant values are Zbar statistical values. Values in parentheses are probability values. * Expresses significance at the level of 0.05. ECT: Error Correction Term was calculated for the long run with the help of t test.

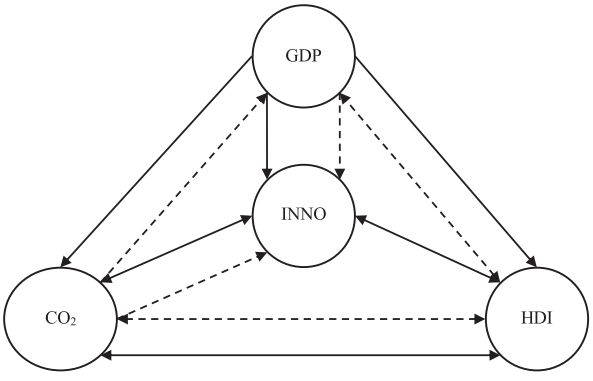

Figure 2: Short and Long-run Causalities between Variables

Note: The dashed lines indicate short-run, straight lines indicate long-run relationships

For the short-run causality test, Fig. 2 shows that results confirm the unidirectional causality running from GDP per capita and CO_2 to innovation performance. Besides, it was found that there is a bidirectional causal relationship between CO_2 and HDI. Also, there is a unidirectional causality running from CO_2 to GDP. Bidirectional causality between HDI and GDP has also been identified.

For the long-run causality test, there is bidirectional causality between HDI and innovation performance. Also, there is a unidirectional causality running from GDP per capita to innovation performance, CO_2 and HDI. Bidirectional causality between CO_2 and HDI has

also been identified. Similarly, it was found that there is a bidirectional causal relationship between CO_2 and innovation performance.

6. DISCUSSION

Today, global problems and their solutions are an issue that all countries emphasize, and it is also one of the important topics on the agenda of national and international organizations. The concept of sustainable development, which stands out in this context, has replaced the traditional development model and has become the priority of all countries. Many factors affect sustainable development. Innovation, which is at the center of the traditional development model, is an integral part of sustainable development.

Innovation is seen as a key driver of competitiveness and economic growth (Porter & Stern, 2002) Many OECD member countries have implemented strategies and policies to increase their innovation performance and economic progress. The results suggest a positive relationship between per capita GDP and innovation performance. This result confirms the findings of (Ülkü, 2004). Also, in the 2018 report of The Global Innovation Index, it is stated that all editions of the GII demonstrate the positive relationship between innovative performance and GDP per capita (Dutta et al., 2018). It is not surprising that the results are the same in this study, which also includes 2019 data.

According to relevant literature, innovation activities contribute to economic growth. It is found that there is unidirectional causality from economic growth to innovation performance. A similar conclusion was reached by Maradana et al. (2017). They found both bidirectional and unidirectional causality between innovation and per capita GDP over the period 1989–2014 for 19 European countries. Similarly, Avila-Lopez, Lyu, & Lopez-Leyva (2019) found unidirectional causality from per capita economic growth to innovation in Brazil.

It was found that innovation has a negative and statistically significant impact on CO_2 emissions. But the magnitude of coefficients (-0,007 and -0,008) implies that a 1% increase in innovation performance decreases CO_2 emissions by around 0,007%. This result is in line with the research of Mensah et al., (2018) showing that innovation plays a vital role in decreasing CO_2 emissions in the sample of OECD countries. A similar result was obtained in another study addressing different regions. Dauda, Long, Mensah, & Salman (2019) found that innovation reduces CO_2 emissions in G6 countries. However, according to their results, it increases CO_2 emissions in the BRICS and the MENA countries. Furthermore, Long, Luo, Wu, & Zhang, (2018) found that innovation has a negative impact on CO_2 emission intensity in China.

The findings indicate the presence of unidirectional causality running from CO_2 to innovation performance in the short run. However, in the long run, a bidirectional causal relationship between the variables. This result is consistent with the findings of Fan & Hossain (2018) which claimed that there is a bidirectional causality is running between CO_2 emissions and technological innovation.

The results suggest a positive relationship between innovation performance and human development. This result is in line with the finding of Ejemeyovwi, Osabuohien, Johnson (2019) which found that innovation has a significant and positive relationship with human development in Africa. However, this result contradicts the findings of Silva & Moreira (2019) which not confirmed the relationship between innovation and human development.

According to the results, it is also found that there is a positive relationship between GDP and CO_2 emissions. This result confirms the finding of Çınar (2011) which indicated an increase in GDP increases CO_2 emissions in the long run in OECD countries. This finding contradicts the findings of Acheampong (2018) which viewed a regional variation in the causal relationship between GDP-carbon emissions.

Furthermore, there is a negative relationship between HDI and CO_2 emissions. This result is in line with the findings of Ouedraogo (2013) which found a negative cointegration relationship between energy consumption and the HDI. However this result contradicts the findings of Costa, Rybski, & Kropp (2011) which found a positive and time-dependent correlation between the HDI and per capita CO2 emissions from fossil fuel combustion.

7. CONCLUSION

The concept of innovation has been existed for a long time and has been seen as a tool for all businesses and even countries to achieve economic development. Innovation policy has started to be an item in the national policies of many developed and developing

countries with the influence of international institutions such as OECD. Many countries have developed national strategies to support innovation activities. It has been assumed that economic development will eventually provide welfare for those living in that country. However, it has been seen over the years that the real welfare for countries is not only achieved with economic development. At this point, the concept of sustainable development, which includes social and environmental progress as well as economic development, has been emerged.

In the 2030 Agenda for Sustainable Development, innovation is one of the SDGs (Goal 9) and also a means for achieving the others. Today, innovation has the mission of serving sustainable development as well as increasing national income. In this study, it was investigated whether this mission was realized or not. According to the results of the analysis, innovation has a positive effect on sustainable development. Therefore it can be argued that innovation is more than just a tool for economic progress. It would be more appropriate to see innovation as a comprehensive tool that also serves the economic, social, and environmental dimensions of development.

8. MANAGERIAL IMPLICATIONS

This study contributes to the existing literature in several ways. The most important result obtained in the study is that innovation performance contributes to every pillar of sustainable development. This means that every country which has a sustainable development goal must have activities that will improve its innovation performance. The determination of short and long-run relationships between innovation performance and other variables is another contribution to the literature. In this way, it is expected that the study will guide countries' development strategies and policies by helping them to understand what to focus on.

9. LIMITATIONS

The study has some limitations. First, only accessible data were used to measure the dimensions of sustainable development. Undoubtedly, sustainable development is a comprehensive concept that can be expressed with many more variables than these. Second, countries with available data on variables are included in the study. Future research should include more countries to the analysis as the number of countries' relevant data increases. This will make it possible for future studies to yield more accurate results.

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The Effect of Guilt on Post-Purchase Regret: Attitudes and Repurchase Intentions Towards Smoking

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ABSTRACT

The aim of the study is to analyze the effect of smokers' guilt on regret and the effect of regret on attitudes and repurchase intention towards tobacco smoking. In addition, it is aimed to determine whether attitudes have a mediating effect on the relationship between regret and repurchase intention towards smoking. Face-to-face survey is conducted to collect data with 429 tobacco smokers in Izmir-Turkey by judgment-sampling method. The findings showed that the post-purchase guilt felt by consumers in terms of health, financial and moral guilt resulted in a feeling of regret. Regret was also found to affect repurchase intention due to the mediating effect of attitudes towards smoking. Another finding also displays that, despite the sample of consumers' represent negative attitudes, they could still exhibit repurchase behavior towards tobacco smoking. The contribution of this study is to investigate guilt and regret simultaneously, to reveal their effects on attitudes and, repurchasing intention towards smoking within the context of social marketing.

Key words: Regret, Guilt, Attitudes towards Smoking, Repurchase Intention

INTRODUCTION

Tobacco is a substance that can lead to psychological and physical addiction and harm society's economic and social welfare. Nicotine in tobacco is known to cause both physical and psychological addiction (conditioned pleasure and delight), thus smoking is considered by the medical world as a chronic health problem that can be contagious (Ozlu, 2008; Ozcan et al., 2013; Wymer, 2015). Additionaly, smoking is perceived as an immoral behavior for women in Asian and Middle East countries such as Korea, India, Pakistan, Turkey (Dagli, 1999; Kim and Shanahan, 2003; Ganatra et al., 2007; Ra and Cho, 2018). There are studies reporting that 1.2 billion people over age 15 around the world smoke, 80% from developing countries (Rahman et al., 2018). In Turkey more than 100,000 people die each year due to diseases related to tobacco use (Turkish Ministry of Health, 2018). The number of annual tobacco deaths is estimated to rise to 10 million by 2030 in worldwide if precautions are not taken (World Bank Tobacco Report, 2019). According to World Health Organisation (WHO) statistics 2019, the ratio of daily smokers in Turkey fell from 32 % in 2000 to 26.5 % of population aged 15+ in 2018. However, Turkey has the second highest smoking rates in the OECD countries after Greece (OECD Health Statistics, 2019). Considering that around 100,000 people die due to tobacco-related causes in Turkey and the age of smoking initiation is 10-11 in 2015, combating the "smoking habit" can be said to be one of the most important issues (Kayli and Yararbas, 2016). The most important reason for the increasing rate especially among the young consumers' is thought to be the insensitivity to increasing prices (Wymer, 2015). Moreover, due to shortcomings, such as inefficient local public control over smoking and inefficient implementation of anti-smoking acts, smoking rates started to increase again after 2012 (Uzundumlu and Topcu, 2015). Despite the criticism and local public control, the consumers continue to smoke and have their own motives i.e., to achieve happiness (Dawkins et al., 2007) and pleasure (Vieira, 2014; Wymer, 2015; Carneiro et al., 2017), to eliminate anxiety and stress (Patten et al., 2018), to control weight (Carneiro et al., 2017) and to share common interest with friends (Wymer, 2015). These

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perceived benefits are probably reasons for prevalences of the consumption of tobacco and tobacco products among different age groups. According to an estimate, by the end of 2015, 21% people were smoking on a regular basis with 28% as the highest rate of smoking among adults in Europe (World Health Organization, 2015). The situation was not much different in Turkey where heavy smokers were 27.2% (Eurostat, 2015).

Smoking is an addictive behavior that causes a leading and major public health problem in the world. For this reason, social marketing designs campaign strategies and policies to cope with the consumption of this unhealthy and harmful product in order to encourage and support changes in attitudes and behaviors (Sampogna et al., 2017). Carneiro et al. (2017) indicated that social marketing has influenced target markets to accept a new behavior, modifying current behavior or abandoning an unwanted habit. Therefore, social marketing activies are needed to reduce or change smoking behavior. Although the legal improvements and public awareness programs have to restrict the consumption of smoking, a desirable reduction in consumption has not been achieved. In the field of social marketing, studies are carried out to identify and cope with environmental factors that trigger the buying impulses of smokers (Burton and Nesbit, 2015).

Smoking does not only provide a self-control mechanism on its own, as smoking results in bad social and personal outcomes, addressing it is a priority. Tobacco purchase and consumption may become a behavior that causes consumers to regard themselves negatively, or have negative feelings such as regret and guilt (Burnett and Lunsford, 1994). The feelings of guilt and regret are also few outcomes of smoking. The emotion of guilt among individuals is due to the negative assessments of their own behavior (Tracy and Robins, 2007). The consumption of tobacco triggers feeling of guilt in terms of health, financial and moral guilt to drive regret (Moan and Rise, 2005). However, some consumers may not be able to control their purchase, even though they feel regret and exhibit repetitive purchase behaviors (Passyn and Sujan, 2006). Taylor et al. (2006) presented that 83% of smokers feel regret for this habit and around three-e-quarters are trying to quit. This entails that smoking eliminates self-control as smokers engage in a behavior that is conflicted with their own attitude (Lerbin, 2015). People feel cognitive dissonance, but they tend to lose control which is one reason why they are unable to quit smoking despite their acknowledgement that it is harmful (Fong et al., 2004). Although smoking leads to unfavorable outcomes such as guilt and regret, it is seen as a type of addiction. Hence due to smoking addiction they feel regret and may have negative attitudes towards tobacco but continue to consume. The consumers' smoking behaviors or habits can be explained by cognitive dissonance theory (Baumeister, 2017).

The aim of this study is to investigate the effect of smokers' guilt on regret and the effect of regret on attitudes and repurchase intention. In addition, the objective of the paper is to determine whether attitudes have a mediating effect on the relationship between regret and repurchase intention towards smoking. This research contributes examining the relationship between guilt and regret arising from tobacco consumption. For this purpose, the study sample consisted of regular smokers aging 18 years and above in Izmir, third largest province of Turkey. Initially, in this study, theoretical background and guilt and regret are investigated. The second part explains the literature review along with the research model and hypothesis development. The third part gives details about methodology and findings of this research. The fourth part put forth the discussion and the conclusion. The last section, theoretical contribution and managerial implications, limitation and future research are discussed.

THEORETICAL BACKGROUND

Smokers continue to smoke even though they know its harmful health effects (Fong et al., 2004). This situation causes psychological discomfort and evokes negative emotions such as bad, miserable, regret and guilt due to smoking (Sweeney et al., 2000). It is thought that smoking consumption reflects a cognitive dissonance (Fotuhi et al., 2013) and attitudes towards consumption affect behavioral intentions (Lerbin, 2015). The Cognitive Dissonance Theory (CDT) provides a theoretical basis to examine consumer emotion of guilt arising out of smoking with its role in triggering the feeling of regret among Turkish smokers. CDT is developed by Festinger (Festinger, 1957) that provides a theoretical basis from which to investigate the effect of guilt felt after smoking on the feeling of regret, and the effect of regret on attitudes and repurchase intention. The theory posits that in cases where two cognitive elements are in opposition, cognitive dissonance occurs—creating pressures within a person to reduce dissonance through misperception or misinterpretation of the information or by ignoring it completely (Peretti-Watel, 2006; Fotuhi et al., 2013; Ozbas et al., 2018).

This theory has been applied to different contexts and situations, especially to the study of addictive behaviors i.e., tobacco consumption. When smokers understand that smoking cause diseases such as cancer then they change their behaviors by stopping smoking or by denying the dangerous effects of smoking (Metin and Camgoz (2011). The theory provides framework for understanding inconsistencies among consumers who understand the harmful effects but continue to smoke despite feeling guilt and being regretful (Ozbas et al., 2018). In contrast to non-smokers, smokers use rationalization through supporting more functional beliefs (i.e., smoking helps me concentrate better and enjoying the biological effects of smoking), risk reduction beliefs (i.e., thinking that the medical evidences implying the harmful effects of smoking are exaggerated) and ignoring the harmful effects (i.e. smoking is not really harmful for me) (Nayak et al., 2017; Bice, 2018). In this way, smokers rationalize the smoking behavior and get out of psychological disturbances that are brought about by inconsistent thoughts (Orcullo and San, 2016). Consumers feel regret due to smoking attitudes; however it does not negatively affect their attitudes and their consumption behaviors. Hence, in this regard they admit experiencing cognitive dissonance (Fong et al., 2004; Ozbas et al., 2018).

There are studies in the literature that examine the feeling of guilt and regret (Brewer et al., 2016; Lee and Cotte, 2009). However, the studies concerning guilt related to smoking are rare (Netemeyer et al., 2016). Janjigian et al. (2010) reported that smokers experienced a stronger sense of guilt compared to non-smokers. Orcullo and San (2016) stated that smokers feel guilty in their behaviors or beliefs when it is regarded by the society as an undesirable and inconsistent action. Some studies explored the regrets of tobacco consumption using cross-country comparisons e.g. the result of a study showed that Thai smokers are more likely to regret compared to Malaysians (Lee, 2007).

The other studies investigated anticipated regret on smoking intentions. Anticipated regret moderates the relationship between purchasing intentions and smoking initiation (Conner et al., 2006). Anticipated regret is found to be a mediating variable between social norms and attitudes towards purchase intentions (Lazuras et al., 2012). Nayak et al. (2017) indicated several predictors of regret in smoking initiation i.e. intention and attempts to quit and being addicted to smoking and fear of smoking related illnesses. In this sense, both feelings are interrelated thus it is necessary to evaluate them together.

1. GUILT AND REGRET

Guilt is related to private moral obligation towards others (Baumeister et al., 1994; Lancellotti and Thomas, 2018). This emotion occurs when individuals violate ethical rules (lying, stealing, etc.), environmental friendliness issues (Sirieix et al., 2017), give up dieting, consume harmful products (tobacco, alcohol, etc.), indulge in excessive eating (Ruddock and Hardman, 2018) and purchase of expensive luxury products (Lyons et al., 2019).

Regret is generally defined as an emotional situation that causes feelings of suffering and sadness due to misfortune, limitations, loss, deficiencies, or mistakes (Patrick et al., 2009). It can also result from moral violation of law (Imhoff et al., 2012). The individuals compare the choices among alternatives and feel uncomfortable, believing they chose the wrong alternatives. In marketing concept regret is a negative emotion elicited either by an unnecessary purchase, or missing opportunities, despite having purchasing power (Lee and Cotte, 2009) and it is acknowledged as a bridge between decision to purchase and non-purchase (Tsiros and Mittal, 2000; Dedeoglu and Kazancoglu, 2012). The consumers feel regret when they believe they chose the wrong alternative. The consumers perceive some risks which are linked to guilt and then feel regret after buying (Lee and Cotte, 2009). The researcher (Bathaee, 2013) recently identified various types of regret which involved negative emotions such as discomfort and pessimism. Regret is different from guilt. According to Ben-Ze'ev (Ben-Ze'ev, 2000), "*when we did something that is forbidden, we feel guilt; when we did something that is a failure, we feel regret*". This is to say that regret is the stronger feeling than guilt (Roseman, 1991) and reflects different psychological processes (Brewer et al., 2016). Guilt can be strongly related with interpersonal emotions that arise in social relationships, but regret is associated with intrapersonel emotions (Wagner et al., 2012). While guilt results from doing something that consumer considers as morally or legally wrong, regret is felt by learning that consumer could have done something different or better (Lyons et al., 2019). In this way, cognitive dissonance is evoked by feelings of regret (Penz and Hogg, 2011).

HYPOTHESIS DEVELOPMENT

The research model is presented as Figure 1.

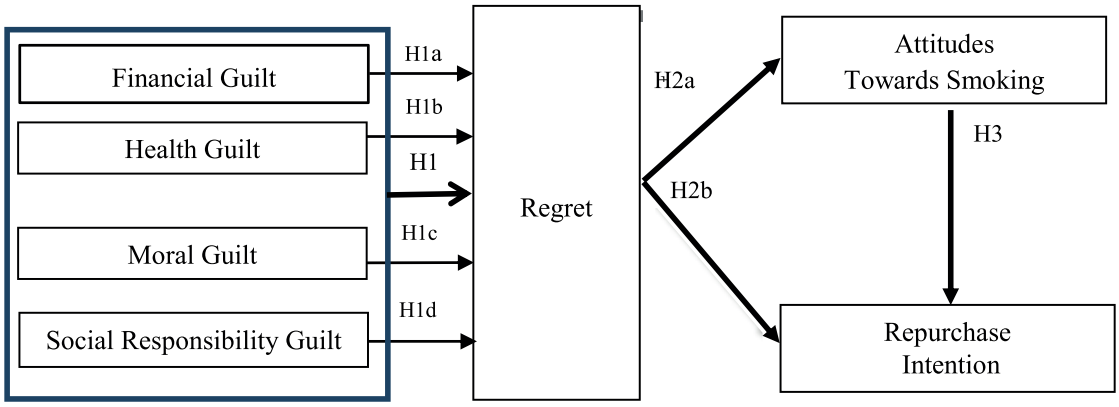


Figure 1: Research Model

In the direction of the model mentioned, the hypotheses are presented as below.

H1: Consumer guilt has a positive effect on regret.
H1a: Consumers' financial guilt has a positive effect on regret.
H1b: Consumers' health guilt has a positive effect on regret.
H1c: Consumers' moral guilt has a positive effect on regret.
H1d: Consumers' social responsibility guilt has a positive effect on regret.
H2a: Consumer regret has a negative effect on attitude.
H2b: Consumer regret has a negative effect on repurchase intention.
H3: Attitudes towards smoking has a positive effect on repurchase intention.
H4: Attitudes towards smoking has a mediating role on the effect of regret on repurchase intention.

THE EFFECT OF GUILT ON REGRET

Guilt is defined as violations of moral obligations or personal and social rules (Buchanan et al., 2016; Arli and Leo, 2017). The consumers' guilt causes regret (Wong and Kwong, 2007) which includes both interpersonal and intrapersonal features of guilt (Zeelenberg and Breugelmans, 2008). Indeed, according to Solomon, regret is an effective way to avoid guilt. Regret consists of guilt. Thus, smokers' major concern is nicotine dependence (Carneiro et al., 2017) and feeling regret at not being able to quit (Katajavuori et al., 2002). In addition, smokers may feel guilty when they recognize health and social consequences of smoking (Dijkstra et al., 2008). Smokers are worried that smoking is damaging to health and regret excessive spending on tobacco. Also, social approvals, norms and violating moral standards are significant predictors of regret.

Guilt is explained as financial, health, social responsibility and moral guilt (Saintives and Lunardo, 2017). The financial guilt is felt as a result of unnecessary and unplanned purchases, excessive spending, or purchasing without negotiating price (Burnett and Lunsford, 1994). Health guilt exists when a person purchases a product that is harmful to health. This type of guilt often arises due to the consumption of fattening foods, fast-food and frozen foods, all of which may be considered unhealthy (Burnett and Lunsford, 1994). These researchers also found that harmful effects of tobacco smoke can cause health guilt for consumers, as it affects their own health as well as the health of others. Moral guilt occurs as a result of purchases that violate moral standards, and when one has engaged in behaviors that are generally considered inappropriate by a society. Alcohol, sexually explicit materials, or non-prescription drugs are generally viewed morally wrong (Burnett and Lunsford, 1994). The tobacco smokers feel guilty, as they may disturb non-smokers and violate social norms (Poutvaara and Siemers, 2008). The social responsibility guilt is experienced when individuals exhibit behaviors unacceptable to others. In consumer context, this type of guilt arises when consumers are violating social obligations due to their purchase decision.

Therefore, making purchases that cause environmental pollution, or reduce the ability to make charitable donations or provide financial support to one's family may all cause social responsibility guilt (Burnett and Lunsford, 1994). The financial, health, moral and social responsibility guilt would diminish consumer's positive response, and may cause regret (Shiffman and Paty, 2006).

THE EFFECT OF REGRET ON ATTITUDES

Consumers' emotional states are influenced by their purchase attitudes and intentions (Bee and Madrigal, 2013) therefore, regret affects attitudes and intentions (Tsiros and Mittal, 2000). Smokers' regret is strongly

associated to their attitudes and behavior (Sansone et al., 2013). Consumers consider the negative anticipated feelings, they may experience as a result of their unethical behavior, and this reduces the intention of the consumer to realize the action (Steenhaut and Van Kenhove, 2006). Therefore, the feeling of regret after smoking affects consumers' attitudes and preferences (Conner et al., 2006).

THE EFFECT OF REGRET ON REPURCHASE INTENTION

Simonson (1992), Abendroth (2000), Tsiros and Mittal (2000) explained that the feeling of regret had a positive effect on complaint and brand change behaviors, but negative effect on word of mouth communication (Uygur and Küçükergin, 2013), and repurchase intention. Patrick et al. (2003) also found that regret for purchases was more common than regret for non-purchases. Lee and Cotte (2009) investigated the factors that lead to post-purchase regret and found that customers experience two types of regret, i.e. they regret the things that they bought (outcome) and the way that they bought them (process). They also indicated that consumers face outcome regret because of alternatives that were not purchased, and process regret due to ignored or excess concentration during purchases. With regret, consumers may find their purchase decisions illogical, blaming themselves and are unable to defend this purchase decision (Inman and Zeelenberg, 2002). These emotions guide the thoughts and behaviors of consumers and cause individuals to have negative attitudes towards their future purchase behaviors (Lu et al., 2012) or repurchase intentions. The feeling of regret after smoking reduces their repurchase intentions towards smoking.

EFFECT OF ATTITUDES ON REPURCHASE INTENTION

Attitudes are related to behavioral intentions (Fishbein, 1975). According to Theory of Reasoned Action (TRA), attitude influences repurchase intentions of the same products (Fishbein and Ajzen, 1975; Ünal et al., 2019). The consumers' smoking attitudes are shaped by beliefs during the learning process (Bee and Madrigal, 2013). Therefore, they may develop a negative attitude to smoking. Moreover, as consumers develop awareness of health, they may also develop negative attitudes to the goods that are harmful to their health (i.e., tobacco, fatty and high-cholesterol foods) and begin to avoid them (Luchs and Mick, 2018). The stronger smoking intentions are associated with attitudes (Conner et al., 2006) therefore repurchase intention can be said to depend on theses attitudes (Lerbin, 2015).

MEDIATING EFFECT OF ATTITUDES

Cognitive dissonance is defined as the psychological distress experienced after the purchase decision (Sweeney et al., 2000). In this sense, dissonance refers to negative feelings, such as the uncertainity resulting from a behavior and feelings of anxiety and regret. The cognitive dissonance is related to attitude and negatively affects customers' attitude when purchasing a product (Keng and Liao, 2009). According to some researchers, cognitive dissonance may either indirectly influence repurchase intention or it may be mediated by attitude. Regret is a type of dissonance and is associated with the action tendencies (Greenwald and Ronis, 1978). Regret may not directly influence consumers' intentions but the effect may also be fully mediated by other factors such as attitude (Lee, 2007). In other words, attitudes may mediate the effect of regret on repurchase intention. Considering that regret reflects cognitive dissonance hence it can be said that the regret may influence repurchasing intention through attitude (Lerbin, 2015). In this way, attitude has a mediating variable on the effect of regret on repurchase intention.

METHODOLOGY

DATA COLLECTION METHOD AND MEASURES

The collection method of data was a face to face survey, administered in Turkish. Judgment sampling method was applied. This method is also known as purposive sampling, selective, or subjective sampling. It is a form of non-probability sampling in which researchers rely on their own judgment when choosing members of the population to participate in their study. This sampling method requires researchers to have prior knowledge about the purpose of their studies so that they can properly choose and approach eligible participants (Tongco, 2007: 147; Black, 2010: 225).

The survey consisted of forty-nine items in total firstly: regret (3-items), attitude (5-items), repurchase intention (5-items), and guilt (36-items). Since the reliability of the social responsibility guilt is very low and the number of statements remains in one statement, it could not be included in the study. Finally, four items were eliminated and forty-five items were used. All items were adapted to Turkish language. In this paper, regret scale developed by Bui et al. (2011), attitude and repurchase

intention scale developed by Lerbin (2015), and guilt scale developed by Burnett (1988) are used. The scale to assess the feeling of guilt was expanded using various statements (marked with "*" in Appendix).

The questionnaire was firstly applied to Turkish consumers in Turkey and then the scales were translated into English with the support of a professional translator. The items were prepared on five-point Likert scale (1= Strongly Agree, 5= Strongly Disagree) (Mackinnon and Wang, 2020). Based on the good pretest results, the main study has been conducted. SPSS 20.0 and LISREL 8 were used to test hypotheses.

PARTICIPANTS AND PROCEDURE

Judgment sampling method was used. The sample size was found to be n=384 at 95% confidence interval with a margin of error of 5% (e=5%). The calculated sample size was 450 smokers. Bryman and Cramer (2001) suggest that the number of participants should be five or ten times of the number of items in the scale in factor analysis. Therefore, there were 450 participants in the study group as ten time of the number of items. However, after the eliminated questionnaires, 429 data were obtained. Considering study groups, it can be stated that the number of participants (n=429) was enough for validity and reliability analysis as five or ten times of the number of items.

The data was treated and cleaned before undertaking statistical analysis and the data checked for missing data. After data collection, data is entered into the SPSS program. Then, the data cleaning process is started to increase the data quality and to ensure the validity, accuracy and consistency of the analysis. In data cleaning, incorrect and missing data are identified in the data set, incorrect data are removed from the data set, and missing data are replaced by means of the variable using the SPSS program. After the elimination of incomplete or incorrect forms, 429 questionnaires were subject to analysis. Also, there were checks on normality of the data given that only a sample of 429 out of Izmir population participated. Skewness and Kurtosis values were examined for normality test. The Skewness value was found to be between -1.03 and 1.11, and the Kurtosis value ranged from 1.38 to -.012. When Kurtosis and Skewness values are between -1.5 and +1.5, it is accepted that there is normal distribution (Tabachnick and Fidell, 2013).

FACTOR ANALYSIS AND RELIABILITY

A pre-test was applied to test the validity and clarity of the questionnaire before final analyses. A total of 20 consumers involved in this pre-test. According to the pre-test, social responsibility guilt was excluded from the final version. There are two reasons of this elimination. The first one is that the reliability of the social responsibility scale was very low (smaller than 0.60). The second reason is that the scale remained just with one variable by low factor loadings. Also in the preliminary test, it was determined that the mean values and the reliability of this dimension were very low. Despite the fact that expressions are revised, the reliability of this scale was again low as a finding of this study.

After pre-test, the study uses Exploratory Factor Analysis (EFA) in determining the validity of the instrument. EFA was conducted to identify and organize a large number of items of the questionnaire into the constructs under one specific variable (Chua, 2014). As suggested EFA was to be conducted to determine a structure of latent dimensions among the observed variables reflected in the items of an instrument (Hair et al., 2010). Therefore, this study was undertaken to produce empirical evidence of the validity and reliability.

Exploratory factor analysis (EFA) was applied all constructs (guilt, regret, attitude, repurchase intention) to determine the number of common factors. EFA is used to construct the research model and generally is applied before Confirmatory factor analysis (CFA) is done. Following the EFA, CFA was conducted to test the validity of the scales for the sample (Brown, 2015). The result of this analysis showed in the Table 1.

After the factor analysis was performed to assess repurchase intentions, the item "REP5" (I do not buy any other thing to substitute when I cannot find any tobacco) was excluded due to its factor loading of less than 0.50, and the analysis was repeated. It was decided not to have this factor because it was unable to explain the structure and was removed from the new model obtained from the analysis (i.e., Figure 2).

Table 1: The Results of Factor Analysis

Items	Factor Loads	Eigen value	Percentage Variance	Cumulative Variance
Financial Guilt=FINANCE		5.264	26.318	26.318
FIN3 I do not feel bad when I buy tobaccotobacco, although the others see buying tobacco /smoking as a waste. ®	.781			
FIN4 I feel guilty when I spend money on smoking instead of buying my needs.	.663			
FIN5 Although I do not approve buying tobacco /smoking, I do not feel regret when I buy®	.773			
FIN10 Although I know that it affects the household budget adversely, I do not regret buying tobacco.	.776			
FIN11 I do not feel regret, even if buying tobacco turns into an unplanned purchase ®	.664			
Health Guilt=HEALT		3.190	15.948	42.266
HEA1 As I know smoking is harmful for my health, I feel regret when I smoke/buy tobacco.	.811			
HEA2 Since smoking restricts my body movements (inability to climb up stairs, inability to run etc.), I feel regret when I smoke/buy tobacco.	.755			
HEA3 Since tobacco contain many harmful substances, I feel regret when I smoke/buy tobacco.	.829			
HEA5 I feel more regret than non-smokers when I do not undergo my annual routine health checks.	.658			
HEA6 I feel concerned over my health when I smoke too much.	.728			
HEA7 I feel concerned over my health every time I smoke/buy tobacco.	.757			
MOR7 I feel guilty when I think that I am harming my family, friends and other people around me.	.632			
MOR8 I feel guilty when I think that I am harming myself while smoking.	.764			
MOR9 I feel guilty when I think that my hair, clothes and breath smell bad after smoking.	.672			
Moral Guilt= MORAL		2.983	14.913	57.179
MOR1 If I think smoking is against my beliefs, I do not smoke/buy tobacco.	.837			
MOR2 I do not smoke/buy tobacco when I think smoking is morally wrong.	.882			
MOR4 I feel regret over smoking when I think that smoking is condemned by the society.	.785			
MOR5 Even if smoking is against my moral values, it does not influence my decisions on smoking/buying tobacco®	.551			
MOR6 I do not smoke/buy tobacco when I think smoking is not right.	.607			
MOR10 The legal regulations imposed to ban smoking in certain areas make me feel guilty.	.508			
KMO=0.880; Bartlett Test of Sphericity =4141.202; df:190; p<0.000; Cronbach's alpha= 0.80				
Consumer Regret=REGRET	**Factor Loads**	**Eigen value**	**Percentage Variance**	**Cumulative Variance**
REG1 I feel bad when I smoke/buy tobacco.	0.907	2.299	76.630	76.630
REG2 I feel regret after I smoke/buy tobacco.	0.896			
REG3 Sometimes I think it would be better in every aspect to buy another thing instead of tobacco.	0.821			
KMO=0.699; Bartlett Test of Sphericity =585.087; df: 3; p<0.000; Cronbach's alpha= 0.85				
Attitude=ATTITUDE	**Factor Loads**	**Eigen value**	**Percentage Variance**	**Cumulative Variance**
ATT1 Despite its negative effects, smoking gives me pleasure.	0.915	3.910	78.198	78.198
ATT2 Despite everything, smoking still makes me psychologically relieved**.**	0.888			
ATT3 I like smoking despite its harmful effects.	0.876			
ATT4 Despite everything, I feel like I am having a good time when I smoke.	0.872			
ATT5 Smoking makes me happy.	0.869			
KMO=0.874; Bartlett Test of Sphericity =1726.901; df:10; p<0.000; Cronbach's alpha=0. 93				
Repurchase Intention=REPURCHA	**Factor Loads**	**Eigen value**	**Percentage Variance**	**Cumulative Variance**
REP1 Despite its negative effects, I still buy tobacco when I need to.	0.878	2.538	63.458	63.458
REP2 Despite everything, I still give priority to buying tobacco over other goods.	0.804			
REP3 Despite everything, I will continue buying tobacco as I know I will be happy.	0.764			
REP4 Despite everything, I still intend to continue smoking/buying tobacco.	0.733			
KMO=0.690; Bartlett Test of Sphericity =685.270; df:6; p<0.000; Cronbach's alpha= 0.81				

ASSESSMENT OF THE MEASUREMENT MODEL

The measurement model was constructed according to the goodness of fit used in the evaluation of the structural model by using LISREL 8.80. In this context, several modifications were made by the deletion of items with lower factor loadings to ensure goodness of fit. Hypotheses were tested by Maximum Likelihood Method. CFA was performed to test the validity of the scales. When the goodness of fit values of the variables was examined, some variables were found to be unacceptable. [(AGFI: health guilt: 0.78; purchase intention: 0.58); (NNFI: repurchase Intention: 0.76) and (RMSEA: financial guilt: 0.081; health guilt: 0.152; moral guilt: 0.092; attitudes: 0.179; purchase intention: 0.299)]. Then, necessary modifications were made with that scales were reached at an acceptable level of reliability after the exclusion of some items (FIN11, MOR10, HEA7, MOR7, MOR8, MOR9, ATT3, ATT5, and REP4).

At the end of the measurement model, the goodness of fit values for the scales was as follows: RMSEA=0.066; AGFI=0.86; CFI=0.92; GFI=0.89; $\chi 2=621.63$; $\chi 2/df=2.9$. Moore et al. (2013) stated that R squared value <0.3 is accepted to be none or very poor; R-squared value $0.3 < r < 0.5$ is accepted a weak or low effect; R-squared value $0.5 < r < 0.7$ is accepted a moderate effect; R-squared value $r > 0.7$ is accepted strong effect. Financial guilt, R^2 values are in the range of 0.43-0.61 and the t-values are in the range of 13.94 - 17.41 ($p<0.05$). Moral guilt, R^2 values are in the range of 0.24-0.89 and the t-values are in the range of 10.35 - 24.62 ($p<0.05$). Health guilt, R^2 values are in the range of 0.35 -0.82, and the t-values are in the range of 13.05 -23.57 ($p<0.05$). Regret, R^2 values are in the range of 0.49-0.77 and the t-values are in the range of 15.79 -21.90 ($p<0.05$). Attitudes, R^2 values are in the range of 0.66-0.80, and the t-values are in the range of 19.67-22.82 ($p<0.05$). Repurchase intention, R^2 values are in the range of 0.47-0.59, and the t-values are in the range of 14.55 - 16.80 ($p<0.05$). The result of this analysis showed in the Table 2.

STRUCTURAL MODEL EVALUATION AND HYPOTHESIS TESTS

Structural Equation Modeling (SEM) was used to test the hypotheses in Figure 2. In that sense, construct reability (CR), convergent validity (CV) and divergent validity (DV) was assessed. In addition, CR should take a greater value than the Average Variance Extracted (AVE). DV should point out the difference between two separate structures (Matthes and Ball, 2019). With the purpose of attaining an acceptable DV value, the correlation between the structures must be lower than the square roots of AVE (Hair et al., 2006: 777). In addition, when determining DV maximum shared variance values should be lower than AVE (Forrell and Lacker, 1981).

In Table 3, the values on the diagonal line are higher than the values on its row and line. This supports the distinctiveness, and shows that all construct are distinct in nature.

Table 2: The Results of Measurement Model

Goodness-of-fit values		Acceptable Fit Index Values	After/Before Modification
X^2			621.63
Degree of Freedom (df)			215
X^2/df		1-5	2.9
GFI		0.90≤GFI≤0.95	0.89
AGFI		0.85≤AGFI≤0.90	0.86
RMSEA		0.05≤RMSEA≤0.08	0.066
CFI		0.95≤CFI≤0.97	0.92
Items*		**R^2**	**t-values**
FIN3	**Financial Guilt**	0.61	17.41
FIN4		0.44	14.14
FIN5		0.55	16.29
FIN10		0.43	13.94
MOR1	**Moral Guilt**	0.68	19.95
MOR 2		0.89	24.62
MOR 4		0.47	15.57
MOR 5		0.25	10.70
MOR6		0.24	10.35
HEA1	**Health Guilt**	0.71	20.90
HEA2		0.64	19.49
HEA3		0.82	23.57
HEA5		0.35	13.05
HEA6		0.48	15.79
REG1	**Regret**	0.74	21.09
REG 2		0.77	21.90
REG 3		0.49	15.79
REP1	**Repurchase Intention**	0.51	15.27
REP 2		0.47	14.55
REP 3		0.71	20.77
ATT1	**Attitude**	0.71	20.77
ATT2		0.80	22.82
ATT4		0. 66	19.67

**items were shown in appendix*

Table 3: Divergent Validity

	Regret	Repurchase Intention	Attitude	Financial Guilt	Health Guilt	Moral Guilt	Cronbach Alpha	Variance Extracted	Composite Reliability
Regret	(0.81)						0.85	0.66	0.85
RepurchaseIntention	0.24	**(0.72)**					0.76	0.52	0.77
Attitude	0.21	0.71	**(0.85)**				0.88	0.72	0.88
Financial Guilt	0.58	0.14	0.12	**(0.71)**			0.81	0.50	0.80
Health Guilt	0.67	0.16	0.14	0.42	**(0.77)**		0.87	0.60	0.88
Moral Guilt	0.24	0.06	0.05	0.20	0.03	(0.71)	0.81	0.52	0.83

Table 4: Estimated Values for Structural Equation Model

	Standardized coefficient	R^2	Error Variance	t- value
Financial Guilt→ Regret	0.32	0.59	0.41	6.39
Health Guilt→Regret	0.54	0.59	0.41	10.65
Moral Guilt→Regret	0.18	0.59	0.41	4.46
Regret→Attitude	-0.21	0.04	0.96	-3.88
Regret→Repurchase Intention	-0.09	0.56	0.44	-1.81
Attitude→Repurchase Intention	0.72	0.56	0.44	12.19

As shown in Table 4 and Figure 2, all types of guilt had a significant and positive effect on the feeling of regret, and attitudes had a significant and positive effect on repurchase intention. Moreover, feeling of regret had a negative effect on attitudes. The effect of regret on repurchase intention was not found as significant. The results of hypotheses were shown in Table 5.

Table 5: The Results of Hypotheses

Hypotheses	Results
H1a: Consumers' financial guilt has a positive effect on regret.	Supported
H1b: Consumers' health guilt has a positive effect on regret.	Supported
H1c: Consumers' moral guilt has a positive effect on regret.	Supported
H2a: Consumer regret has a negative effect on attitude.	Supported
H2b: Consumer regret has a negative effect on repurchase intention.	Not Supported
H3: Attitudes towards smoking has a positive effect on repurchase intention.	Supported
H4: Attitudes towards smoking has a mediating role on the effect of regret on repurchase intention.	Supported

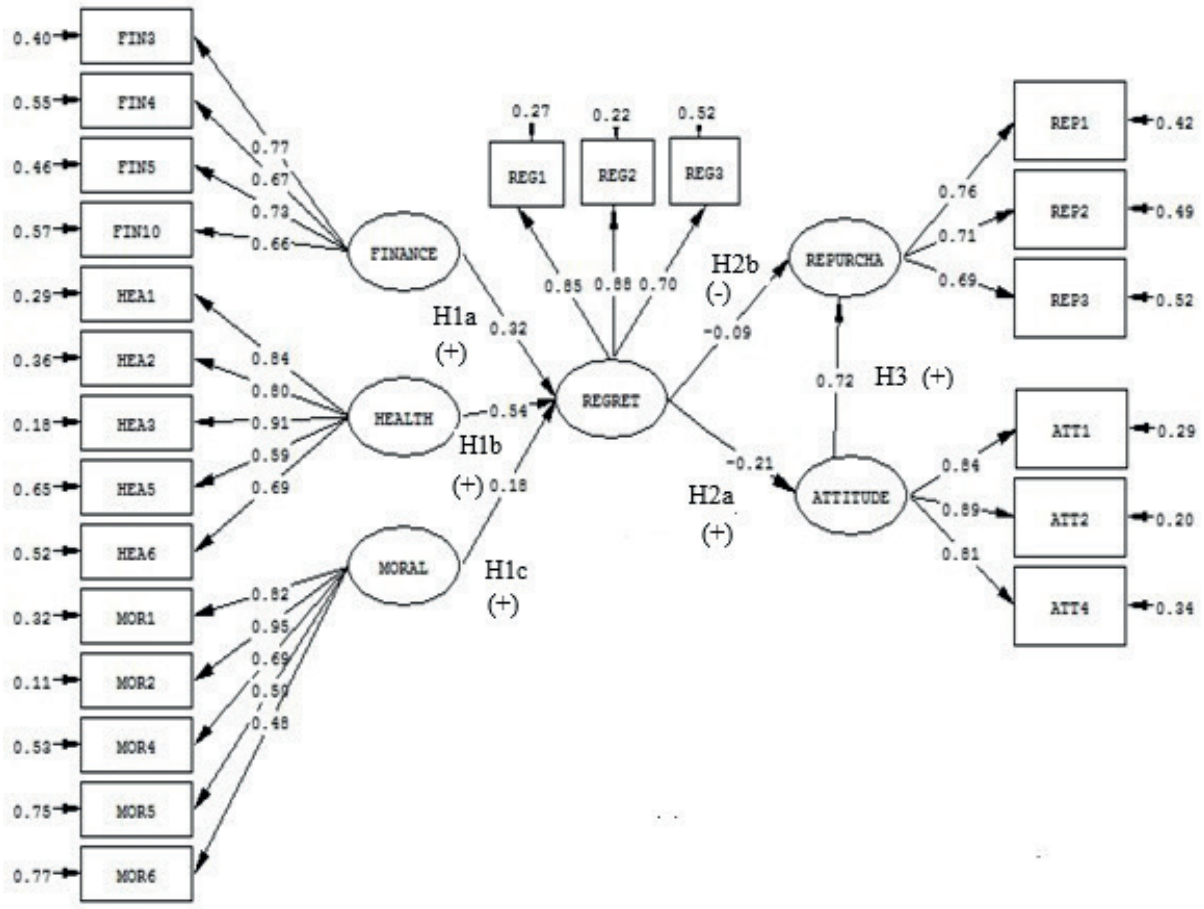


Figure 2: Structural equation model

According to the structural model model fit index are as below:

X^2: 688.17; df: 221; P-value: 0.0001; AGFI: 0.85; GFI: 0.88; RMSEA: 0.070; CFI: 0.91; NNFI: 0.89; NFI: 0.87.

Fit index values of measurement model and structural model are generally in range of acceptable fit index values. But some of them are not in this range. According to some researchers, fit indices values within the range between 0.80 and 0.89 are also acceptable (Segars and Grover, 1993; Doll et al., 1994; Hu and Bentler, 1998; Schermelleh-Engel et al., 2003; Hooper et al., 2008).

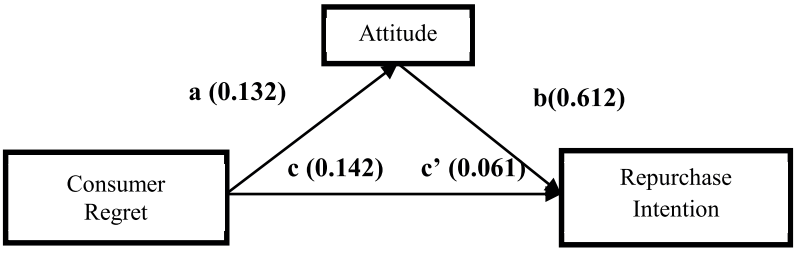
MEDIATION TEST

It is necessary to define whether the direct effects of independent variable on dependent variable are significant or otherwise. Hence, in order to define the mediator effect, a macro (PROCESS) for SPSS developed by Hayes (2015) was used. This macro also generates bootstrap confidence intervals for an indirect effect (Reutter and Bigatti, 2014). Thus Sobel Test was used to test the significance of a mediation effect. In the Sobel Test, z-score greater than 1.96 indicates the existence of mediating effect. To determine how effective, the mediating variable is on the relationship, it is important to determine the total, direct and indirect effects and the bootstrap confidence intervals should be used to decide whether the indirect effect is significant (Pham et al., 2019).

Figure 3 shows that three criteria for mediating effect have been met, and that these paths are found as significant. An examination of path c shows that the mediating effect is not significant. This finding is important, but not sufficient evidence of the existence of a mediating effect. Partial mediation refers to a pattern of findings where mediation is established in the presence of significant total effect of X and the direct effect of X (c′) is statistically different from zero (Hayes and Rockwood, 2017: 40). Since the z-score (Z= 3.166; P=0.000) obtained in the Sobel Test is significant and larger than 1.96, a partial mediating effect can be said to exist.

Table 6 shows the bootstrap confidence intervals which determine the size and significance of mediating

effect. In bootstrapping, both the lower and upper bounds should be below or above 0 (Preacher and Hayes, 2008). As shown in Table 6, as both values are below 0 in this study, attitudes can be considered to have a partial mediating effect on the relationship between the feelings of regret and repurchase intention. Thus, H4 was supported.



Sobel Z-score= 3.166 p=0.00

Figure 3: Mediating role of attitude

Table 6: Total, Direct and Indirect Impact Values

The Effect of the Attitude on Relationship	Total Effect	Direct Effect	Indirect Effect	Bootstrap Confidence Interval BoLLCI-BoULCI	Type of Mediation
Regret →Repurchase Intention	0.142	0.061	0.081	(-0. 1370)-(-0. 0275)	Partial

DISCUSSION AND CONCLUSION

Despite the recent legal regulations aimed at reducing smoking rates, the intention to smoke is still increasing among young adults especially in developing countries such as Turkey (Uzundumlu and Topcu, 2015; Cetin, 2017). Given the early age of smoking initiation, researching the habit of smoking has become a priority. Although consumers know the harm of smoking and show negative attitudes, they continue to smoke. As Johnson et al. (2010) stated many smokers who show dissonance of the attitudes towards the brand and the industry. Although smokers know their harm, they continue to smoke.

This research contributes to examine the relationship between guilt and regret arising from tobacco consumption. Zhang et al. (2020) emphasized that according to the theory of self-discrepancy, guilt and regret were different emotional experiences, although there was a high correlation between them. Guilt is associated with a more moral self-blame than regret and is caused by interpersonal harm (Lickel et al., 2014). Regret is caused by both self-harm (Berndsen et al., 2004) and harm to others (Zeelenberg and Breugelmans, 2008). The results of this study indicated that guilt affects regret positively; regret occurs as a consequence of guilt, parallel to the literature (Landman, 1993; Dijkstra et al., 2008; e Silva and Martins, 2017). Williamson et al. (2020) stated that the psychological experiences of guilt and regret are closely related to smoking experience. As Vosgerau et al. (2016) investigated guilt and regret for hedonic consumption, this study indicated that consumer felt guilt and then regret in addictive products such as smoking.

This study investigated the effects of each guilt type on regret. The findings of this study were that health and financial guilt were more effective than moral guilt to trigger smoking-related feeling of regret. This result is consistent with other previous study (Sansone et al., 2013).

This paper aims to investigate effects of regret on tobacco repurchase intention by assessing the mediating role of attitude towards tobacco. Unlike other studies, which detected that negative relationship exists between regret, as expression of cognitive dissonance, and repurchase intention, this study found that regret have no effect on repurchase intention (Conner et al., 2006; Keng and Liao, 2009; Lerbin, 2015). Consistent with previous research, negative emotions (regret, guilt etc.) reduce the intention of repurchase behavior. Fong et al.

(2004) mentioned that a smoker who has experienced regret has positive intentions to quit smoking. According to Koch (2014), it is predicted that anticipated regret for smoking affects low intentions to start or continue smoking. However, Fazal-e-Hasan et al. (2020) emphasized that regret was not found sufficient for smokers' intention to quit smoking or to repurchase. In order for smokers not to buy again or be willing to quit, they must have self-control and have information about ways to quit smoking, and a support must be provided from the environment. Sansone et al. (2013) stated that in countries where tobacco control is low and weak, this situation affects the social norms of smoking less, and therefore regret for smoking is felt less. Strong tobacco policies have been found to be effective in the formation of regret due to smoking. These tobacco policies may affect the health damage caused by smoking, negative social norms and the financial cost of purchasing cigarettes.

By comparing the harms of smoking with the benefits such as pleasure, enjoyment, relaxation and happiness, smokers perceive the benefits of smoking more than the perceived harms (Oakes et al., 2004). This stituation can increase the rationalization of smoking behavior and cause less regret due to smoking. Therefore, rationalization of smoking does not affect the intention to quit, repurchase due to the feeling of less regret. For this reason, Lee (2007) mentioned that social norms and culture may be effective to quit intention or to repurchase. Due to factors not included in the study, such as inadequate tobacco control policies, rationalization, social norms, and cultural influence, there may be no relationship between regret and repurchase intention towards smoking.

It can be determined that regret because of smoking has a negative effect on attitudes. The findings of this paper are parallel to the findings of previously held studies (Keng and Liao, 2009; Lerbin, 2015). The cognitive dissonance theory provides a framework for understanding inconsistencies among consumers who understand the dark side of consumption (Gregory-Smith et al., 2013), but still continue to smoke. The findings indicated that attitudes towards smoking were found to have a positive effect on repurchase intention and is in line with previously held studies (Lerbin, 2015). The researchers found that more positive attitudes of consumers towards tobacco smoking in the past, the greater the intent to repurchase tobacco in the future, and vice versa. It was also found that attitudes had a mediating role in the effect of regret on repurchase intentions, paralel with some studies (Keng and Liao, 2009).

THEORITICAL CONTRIBUTION

The study has theoretical contributions. This study emphasizes that guilt and regret have not been a major focus in the marketing literature, and they need to be better investigated to reveal their effects on consumer behavior. In the literature, tobacco consumption has been studied separately with guilt (Fong et al., 2004; Lee and Paek, 2014) and regret (Lazuras et al., 2012; Nayak et al., 2017). Furthermore, a limited number of studies in medicine or psychology have been found where these two are studied together. Therefore, the first contribution of this study was that the investigation on guilt and regret which has been showed together to examine the relationship between guilt and regret arising out of tobacco consumption. Financial, health, moral and social responsibility guilt would diminish consumer's positive response and may cause regret (Shiffman and Paty, 2006). Hence, the second contribution of this study is that the effects of each guilt type on regret have been investigated. This study is also related to the tobacco consumption with the feelings of guilt and regret, and examining effect of regret on repurchase intention and attitude. Accordingly, the last contribution is to better understand the effects of regret on tobacco repurchase intention by assessing the mediating role of attitude. If the relationship between independent variable and dependent variable decreases, partial mediation effect can be mentioned (Howell, 2013: 547). In this study, an attitude is a partial mediating effect between the feelings of regret and repurchases intention.

MANAGERIAL IMPLICATIONS

The results of this study may contribute to practicioner understanding of tobacco consumption as cognitive-based and a cause of incompatibility in consumers' behavior. In order to affect and change attitudes towards smoking, cognitive factors should be considered by businesses in all activities and strategies. This research provides support for the development of social marketing campaigns. In order to increase feelings of regret among consumers, advertisement policies should focus not only on health but also on financial and moral guilt. In this way, smoking can be demonstrated as something which has to be regretted, sharing corrective messages that help them to quit smoking (Lee et al., 2019). Razaet al. (2018) determined that the message used in anti-smoking advertisements should be persuasive and based on knowledge and humor rather than fear, in order to

encourage the consumer to quit smoking. In this context, it is emphasized that messages should be designed to explain what it does to health and why you should quit the habit. In addition, it has been found that emotional messages are more effective than other message strategies with the use of graphic images to encourage smoking cessation behavior (Davis et al., 2017). Yoo and Eastin (2017) emphasized that social media, video games, wearable devices and mobile technologies create mutually interactive environments, and increase awareness by providing educational entertainment oriented health messages for non-smoking campaigns. Yang (2018) stated that messages such as reward and benefit instead of fear based messages for the positive effects of smoking cessation were more effective in quitting smoking. Media campaigns using negative advertising are regarded as effective public health tools that lead to behavioral change. It is not sufficient, therefore, to address the harms of smoking only on the packages themselves. Rather ad agencies must also make more efficient use of negative advertising (Wymer, 2015, 2017). Visual and written warnings on tobacco packages are the most frequent deterrent methods in countries where tobacco advertising is prohibited.

Social media can be used as an effective media tool to present harmful effects of smoking. Social media platforms support efforts to quit smoking interactively, allowing users to share text, audio, photos, images, or videos to interact and support their own experiences. In this way, social media provides a platform for participants to learn about their smoking cessation performance and difficulties, improve their personal skills and social modeling from other participants. In addition, social media enables participants to provide a change in their health behavior, increase self-efficacy or trust on themselves through peer motivation, encouragement and, learning about quitting smoking. Social media facilitates this through personalized incentives and social persuasion (Naslund et al., 2017). Thus, people send interfering content created especially through special groups created on social media. In this way, social media enables users to interact with content posted on their profiles (eg Smokefree.gov's Facebook page) (Thrul et al. 2019). Namkoong et al. (2017) emphasized that the increase in social media use will change the attitudes and perceived social norms of consumers regarding smoking behavior and play an important role in reducing the intention to smoke accordingly. Social networks such as Facebook and Twitter (SNSs) can be used as a campaign tool aimed at interactive health communication, especially for young adults. It has been demonstrated that interactive social media campaigns will be more effective in quitting smoking as they will create collective efforts with community-based participatory projects (Brabham et al., 2014). Yoo et al. (2016) stated that social media is an interactive communication channel especially for university students to quit smoking, to produce content, share and interpret in an interactive way. Through the anti-smoking messages developed in the social media environment, more people will be exposed to these messages to improve or change individuals' attitudes and behavioral intentions. Antismoking messages highlighting the negative health consequences of smoking are found to be the most persuasive tool to change the knowledge, negative attitudes and beliefs of university students about tobacco use (Terry-McElrath et al., 2013). In this regard, it was emphasized that public health practitioners can use social media as an active intervention platform for university students to prevent and quit smoking.

When the Turkish literature is analyzed, it is determined that there are not many studies investigating the role of social media in smoking cessation. Erkek (2016) stated that beneficial results can be obtained since the Ministry of Health makes informative posts by using social media in smoking cessation campaigns. Ince and Koçak (2017) examined the smoking habits of the staff working in public institutions. This study determined that the employees use the internet mostly in obtaining information about the harm of tobacco products, followed by television and social media, respectively. In addition, it was found that there was an increase in the level of trust in social media due to the increase in the level of importance given by the employees to the internet among other media types in obtaining information about the harms of smoking.

In terms of behavioral factors, information and incentives about smoking-related deaths, or negative effects of smoking on health may create a perception that smokers are vulnerable to such effects. Companies can play a more active role in reducing smoking rates among employees by increasing the number and frequency of information telephone services, workplace clinics and free medical support services. Furthermore, companies should provide training on health to increase awareness, and should offer instructive anti-smoking programs, as well as supervising the supply of tobacco and tobacco products and expanding the scope of such supervision.

This study has some implications for public policy makers as well. There is a need to increase the number of trainings and social awareness activities which may prove as important actions to reduce smoking intentions. The

effect of consumers' regret on attitude about tobacco can only be reduced by education and awareness programs. Public education is essential to reduce smoking rate through restricting the age at which people could purchase tobacco, marketing on television and increasing prices via taxation (Wymer, 2015). The studies investigated the impact of increasing taxes and prices on the consumption of tobacco products in Turkey; some studies have indicated the reduced tobacco products consumption as a result of these actions (Karaöz et al., 2010; Buyrukoğlu et al., 2016); in some studies, as a result of the measures taken, it was determined that consumers have shifted to cheap, substitute and illegal product consumption (Uğur ve Kömürcüler, 2015; Durmusoğlu, 2017; Cetin and Özkan, 2018; Beser and Askan, 2019). In this respect, it was emphasized that taxes and price increases on tobacco products cannot be effective alone in reducing tobacco products consumption (Hayrullahoglu, 2015).

Hence, in order to increase effectiveness of anti-smoking policies, actions must be taken to increase conscious of the harm caused, with a particular emphasis on the harm of smoking to the environment and to others. For instance, ads showing the effects of smoke and carelessly discarded tobacco can be used to promote a healtier world. Within the framework of legal regulations and laws imposed by the government to prevent or reduce smoking, continuity is important to impose restrictions and controls in potential segments. In order to reduce the harm from tobacco industry, it is not sufficient to apply only short term policies such as package design, increase taxes, but also long term progressive policies such as removing nicotine from tobacco and tobacco products (Wymer, 2017).The findings of this study implied that financial guilt was found to be the second most experienced type of guilt. This indicates that beside health guilt, government imposed financial measures would be beneficial by increasing tobacco taxes together with an increase in price. In particular, to help smokers overcome guilt and regret, a range of social support is needed. Especially, Carneiro et al. (2017) has found that social interactions with the family and the reference groups are effective in the change of attitudes of consumers, especially among young people. Therefore, environmental factors, i.e. family, workplace, and schools, as influential institutions, should act in harmony to change consumer's attitudes. These groups act in cooperation with media, educational bodies, governmental practices and legal regulations. In addition, society should be convinced that smoking is a social norm and an undesirable behavior via anti-smoking campaigns (Cohen and Anglin, 2009). The cognitive messages may be provided about the harm of smoking by all organizations. Studies have been conducted by the Ministry of Health and non-governmental organizations for the purpose of protecting children and young people from the harmful effects of tobacco products in Turkey with the participation of volunteered young people. In this context, "Youth Action Plan for Combating Tobacco" was prepared in 2016. Within the scope of this action plan, young people were given "Peer Education Program for My Fight against Tobacco" trainings. These preventive trainings are still continuing today, and the adverse effects of tobacco use on health and the harm of tobacco addiction are explained to the youth. In addition, tobacco products are not sold in schools and universities in order to protect children and young people from using tobacco products and to prevent their accessibility (Havanı Koru Saglik Bakanligi).

LIMITATIONS AND FURTHER RESEARCH

This paper has a few numbers of limitations. Initially, the sample of the study is only Izmir, thus the results cannot be generalized to other regions of Turkey. It focuses only on financial, moral and health guilt, and excludes social responsibility guilt. The other limitation of this research is that social desirability bias is present in face-to-face survey compared to the other research methods such as email, telephone, or self-administrated methods. Even though several aforementioned remedies had been taken in order to minimize this bias, the social desirability bias can be stated as the limitation of the study. In the future researches, the social desirability scale (Crowne and Marlowe, 1960) can be used, forced-choice items questions added and computerized self-administration can be hired which are more effective at reducing social desirability bias.

This study may have some other suggestions for future studies. Further studies may be conducted to examine strategies consumers use to overcome the feeling of regret after buying tobacco, and how this feeling affects their future purchases. The guilt type that leads to more regret after eating fast food or drinking alcohol may also be examined (Lemaster, 2010; Sandberg et al., 2016), and the range of products expanded. It would also be valuable to study the feelings of regret and guilt after purchases that are impulsive, unplanned, hedonic, and obsessive purchases. Since smoking rates may differ between developed and developing countries, comparative research can be conducted across geographies and cultures. Future studies may also involve analyzing the differences between light, heavy and social smokers.

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APPENDIX

The items later added to the model (FIN4, FIN8, FIN10, HEA4, MOR7-MOR13) are shown with "*"

The reverse coded is shown with "®"

Scales of The Study

Financial Guilt=FINANCE
FIN1 I sometimes feel guilty when I buy tobacco/smoke, although I do not want to do so.
FIN2 I feel guilty due to the impact of buying tobacco/smoking on my financial status.
FIN3 I do not feel bad when I buy tobacco, although the others see buying tobacco/smoking as a waste. ®
***FIN4** I feel guilty when I spend money on smoking instead of buying my needs.
FIN5 Although I do not approve buying tobacco/smoking, I do not feel regret when I buy®
FIN6 I feel guilty when I buy an expensive brand of tobacco.
FIN7 I want to return the tobacco I purchased since I feel financially guilty.
***FIN8** I do not regret buying tobacco as I thought I make contribution to the national economy.
FIN9 I feel regret buying tobacco when I think that smoking prevents me from saving money.
***FIN10** Although I know that it affects the household budget adversely; I do not regret buying tobacco.
FIN11 I do not feel regret, even if buying tobacco turns into an unplanned purchase ®
FIN12 I feel regret when I do not buy the tobacco of optimal quality relative to its price.
Health Guilt=HEALTH
HEA1 As I know smoking is harmful for my health, I feel regret when I smoke/buy tobacco.
HEA2 Since smoking restricts my body movements (inability to climb up stairs, inability to run etc.), I feel regret when I smoke/buy tobacco.
HEA3 Since tobacco contain many harmful substances, I feel regret when I smoke/buy tobacco.
HEA4 I still continue smoking although I am aware of its harmful effects on the health of my family, especially my children.
***HEA5** I feel more regret than non-smokers when I do not undergo my annual routine health checks.
HEA6 I feel concerned over my health when I smoke too much.
HEA7 I feel concerned over my health every time I smoke/buy tobacco.
Moral Guilt=MORAL
MOR1 If I think smoking is against my beliefs, I do not smoke/buy tobacco.
MOR2 I do not smoke/buy tobacco when I think smoking is morally wrong.
MOR3 I do not feel bad when I smoke/buy tobacco even if smoking is against my beliefs.®
MOR4 I feel regret smoking when I think that smoking is condemned by the society.
MOR5 Even if smoking is against my moral values, it does not influence my decisions on smoking/buying tobacco®
MOR6 I do not smoke/buy tobacco when I think smoking is not right.
***MOR7** I feel guilty when I think that I am harming my family, friends and other people around me.
***MOR8** I feel guilty when I think that I am harming myself while smoking.
***MOR9**I feel guilty when I think that my hair, clothes and breath smell bad after smoking.
***MOR10**The legal regulations imposed to ban smoking in certain areas make me feel guilty.
***MOR11** I feel guiltier when I see the anti-smoking public service ads on the TV.
***MOR12** I feel guiltier when I watch TV shows about the harmful effects of smoking.
***MOR13** Images on cigarette packages make me feel guilty.
Social Responsibility Guilt=SOCIAL
SOS1 When I think of the damage that cigarette gives to nature, I feel bad for everyone else.
SOS2 I feel guilty when my family feels sorry for my smoking.
SOS3 I feel guilty about running away from organizations about smoking cessation.

SOS4 I do not feel guilty to anyone because I smoke.
Consumer Regret=REGRET
REG1 I feel bad when I smoke/buy tobacco.
REG2 I feel regret after I smoke/buy tobacco.
REG3 Sometimes I think it would be better in every aspect to buy another thing instead of tobacco.
Repurchase Intention=REPURCHA
REP1 Despite its negative effects, I still buy tobacco when I need to.
REP2 Despite everything, I still give priority to buying tobacco over other goods.
REP3 Despite everything, I will continue buying tobacco as I know I will be happy.
REP4 Despite everything, I still intend to continue smoking/buying tobacco.
REP5 I do not buy any other thing to substitute when I cannot find any tobacco.
Attitudes=ATTITUDE
ATT1 Despite their negative effect, smoking gives me pleasure.
ATT2 Despite everything, smoking still makes me psychologically relieved**.**
ATT3 I like smoking despite its harmful effects.
ATT4 Despite everything, I feel like I am having a good time when I smoke.
ATT5 Smoking makes me happy.

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