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MUSIC INFORMATION SYSTEM FOR BOOKSTORES

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THESIS APPROVAL PAGE

DECLARATION

I hereby declare that this master's thesis titled as "Music Information System for Bookstores" has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials benefited in this thesis consist of the mentioned resources in the reference list. I verify all these with my honor.

Date

…/…/…….

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ABSTRACT

Master's Thesis

Music Information System for Bookstores

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Effective usage of background music has an important impact on businesses nowadays. In light of previous studies, it can be said that background music has a significant effect on factors such as: "Mood of customers", "Satisfaction of customers", "Total time spent by customers", "Performance of salespeople", "Total sales of the bookstore" and "Possibility to revisit of customer" which are important for a business. The purpose of this study is to use "Music Information System" in a bookstore to increase the effects of background music on these factors.

"Music information system" works with "Music control devices" which are placed to each department properly. These devices perceive customer arrival to play and pause the background music in the related departments according to themes of the departments. The system differentiates background music of each department instead of one stable background music which is dominant in every place. Music starts when a customer approaches the related department and pauses when the customer leaves. At the same time, the system sends information of the customer arrival belong the related department to main computer to make it possible to be monitored by managers. The system is designed to use music in a more dynamic and interactive way to increase its benefits for bookstores.

The effects of different thematic background music usage and department classifications of bookstores are investigated in this study. A questionnaire was applied to employees (usually managers) of the local

bookstores in İzmir, Turkey to define the essential departments where "Music Information System" should give service for and see the expectations of participants from this system. According to results, the "Music information system" was designed for "Kırmızı Kedi Kitabevi" and tested for one week. After that, a questionnaire was applied to customers who experienced the system and interviews were conducted with managers of the "Kırmızı Kedi Kitabevi".

Results show that "Music information system" affects these factors in a positive way: "Mood of the customers", "Satisfaction of the customers", "Total time spent by customers" and "Performance of the salespeople". On the other hand, it is also approved that the system has no significant effect on the factors which are: "Total sales of the bookstore" and "Possibility to revisit of the customers". The most important contribution of this thesis to the literature is to reveal the advantages and disadvantages of using different thematic background music in different departments of the store.

Keywords: Thematic Background Music, Bookstore, Music Information System.

ÖZET

Yüksek Lisans Tezi

Kitabevleri için Müzik Bilişim Sistemi

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Günümüzde arka plan müziğinin efektif kullanımı, işletmeler üzerinde önemli bir etkiye sahiptir. Geçmişte yapılan çalışmalar ışığında, işletmelerde kullanılan arka plan müziğinin: "Müşterinin ruh hali", "Müşteri memnuniyeti", "Müşterinin mağazada geçirdiği toplam süre", "Çalışanların performansları", "Mağazanın toplam satış rakamları" ve "Müşterinin mağazayı tekrar ziyaret etme ihtimali" gibi faktörlere önemli etkilerinin olduğu görülmektedir. Bu çalışmanın amacı, bir kitabevinde, "Müzik bilgi sistemi" kullanarak arka plan müziğinin bu faktörlere olan etkisini artırmaktır.

"Müzik bilgi sistemi" her reyona uygun şekilde yerleştirilmiş "Müzik kontrol cihazları" ile çalışır. Bu cihazlar müşterinin ilgili reyona gelişini algılar ve buna göre ilgili reyonun temasına uygun arka plan müziğini başlatıp durdurur. Sistem tüm çevreye hakim tek bir arka plan müziği kullanmak yerine her reyonun arka plan müziğini farklılaştırır. Müzik, müşterilerin ilgili reyonu ziyaret etmesiyle birlikte başlar ve terk etmeleriyle birlikte durur. Aynı zamanda sistem, ilgili reyona ait müşteri geliş bilgisini, yöneticiler tarafından görüntülenebilmesi amacıyla ana bilgisayara gönderir. Sistem müziğin mağaza içindeki etkinliğini artırmak için müziği dinamik ve interaktif kullanmak amacıyla tasarlanmıştır.

Bu çalışmada, farklı tematik arka plan müziklerinin kullanımının etkileri ve kitabevlerinin reyon sınıflandırmaları incelenmiştir. Müzik bilgi sisteminin hizmet vermesi gereken temel reyonları belirlemek ve katılımcıların

sistemden beklentilerini görmek amacıyla; Türkiye'nin İzmir şehrindeki öne çıkan kitabevlerinin çalışanlarına (genellikle yöneticiler) bir anket uygulanmıştır. Elde edilen sonuçlara göre sistem "Kırmızı Kedi Kitabevi" için dizayn edilip bir hafta süresince denenmiştir. Sonrasında bu sistemi tecrübe eden müşteriler ile anket ve "Kırmızı Kedi Kitabevi" yöneticileri ile röportaj çalışmaları yürütülmüştür.

Sonuçlar müzik bilgi sisteminin şu faktörlere olumlu etkisi olduğunu göstermiştir: "Müşterinin ruh hali", "Müşteri memnuniyeti", "Müşterinin mağazada geçirdiği toplam süre", "Çalışanların performansları". Aynı zamanda sistemin şu faktörlere kayda değer bir etkisi olmadığı da doğrulanmıştır: "Mağazanın toplam satış rakamları" ve "Müşterilerin mağazayı tekrar ziyaret etme ihtimali". Bu çalışmanın literatüre en büyük katkısı, farklı tematik arka plan müziklerinin mağazanın farklı reyonlarında kullanılmasının avantaj ve dezavantajlarını ortaya koyması olmuştur.

Anahtar Kelimeler: Tematik Arkaplan Müziği, Kitabevi, Müzik Bilgi Sistemi.

MUSIC INFORMATION SYSTEM FOR BOOKSTORES

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ABBREVIATIONS

A.	Agree
AC	Alternative Current
BIS	Business Information System
CD	Compact Disc
D.	Disagree
DC	Direct Current
DFD	Data Flow Diagram
DVD	Digital Versatile Disc
MP3	MPEG-1 Audio Layer 3
MPEG	Moving Picture Experts Group
N.	Neutral
PIR	Passive Infra-Red
S.A.	Strongly Agree
S.D.	Strongly Disagree
Sci-Fi	Science Fiction
SD Card	Secure Digital Card
USB	Universal Serial Bus
Wi-Fi	Wireless Fidelity

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INTRODUCTION

Effective usage of background music establishes several benefits for different kinds of stores. Among these different kinds, bookstores come to the forefront because music and literature are both branches of art and this association increases the importance of music for the bookstores. The purpose of this study is: "Use "Music information system" to increase efficiency of background music in a bookstore to establish a competitive advantage for them." To survive on the market against competitors, all companies require some competitive advantages. This study might help to meet this requirement of the bookstores.

Previous studies show us that background music has a significant effect on customers' behaviors. Allan (2008), made some conclusions about previous studies which work on effects of background music. In light of the studies, main factors which are affected by background music are listed as: "Mood", "Pleasure and arousal", "Salesperson perception and affiliation", "Store perception"," Time waiting", "Time spent", "Willingness to buy", "Money spent". Background music usually increases the total time spent in a shop by customers and their satisfaction which leads to increase in total sales for the store if it is chosen wisely according to concept. On the other hand, if background music makes the customers uncomfortable, it may affect their buying intentions negatively. Both these deductions show us that the background music should be chosen wisely. A music information system which controls background music inside of the store perfectly can solve this problem for these stores.

Depending on many variables (like location, concept, type, etc.) success criteria of the background music also changes. A shop that sells historical stuff can affect customers with historical music while a shop that sells technological stuff can be successful on that with more modern sounds. But for standard bookstores there is no obvious choice like that because those kinds of stores usually sell too many different varieties of books by dividing their shops in many different departments. For that kind of stores, the most successful background music can be different for each different department.

To handle this problem, “Music Information System” aims to play different background music in different departments of the bookstore and maximize the benefits of the background music in all departments. If one customer comes to buy a romantic novel, background music that supports the novel’s romantic mood can be more successful on affecting the customer’s perception. But if another customer comes to buy comics, soundtracks from a superhero franchise as background music can be more effective. The purpose of this study is to meet expectations of all those different buyers with one system.

Playing different background music in different departments can also constitute a dynamic ambiance in bookstore and increase; customer’s buying intention, shopping time and pleasure. Even a random individual that visits the bookstore may want to check different parts of the shop because of curiosity or good mood. This situation can help a bookstore to increase its profitability and popularity.

One of the most important limiting forces about the design of “Music information system” is that all shops are unique to each other and have a different environment. As a result, proper system designs are going to be different for each bookstore which means extra costs and labor forces for each shop. The main departments, where “Music information system” gives service, may be required to be relocated to be able to use this system because there is a possibility that the background music of one department can mix with another one. To prevent this problem, technical details of the system should be well-calculated for each different store which allows the system to control the background music reasonably.

In literature, there are various studies that show importance of the background music for the businesses and power of music that can affect individuals’ mood. Yalch and Spangenberg (1993) approved that playing the appropriate music in specific departments resulted in more purchases and more spending money from shoppers. This study also aims to use different music according to themes of each department. In light of this study, it can be said that music affects every customer’s feelings and associations in a unique and desired way at the same time because every individual and their requirements about background music are unique. This study differentiates from other studies by answering the requirements of all those individuals at the same time with the help of a business information system.

Meanwhile this thesis can be a leading study for other studies which aims to use “Music information system” in different kinds of stores.

In terms of method, mostly literature review and observations from past experience methods are used in this study. In order to prepare the theoretical part, literature reviews and observations; in design and field study parts, observations, interviews and questionnaires are used. Charts that are used to emphasize the results of the questionnaires are prepared on the website: https://www.meta-chart.com.

In the first part; music, its effects on businesses and previous studies about this subject are examined to understand the benefits and losses of background music for businesses. The main factors which are important for a business and affected by background music are defined as: “Mood of the customers“, “Satisfaction of customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Possibility to revisit of customer”. Also the study of Yalch and Spangenberg (1994), which indicates that playing appropriate thematic music in different departments also increase the benefits of music for the business, became a source of inspiration to implement the “Music Information System” for bookstores.

In the second part, departments which are essential for a bookstore are examined with the help of a search on local and universal online bookstores and a questionnaire was applied to local bookstores in İzmir, Turkey to confirm the results of this search. The main departments, where the “Music information system” should give service for, are defined with the help of these results. Opinions of the participants about the “Music Information System” and its effects on the main factors, which are defined in the first part, are also asked to be used in the following part.

In the third part, the possible effects of the system on the main factors that are defined in the first part and the further expectations from the system are examined. Results of the questionnaire that was applied in the previous part are used and the expected effects of the “Music Information System” on each factor are evaluated. The findings of this study are also compared with the findings of the previous studies in this part.

In the final part, the system is designed and installed to “Kırmızı Kedi Kitabevi”. Technical details and specifications of the system are explained with details in this part. System was tried in “Kırmızı Kedi Kitabevi” for one week and a questionnaire was applied to the customers who experienced the system to see the effects of the system on the factors that are mentioned in the previous parts. Interviews are also conducted with the managers of the bookstore to measure the success level of the system and effects of it on the main factors.

CHAPTER ONE
MUSIC AND ITS EFFECTS ON BUSINESSES

1.1. MUSIC

Music is used by humans in many different areas of life to meet their many different expectations for ages. The definition of music is made as such in Oxford dictionary: “Music is art of combining vocal or instrumental sounds (or both) to produce beauty of form, harmony, and expression of emotion.” (Oxford Dictionary, 2018). In Cambridge Dictionary, it is defined such as: “A pattern of sounds made by musical instruments, voices, or computers, or a combination of these, intended to give pleasure to people listening to it.” (Cambridge Dictionary, 2018). Collins Dictionary defines it like: “Music is the pattern of sounds produced by people singing or playing instruments.” (Collins Dictionary, 2018).

In light of all of these definitions, we can see the music as a tool which occurs by human interactions and influences people’s emotions. The power of this tool can be useful for several purposes because controlling emotions of people is a good way to control their actions. This situation also increases the importance of the music for businesses.

Businesses are using the power of the music for several purposes. Background music is used in shopping centers to influence customers’ mood, popular artists and songs of them are used in the advertisement of companies, a background music is added to the phone lines of the companies for the customers who wait for service, a background music is used according to feelings that is meant to be given in a movie and there are many other examples about usage of the music in the businesses. These examples show us the music is a very important tool for businesses. Proper usage of the music is also very important for businesses because using this important tool in a poor way may cause the business to be affected negatively.

1.1.1. History of Music

Humans are using music to influence others' feelings since the darkest eras of their history. Burnley (1789) gives information about the music of ancients. "It does not appear from history that the Egyptians, Phoenicians, Hebrews, or any ancient people, who cultivated the arts, except the Greeks and Romans, had musical characters; and there had no other symbols of sound than the letters of their alphabet, which likewise served them for arithmetical numbers and chronological dates. As the notation of the Greeks was imagined in the infancy of the art of music, when the flute had but few holes, and the lyre but few firings, the simplicity of expressing the octave of any sound by the same sign, as in modern music, was not thought of; the most ancient and constant boundary of musical tones having been the Diatessaron, or fourth, the extremes of which interval were fixed, though the intermediate founds were mutable: and in the manner of tuning these consisted the difference of intervals in the several genera. The Greek scale, in the time of Aristoxenus, the oldest writer upon music, whose works are come down to us, extended to two octaves, and was called "Systema perfectum", "Maximum immutatum"; the great, the perfect, the immutable system; because its extremities formed a perfect consonance, including all the simple, double, direct, and inverted concords, with all the particular systems; and it was the opinion of the ancients that double octave, was the greatest interval which could be received in melody." (Burnley, 1789). The Diatessaron, which means "Harmony of Four", is an early Christian text written by the apologist and ascetic Tatian who combined the four canonical gospels into a single harmonious narrative (New World Encyclopedia, 2017). The study of Burnley (1789) shows the usage and importance of the first signs of music for humans in the ancient eras.

Sherrane's study (2018) demonstrates that the development of music from middle ages to twentieth century. In the middle ages during the time of Pope Gregory I, the music which was approved as music of the Church and known as "Gregorian Chant" is appeared. Much later a new kind of music, which was called "Organum", was found at the University at Notre Dame in Paris. The first great name in music, Guillaume de Machaut, also appeared in these ages. Machaut was the first composer in western music history who seemed to be aware of his artistic achievements.

During the Renaissance (1420-1600), with the rise of humanism, sacred music broke free of the confines of the Church and a school of composers trained in the Netherlands who mastered the art of polyphony. Josquin des Prez was one of the masters of the Flemish style. In the late Renaissance, English madrigals were composed by such masters as John Dowland, William Byrd, and Thomas Morley in England.

In the Baroque period (1600-1750) composers started to rebel against the styles that were common during the Renaissance. Many monarchs employed composers at their courts, where they were little more than servants. The greatest composer of this period, Johann Sebastian Bach, was also such a servant.

From 1750 to 1820; musicians moved away from the fancy styles of the Baroque and the Rococo, and instead chose a clean style. In those ages the aristocracies were replacing monarchs and the church was still the center of arts and graceful music.

In the late eighteenth-century, composers of the period started to add a new emotional depth to the classical style. The musicians intended to show their subjective emotions in their tunes. The name “Romanticism” is derived from the romances of the medieval times and artists of those ages called as romantic artists .

In the twentieth century, many composers experimented in new ways with traditional instruments (such as the “prepared piano” used by American composer John Cage). In addition to new styles of musical trends, many composers, whose harmonic and melodic styles are still enjoyed by many listeners, appeared in the twentieth-century. The study of Sherrane (2018) summarized the known history of the music until the middle ages to the twentieth century. It is seen that music experienced many reforms by the ages but the only thing, that didn’t change, is the interest of people to the music since the darkest times of history.

In the modern 21th century, all different music genres (like “Jazz”, “Rock”, “Blues”, “Country”, “Hip-Hop”, “Pop” , “Electronic”, etc.) earned big audiences from many different crowds of people. The music compositions are differentiated from each other according to their characteristics and constitute these genres and internet became a popular tool to meet all these different requirements of the people about music genres. Spreading music as a digital media became more popular and

music tracks are easily saved like that in memories of the computers, CDs (Compact Disc) and DVDs (Digital Versatile Disc).

Nowadays it becomes popular to use “Cloud computing” to access any music data instead of using physical memories. In the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive (Griffith, 2006). Many web sites and online radios that use this technology start to give music services via internet like: “Spotify”, “Pandora”, “Youtube”, etc. The increasing popularity of the new technologies like “Cloud computing” created new branches of the industry and increased the importance to use these new technologies for businesses.

1.1.2. Basis Elements of Music

There are different characteristics which define kinds of music. Music may be soft or loud, slow or fast, and regular or irregular in tempo. All of these differences depend on some parameters which are defined as: “Beat and Meter”, “Dynamics”, “Harmony”, “Melody”, “Pitch”, “Rhythm”, “Tempo”, “Texture” and “Timbre” in the research of Estrealla (Estrella, 2018).

- A beat can be defined as rhythmic pattern of the music which can be regular or irregular. Notes accommodate themselves according to this rhythmic pattern. Meters are the rhythmic patterns which are produced by grouping together beats. In a measure there can be two beats which make a meter duple or four beats which makes a meter quadruple, etc.
- Dynamics are the symbols which specify the intensity of a note or a passage that should be played in a musical composition. The volume of a performance depends on this element and can be changeable according to its usage. In compositions, dynamics are indicated by abbreviations or symbols that signify the intensity at which a note or passage should be played or sung.
- Harmony is a combination of two or more notes or chords that are played at the same time. Depending on the notes played together, harmonic chords may drive people’s emotions in different ways and can be defined like minor,

major, augmented or diminished. Harmony supports melody and gives texture to it.

- Pitch is the sound that is dependent on frequency of vibration and the size of the vibrating object. Higher pitch requires the faster vibration and the smaller vibrating object meanwhile the slower pitch requires the slower vibration and the bigger vibrating object. For example, the pitch of a double bass is lower than that of the violin because the double bass has longer strings.
- Tempo can be simply defined as the speed of a piece of a music that is played. Italian words are commonly used to define tempo levels such as "largo" for slow, "moderato" for moderate speed and "presto" for a very fast one. Tempo can also be used to indicate emphasis.
- Rhythm can be called as the placement of notes in a music piece signifying beats in music. It depends and can be shaped by other elements like tempo, beat and meter. While tempo means the speed of a piece of music, rhythm defines its beat.
- Texture defines the number and types of the layers that are used in a music piece. A texture can be "monophonic" which refers to a single melodic line. It can also be "polyphonic" which refers two or more melodic lines or "homophonic" when the main melody is accompanied by chords.
- Timbre refers to the quality of a sound that differentiates one voice or instrument from another one. It can range from "dull to lush" or "dark to bright" depending on different techniques. Timbre is also known as tone color.

The main characteristics of music are given like that in study of Estrella (2018). In the "Effects of Background Music on Businesses" part effects, of changing some of the characteristics of the background music on the customers, are examined. According to the previous studies that are mentioned in that part the most common characteristics of music, which have effects on background music when they are changed, are "Tempo" and "Beat".

1.1.3. Music and Humans

The effects of music on the human brain are explained in the study of Blood and Zatorre (2001) as: “Cerebral blood flow changes were measured in response to subject-selected music that elicited the highly pleasurable experience of ‘‘shivers-down-the-spine’’ or ‘‘chills.’’ Subjective reports of chills were accompanied by changes in heart rate, electromyogram, and respiration. As intensity of these chills increased, cerebral blood flow increases and decreases were observed in brain regions thought to be involved in reward/motivation, emotion, and arousal, including ventral striatum, midbrain, amygdala, orbitofrontal cortex, and ventral medial prefrontal cortex.

These brain structures are known to be active in response to other euphoria inducing stimuli, such as food, sex, and drugs of abuse. This finding links music with biologically relevant, survival-related stimuli via their common recruitment of brain circuitry involved in pleasure and reward.” (Blood and Zatorre, 2001).

Study of Blood and Zatorre (2001) shows that human brain responds to music in the same way as other physical reactions such as food, sex and drugs do. In light of this study, it can be said that power of music may be used to influence mood and decisions of the people in a desired way. Thus it’s important to use music in a proper way in industries where relations with customers are important.

1.2. EFFECTS OF MUSIC ON BUSINESSES

Businesses are general name of the organizations which are created to exchange goods or services for money or other goods. Every business make decisions in the direction of their “Vision” and “Mission” and go into action. In business dictionary, “Vision” is defined as: “An aspirational description of what an organization would like to achieve or accomplish in the mid-term or long-term future. It is intended to serve as a clear guide for choosing current and future courses of action. See also mission statement.” (Business Dictionary, 2018). In business dictionary, “Mission” defined as: “A written declaration of an organization's core purpose and focus that normally remains unchanged over time. Properly crafted

mission statements (1) serve as filters to separate what is important from what is not, (2) clearly state which markets will be served and how, and (3) communicate a sense of intended direction to the entire organization." (Business Dictionary, 2018).

The general purpose of the businesses is making profit with their actions. "Continuity of the profitability" and "Growth of the business" are also other important concerns of the businesses. There are many factors which affect the businesses to fulfill their goals. "Personnel relations and performance", "Customer relations and satisfaction" are some of these factors that affect the success of the businesses.

"Usage of Music", which may affect "Customer and personnel relations" of a business, also plays an important role for the businesses. Businesses use music to affect ambiance and perceive customers' intentions. For example the choice of the background music, is significantly important for many stores like bookstores and affecting them in a positive or a negative way. In this study, the main target is bookstores and proper background music usage for them so the previous studies are investigated to understand the effects of background music for bookstores and other kinds of stores.

1.2.1. Effects of Background Music on Businesses

Effects of background music have been investigated many times in previous studies. The study of Smith & Curnow (1966) shows us that increasing the loudness of background music results in less time spent in store but no difference in customer satisfaction or sales. Milliman (1982) focused on shopping centers with using fast tempo music, slow tempo music and no music at all. Slow tempo music resulted in a slower pace of in-store traffic and also higher volume of sales. Another study of Milliman (1986) was about restaurants. In this study, slow tempo music resulted in longer service time, longer customer time at table, less groups leaving before seated, more amount of food purchased, more amount of bar purchases and more estimated gross margin.

Study of Judy and Mark Alpert (1990) about greeting cards shows that variations in musical structure influences behavioral intentions towards the greeting

cards and “happy” music influences listener moods to become more positive than “sad” music. Yalch and Spangenberg (1988) approved that background music resulted in younger clothing store shoppers perceiving more time shopping. Another study of theirs (1990) show that clothing store shoppers preferred foreground to background music but moods and unplanned purchases were not affected. Yalch and Spangenberg (1993) also approved that playing the appropriate music in specific departments, results in more purchases and more spending money from customers. This study also approved that background music affects according to age but not gender. This study is especially encouraging to implement this system because this system aims to use different kinds of music in different departments.

Baker et al. (1992) used music as an ambient factor and approved that high ambient store environment with classical music provides a greater pleasure than low ambient store environment with top-40 music and also approved that there is a positive relation with consumers’ “pleasure” and “willingness to buy”. This relation shows that music affects “willingness to buy” indirectly. The study of Areni and Kim (1993) was about wine sales of a restaurant. It is approved that classical music affected customers to order more expensive wines but interestingly time spent at the store didn’t affect by music. Chebat et al. (1993) approved that music affects attention level, mood and time spent in a simulated bank environment. Dubé et al. (1995) shows that both music-induced pleasure and arousal have effect on consumers’ desire to affiliate with bank personnel. Dubé et al. (1997) also confirmed that when there is a wait for service, playing music will positively affect emotional evaluation of the service environment.

Donovan (1994) indicates: “Pleasure induced by store environments appears to be a strong cause of consumers spending extra time in the store and spending more money than intended”. Herrington (1996) tested some hypotheses according to previous studies in a shopping center. His study shows that the tempo of music doesn’t affect the total shopping time and the total amount of money spent by shoppers. Loud music also doesn’t affect the time and amount of money spent by shoppers. But he also approved that preference of background music can have a positive influence on the amount of money spent by shoppers. North and Hargreaves (1996) used different music sources which played different genre of music at the

same time in a university cafeteria and indicated a positive relationship between response to music and response to different aspects of listening environment. Another study of Yalch and Spangenberg (2000) focused on effects of familiar and unfamiliar music on shopping behaviors of customers. According to his study, shoppers reported that they were shopping longer when listening to familiar music but actually they shopped longer with unfamiliar music.

Baker et al. (2002) indicated that store music perceptions have a positive relationship with interpersonal service quality perceptions, merchandise quality perceptions and monetary price perceptions. Caldwell and Hibbert (2002) tested the relationship between music tempo and preference in a restaurant. The results show that the variables which are actual time spent in the restaurant, perceived time and money spent are significantly related to musical preference. The study also revealed that effects of music tempo are insignificant. Oakes (2003) revealed that there is a relationship between background music tempo and perceived duration of time. According to this study, slow-tempo music has a significant effect on positive affective response on short-wait and long-wait bands unlike the fast-tempo and no music conditions. Babin et al. (2004) found out that changes in music type and volume were related to respondent perceptions of appropriates which significantly effect: product quality, the perceived value of shopping experience and customer feelings. Study of Eroglu et al. (2005) was about effects of music tempo. This study shows that shopping experience is most favorable under the condition of slow music/high density and fast music/low density. Significant main effects of music tempo are also founded for behavioral responses.

The study of Allan (2008) examines previous studies about background music that used in shops. “Mood”, “Pleasure and arousal”, “Salesperson perception and affiliation”, “Store perception”, “Time waiting”, “Time spent”, “Willingness to buy” and “Money spent” are defined as the main factors that are affected by background music according to this study. Spangenberg et al. (2005) built a Christmas ambiance with Christmas scent and music in a store to understand the effects on customers. There was no significant effect of scent or music alone. But Christmas scent in the presence of Christmas music increased pleasure and intentions of the customers to visit the store and created a greater arousal while Christmas scent

with non-Christmas music had no effect. Garlin and Owen (2006) analyzed previous studies about background music to define common points and make a conclusion about it. Slower tempo, lower volume and familiar music led customers to stay longer in shop unlike the high volume, tempo and unfamiliar music which makes customers perceive time longer than normal. The authors also found that tempo has the greatest effect on arousal.

Vida et al. (2007) tested effects of music on shoppers' behaviors. It's found out that music valence indirectly affects shoppers' behaviors. Music valence has a positive influence on a shopper appraisal of the store offering which increases the shoppers' time spent in the store. The time spent in the store also increases the total money spent in the store according to this study. Furthermore, when music is chosen in conformity with the overall store image, the total time spent in the store is increased. The study of Liaw (2007) focused on the relationship of store music perceptions and customers' buying emotion. The influence of music was not significant between other factors in this study. Ferreire and Oliveira-Castro (2011) investigated the effect of high and low quality background music that is used in two different stores. Results of this study showed that high quality music increases cash flow and pleasure and decreases conversion rates. But high quality music did not affect the number of customers passing in front of the store. Morrison et al. (2011) experimentally tested the effects of background music and aroma scent on customers. Both background music and aroma significantly increased pleasure levels which led to positively influencing the time spent, money spent, satisfaction and shopping experience of the customers.

Andersson et al. (2012) investigated the influence of background music on consumer behaviors with a field study. The study had two parts. In the first part of the study, it is approved that music affected time and money spent by customers in the store. Behaviors of female and male customers were also different in different music conditions (music and no music). In the second part, effects of music tempo were investigated. Music tempo affected general approach/avoidance behavior and enjoyment with purchase experience but didn't affect time and money spent in the store and gender of customers played a moderating role according to this study. Gaygen (2013) reported with an experimental study that buying intentions is greater

and time spent is longer with no music condition than happy and sad music conditions. This study concluded that music sometimes may not be necessary for retailers.

Zeeshan's study (2013) reviewed and examined previous researches to reveal the influences of music on consumers' behavior. The study concluded that playing happy or liked music can increase shopping in the store. Petruzzellis et al (2014) investigated effects of famous or non-famous music. According to this study, while famous music increases arousal, non-famous music increases pleasure. Under famous music conditions, customers were distracted by the music they recognized and it reduced shoppers' cognitive activity. Meanwhile under the non-famous music condition, customers were more relaxed and concentrated on their tasks about shopping. On the other hand famous music enhances positive feelings in customers. Hussain and Ali (2015) investigated effects of atmosphere including music on the customers' purchase intentions in international retail chain outlets of Karachi, Pakistan. In this study music showed an insignificant impact on the consumer purchase intention.

As a consequence, it is seen that the background music has significant effects on important factors for many different kinds of businesses. The previous studies focus on increasing the efficiency of the background music with different methods. Some of these studies change some of the characteristics of the background music (mostly "Tempo") and test all different conditions. Some of them try different genres of the music as background music and test efficiencies of them. Allan (2008) investigated these previous studies about the effects of background music and listed the main factors which are affected by background music as: Mood, pleasure and arousal, salesperson perception and affiliation, store perception, time waiting, time spent by customer, willingness to buy and money spent by customers. Results of all studies are different from each other but usually the factors, that background music affects, can be listed such as Allan's study.

Study of Yalch and Spangenberg (1993) approved that playing the appropriate music in specific departments resulted in more purchases and more spending money from shoppers. This study gives encouragement to implement a system which plays different background music in different departments of a

bookstore. Thus, the main function of the “Music Information System”, which is desired to be implemented in this study, is to play different background music in different departments according to their themes. Songs with same themes might have different music characteristics but it is not a concern of this study. The main focus is to divide the songs according to their themes even if they have different musical characteristics.

In light of these previous studies and consideration of them according to bookstores, main factors that have a significant importance for the bookstores are defined as: “Mood of the customers“, “Satisfaction of customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Probability to revisit of the customers”. It can be said that affecting these factors in a positive way will provide a significant advantage for a bookstore. In this study, success level of the “Music Information System” will be evaluated according to its effects of it on these factors.

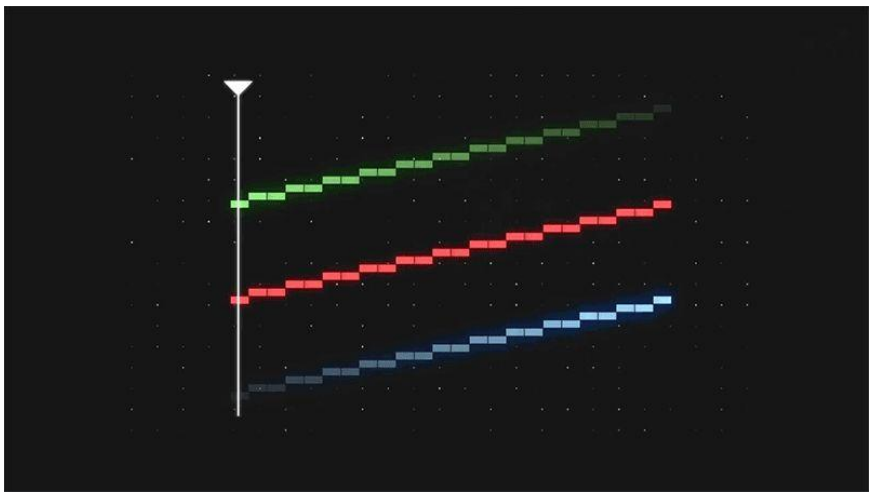
1.2.2. Further Effects of Music for Businesses

Nowadays, music is used to influence perceptions and decisions of people. In cinema industry, directors started to work with their own composers to control audience’s feelings suitable to different moments of a movie because effective usage of music became one of the most important success criteria for movies to give the intended emotion to the audience. If the background music is not used in a proper way in a movie, it’s very hard to trigger the desired emotions of the people. For example, if a music tune which triggers cheerful emotions is chosen for the stressful moments of a thriller movie, it will be almost impossible to give the desired scary feeling and the movie will be unsuccessful in taking the audience from real world to the movie.

One of the most outstanding movie directors of the new age “Christopher Nolan” declared that the composer “Hans Zimmer”, whom he worked together for many of his movies, used “Shepard Tune”, in his movies named “Dunkirk” “Interstellar” and “Inception”, not to decrease tempo of the movie even a moment.

“Shepard Tune” can be explained as: “The tone is a sound that comprises multiple sine waves separated by an octave and layered on top of each other (See Figure-1).

Figure 1: The Shepard Tone



Source: Lewis Mcgregor, 2017

In essence, there is a high-pitched tone, a middle-pitched tone, and a low-pitched tone that all rise in pitch until they loop back to the start. By the end of the track, the highest-pitched tone has become quiet, the middle-pitched tone stays loud, and the low-pitched tone has become louder. Because you can always hear two tones rising in pitch, your brain skips the loop and believes the tone is infinitely ascending.”. This cooperation of Christopher Nolan and Hans Zimmer helps us to understand the importance of music for this industry. Usage of the Sheppard tune can be also useful as background music in some departments of a bookstore.

Similar to the cinema industry, people use music in many different branches to reach their business objectives. For example companies that hold people on a phone line or a waiting band usually choose calm and slow tempo music because perception of the people about the waiting time is less than normal under the effects of slow tempo music. Oakes revealed that slow-tempo music has a significant effect on positive affective response on short-wait and long-wait bands unlike the fast-tempo and no music conditions.

Music is usually used in the advertisements to be reminded by the customers. Study of Morris and Boone (1998) appears that music can have a significant effect

particularly on emotional response, but also on attitude and purchase intent, depending on the advertisement. And this effect can be positive or negative, even with high fit scores between the advertisement and music. This demonstrates how sensitive and careful advertisers must be when pairing music and advertisements. Study of the Morris and Boone (1998) approve that the music choice is an important factor for the advertisements. If the music is chosen properly according to topic of the advertisements, effects will be positive. Otherwise music affects the success of the advertisement in a negative way.

Efficiency of music is also important for shopping industry. The study of Allan (2008) summarizes previous studies about background music of shops. Findings of this study indicates that background music can affect these factors: "Mood", "Pleasure and arousal", "Salesperson perception and affiliation", "Store perception", "Time waiting", "Time spent", "Willingness to buy" and "Money spent". These factors have vital importance for all businesses. The affection of music on these factors increases its importance in a significant way for the shopping industry.

There are also studies which suggest using music in the farming industry. According to study of O'Brien (2004), in the 2001 University of Leicester study reported that songs like "Everybody Hurts" by REM and Simon & Garfunkel's "Bridge over Troubled Water" soothed cows enough to produce the most milk, while such Y2K Euro club classics like Mousse T vs. Hot N Juicy's "Horny" failed to produce such positive results. From a practical standpoint, perhaps the use of music in the milking parlor is just an easy way to drown out mechanical noise and provide the animals with a consistent environmental element. "Music is a calming sound to the cows," says Spadgenske, the Minnesota dairy farmer and adds: "They get used to that. If they're calm and content, then obviously milk production is going to be better. There are different ways you can reach that, and I think that music happens to be one of those ways." Study of O'Brien shows that music can even influence mood of animals. It is easy to say if music even affects the mood of animals, effects of it on humans must be more significant.

Music affects people's emotions so even behaviours of people can be controlled by background music. The study of North et al. (2004) shows that

background music can be used to affect people's helping behaviour. In a university gym, uplifting and annoying music are played as background music. When people complete their workout, they are asked to sign a petition and responses of people are taken as a result. This findings show that the background music did influence the incidence of helping behaviour of people.

These examples demonstrate the importance of the music for many different businesses. There are also many not mentioned businesses where music holds an important place so the examples can be increased. The gist that can be obtained from these examples is that a proper usage of the music may create big advantages for many different businesses but it may also have negative effects when the music choices are made in a wrong way.

CHAPTER TWO
BOOKSTORES

Nowadays there are different kinds of bookstores which meet requirements of different customers. Some bookstores focus on selling a specific category of books such as bookstores which only sell educational books. These kinds of bookstores meet requirements of a specific target audience. There are also some bookstores which aim to sell books with many different categories to meet requirements of a larger scale of people. In this study, target bookstores are the ones which aim to sell books with many different categories to make it possible to use "Music Information System" to play different thematic background music according to theme of the different categories. That kind of bookstores is called as standard bookstores in this study.

The essential categories of a standard bookstore are defined in this part to designate the themes which "Music Information System" should focus on. First of all, local and universal online bookstores and their categorization of books are analyzed to find out the most common essential book categories that are used by the most popular stores. Then, mutual categories are defined which are used by various stores to reveal an effective categorization for a bookstore according to this search.

This categorization is also used in a questionnaire and opinions of local bookstore directors are asked about these categories. Results of the questionnaire are used to designate the essential categories for the local bookstores and the categories that can be evaluated as a sub-category. Categories are pointed according to results of this questionnaire.

2.1. DEPARTMENTS OF ONLINE BOOKSTORES

All bookstores have different characteristics which are bounded to many internal and external factors like size, location and concept of the store. These differences are also affecting their categorization. On the other hand online stores have minimum physical limitations because all stores use the same standard web page which gives them the same freedom for many attributes including

categorization. That's why the categorization of the online bookstores is not affected by physical boundaries. Internet also makes it easy to reach people from different location, cultures, and ages. This fact forces online stores to meet requirements of a larger scale of people. This is another reason that makes it a necessity to define the categories of the online bookstores more carefully and answer the requirement of the majority of people. Thus it's easier to define essential categories in the online bookstores so a search is made on online bookstores.. The examined bookstores can be seen in Table-1.

Table 1: List of Examined Bookstores and Website Links

Online Bookstores	**Global/Local**	**Website**
D&R	Local	**www.dr.com.tr**
İdefix	Local	**www.idefix.com**
BKM Kitap	Local	**www.bkmkitap.com**
İnkilap Kitabevi	Local	**www.inkilap.com**
Pandora Kitabevi	Local	**www.pandora.com.tr**
Nobel Kitap	Local	**www.nobelkitap.com**
Hepsiburada Kitap	Local	**www.hepsiburada.com**
Babil Kitabevi	Local	**www.babil.com**
Arkadaş Kitabevi	Local	**www.arkadas.com.tr**
Kitapyurdu	Local	**www.kitapyurdu.com**
İmge Kitabevi	Local	**www.imge.com.tr**
Powell's City of Books	Global	**www.powells.com/**
Book Depository	Global	**www.bookdepository.com**
Barnes & Noble	Global	**www.barnesandnoble.com**
Amazon/Books	Global	**www.amazon.com**
E-Bay/Books	Global	**www.ebay.com**
Thrift Books	Global	**www.thriftbooks.com**
Alibris	Global	**www.alibris.com**
Abe Books	Global	**www.abebooks.com**
Books a Million	Global	**www.booksamillion.com**
Better World Books	Global	**www.betterworldbooks.com**

2.1.1. Departments of Local Online Bookstores

Turkish online bookstores are examined in this part. The first application of the “Music Information System” is planned to be tried in İzmir, Turkey so the categorizations of Turkish bookstores are significantly important for this study. Eleven different popular online bookstores, whose main categories are taken as samples, can be listed as: “D&R”, “İdefix”, “BKM Kitap”, “İnkilap Kitabevi”, “Pandora Kitabevi”, “Nobel Kitap”, “Hepsiburada Kitap”, “Babil Kitabevi”, “Arkadaş Kitabevi”, “Kitapyurdu” and “İmge Kitabevi”. Choices of the bookstores are made according to popularity of the bookstores with the help of “Google search engine” at 07 February 2018. Website links of these bookstores are given at Table-1. The categories are arranged according to their commonality in stores. Their commonalities also show their essentiality. Therefore, the most common categories are planned to be found out.

Table 2: Most Frequent Categories in Online Bookstores

Categories	**Global Score**	**Local Score**
History	1	1
Science & Technology	1	0,727
Art & Design	0,9	0,909
Children's	0,9	0,818
Economics & Business	0,9	0,727
Travel	0,9	0,727
Cooking	0,9	≤ 0.7
Education	0,8	0,909
Health & Fitness	0,8	≤ 0.7
Religion & Mythologies	0,8	0,909
Home & Garden	0,8	≤ 0.7
Sports	0,8	≤ 0.7
Social Sciences	0,8	≤ 0.7
Literature	0,7	0,909
Hobbies & Crafting	≤ 0,7	0,909

Every category is scored according to their frequency of presence in the stores. Their scores are calculated by dividing the total number of shops which have related category to total number of shops. Thus, the maximum possible score that a category may get is “1”. The categories that have a score above “0,7” are important and worth to be examined for this study. “0,7” is a breaking point for this study because below this number, number of categories are exponentially increasing and being specific which is beyond our purpose. Some categories like “Psychology”, “Computer” and “Health” dropped behind “0.7” which is below our defined breaking point. The categories with a score above 0,7 can be seen in Table-2.

“History” and “Philosophy” get the highest possible point which is “1”. This result is expected for “History” but “Philosophy” receives surprisingly high point when it is compared with the global results. “Literature” category is also higher than global results. Other categories took more or less similar scores in global and local conditions.

2.1.2. Departments of Universal Online Bookstores

In this part, universal online bookstores are examined. Ten different online bookstores, whose main categories are taken as samples, can be listed as: “Powell’s City of Books”, “Book Depository”, “Barnes & Noble”, “Amazon/Books”, “E-Bay/Books”, “Thrift Books”, “Alibris”, “Abe Books”, “Books a Million” and “Better World Books”. Choices of the bookstores are made according to popularity of the bookstores with the help of “Google search engine” at 07 February 2018. Website links of these bookstores are given at Table-1. The categories are arranged according to their commonality in stores like the local online bookstores’ study. Again, the most common categories between these online bookstores are defined. Scores of the categories are defined with the same method that is used for local online bookstores. The results can be seen in Table-2.

“History” and “Science” get the highest possible point. “History” is the category with the maximum point also in the local results (See Table-2). “Science”, which gets 0.727 in local results, is significantly higher in the global results.

“Economics & Business” and “Travel” get also higher point than the local results. “Cooking”, “Health & Fitness”, “Home & Garden”, “Sports”, “Social Sciences”, “Fiction”, “Comics” and “Romance” categories are beyond our breaking point “0.7” in global results. These categories take a score below “0.7” in local results and created a significant difference between both results. Other categories take similar points with the local results.

2.1.3. Comparison of Departments of Online Bookstores

The examinations of local and universal bookstores show that preferred categorizations may show differences according to location. It is observed that there are very popular categories in local online bookstores which are not counted as a main category in universal stores and vice versa. There are also some categories which acquired a high score in study of both local and universal bookstores. It can be said that the importance of these categories is not dependent on location as much as others. So these categories should be examined more intently in further parts of this study.

“History” took “1” as a score in both conditions. According to this examination it is the most significant essential category. “Art & Design” took “0,9” or above in both conditions which showed that the importance of this category is also irrelevant with location. “Children’s”, “Education”, “Science”, “Economics & Business”, “Religion & Mythologies”, “Hobbies & Crafting” and “Travel” categories also came to the forefront in both conditions with a score of “0,7” or above in both conditions.

This examination provides some insights but it doesn’t mean these results represent certain rights to follow for further parts of the study. As it can be seen, the importance of categories is depended on location and many other variables which make all bookstores unique to each other. So the design of an efficient “Music information system” may show differences according to dynamics of each store. Target bookstores should be examined properly and some possible appropriate changes should be made for departments before the design part.

2.2. FIELD STUDY

Categorizations of departments of local and international online bookstores have some differences according to this study. So a questionnaire was applied to understand the perspective of local bookstores in İzmir. The categories were asked to the participants to understand the order of importance.

2.2.1. Characteristics of the Bookstores

The questionnaire had been applied between 09 February 2018 and 03 March 2018 to the personnel of twenty-five prominent bookstores that are chosen to be participated. Unfortunately five of them didn't attend. Corporate positions of the attended personnel (preferably managers) can be seen in Figure-2. Participation of the managers is important for this study because the decision making about the usage of the "Music Information System" can be made by managers. Sometimes people rejected to fill the questionnaire because of various reasons. Lack of time and corporate procedures that concern managers were primary difficulties which were faced and the participants were usually managers. But usually even managers spent time to fill the questionnaire.

Figure 2: Corporate Positions of the Participants

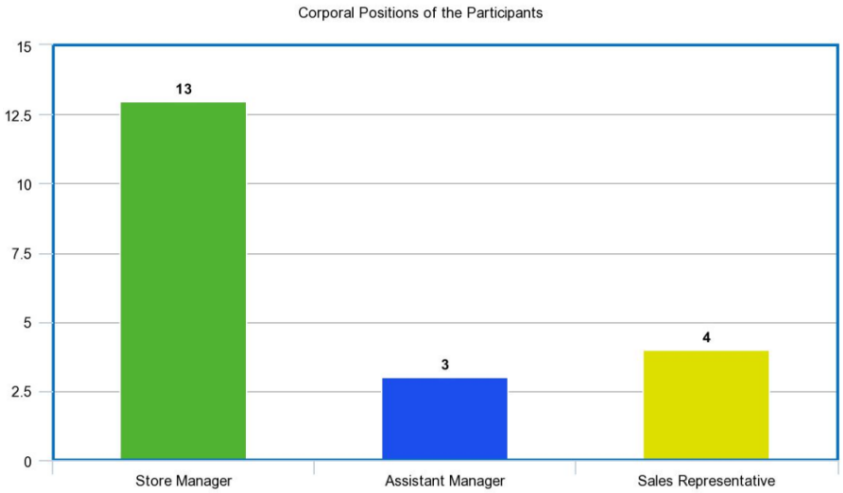
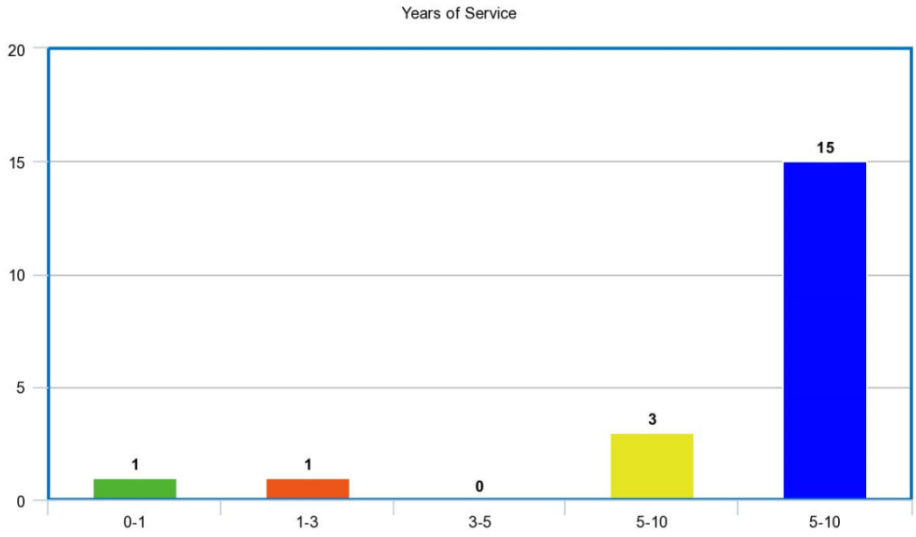


Figure 3: Years of Service of the Participant Bookstores



Years of service of the stores can be seen in Figure-3. Significant part of the participants work in a store which is providing service more than 10 years. Surviving in this market for 10 years is not easy and these companies can be evaluated as successful. So attendance of bookstore personnel with more years of service increases the importance of the questionnaire for this study.

2.2.2. Questionnaire Results about Categorization of Departments

The essentialities of categories, which are the most used in local and universal online bookstores, are questioned to understand which of them are more important for these stores. So the categories that should be focused could be designated more clearly. The results of the questionnaire can be seen in Table-3. “History”, “Literature”, “Art & Design” and “Children’s” categories are significantly agreed by participants to be essential category. Other categories are also mostly supported. Only “Philosophy” and “Hobbies & Crafting” category aren’t supported as much as others.

As a consideration of these results, categories are scored according to data that is obtained by the questionnaire. Total votes for each choice are given in Table-5. These numbers are multiplied with different factors according to their influences. (“5” for strongly agree, “4” for agree, “0” for neutral, “-4” for disagree and “-5” for

strongly disagree). Then those numbers are divided to “100”, which is the maximum score that can be obtained with “20” strongly agree votes from “20” bookstores, on the purpose of determining a score for each category. The possible maximum score is “1” according to this calculation. The final scores of the categories can be also seen in Table-3.

Table 3: Essential Categories for a Bookstore

Categories	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Final Score**
History	17	2	1	0	0	0,93
Literature	18	2	0	0	0	0,94
Art & Design	18	2	0	0	0	0,94
Science & Technology	15	2	3	0	0	0,83
Religion & Mythologies	15	2	1	1	1	0,74
Education	16	1	3	0	0	0,84
Children's	19	1	0	0	0	0,99
Hobbies & Crafting	11	5	3	1	0	0,71
Philosophy	9	6	3	2	0	0,61
Economics & Business	13	5	1	1	0	0,81
Travel	15	3	2	0	0	0,87
Entertainment	13	5	2	0	0	0,85
Others	Poems:1					

This study provides some information about importance of the categories for local and universal online bookstores and traditional bookstores located in İzmir, Turkey. The final scores of the categories show the importance of each category for “Music information system”. Most of the categories took a point above “0.8”. This situation shows that the search that is made on online bookstores reached accurate

results according to participants of the questionnaire. The results are evaluated below:

- Three categories got a score below “0.8” which are “Philosophy” with a score of “0.61” and “Religion & Mythologies” with a score of “0.74” and “Hobbies & Crafting” with a score of “0.71”. Essentialities of these three categories are a little lower comparing to the other categories according to results of the questionnaire.
- Five categories took a score between “0.8” and “0.9” These categories can be listed as: “Science & Technology” with a score of “0.83”, “Education” with a score of “0.84”, “Economics & Business” with a score of “0.81”, “Travel” with a score of “0.87” and “Entertainment” with a score of “0.85”. This situation shows us the local bookstores, which are located in İzmir, Turkey, mostly come to a common ground about the essentiality of these categories.
- Four categories got an even bigger score than “0.9” which can be listed as: “Children’s” with a score of “0.99”, “Literature” with a score of “0.94”, “Art & Design” with a score of “0.94”, and “History” with a score of “0.93”. This situation shows that these categories are further more important than others and the “Music Information System” must give service for these departments.
- As an addition, one participant decided to offer one other category that is not given on the checklist which is “Poems”.

As a final conclusion, it can be said that while the system is being designed, this field study should be taken into consideration and the focus should be on the categories with a higher score. ”Music information system” must give service for four categories that get points above “0.9” because the results indicate that these are the most essential categories for a standard bookstore. Relocation of the books should be made if the books which belong to these departments are located in other departments before the “Music Information System” is installed because the main purpose of this system is to play different thematic background music according to theme of the department. If contents belong to different departments are mixed between themselves, system is not going to be able to reach its goal.

Except of these four categories, the other categories can be also chosen to give service in light of these results. Physical characteristics of the bookstores play an important role on this choice. It shouldn’t be forgotten that each bookstore is unique and different designs may meet their requirements in a better way because all bookstores have different characteristics like size, location or franchise agreements. So if size of the bookstore is big enough, different background music can be played in seven or eight different departments. If size of the bookstore isn’t big enough, playing different background music in four main departments may be enough for this bookstore. Therefore, the other categories, which also took high scores, may be considered to give service according to findings of this part of the study.

CHAPTER THREE
MUSIC INFORMATION SYSTEM AND THE MAIN FACTORS

In today's challenging business world, usage of technology leads up to a serious competitive advantage against companies that don't use them. Information technologies may decrease required labor force for a job, prevent possible errors which may occur because of human intervention, ease the job and create a competitive advantage with a specific solution, etc. In this study, a system is designed to use background music in a more efficient way and named as "Music Information System". The main purpose of the "Music Information System" is "Using different thematic music in every different department to maximize efficiency of music in a bookstore".

Previous studies were investigated in the first part of the study to define the important factors for stores that are affected by background music. These factors which are defined as main factors, can be listed as: "Mood of the customers", "Satisfaction of the customers", "Total time spent by customers", "Performance of salespeople", "Total sales of the bookstore" and "Possibility to revisit of customers". The success level of the system is defined by measuring the impacts of the system on these mentioned factors. This system plays suitable thematic music for different departments at the same time via interaction with customers and uses music in a more effective and dynamic way to enhance music and customer relations for a bookstore.

3.1. EFFECTS OF MUSIC INFORMATION SYSTEM ON MAIN FACTORS

A questionnaire, which was applied to the personnel (mostly managers) of the selected bookstores in the previous part, also have some questions about the possible effects of the "Music information system" on these main factors, which are defined in the first part. In light of the results of this questionnaire and the previous studies; the possible effects of the "Music Information System" on these factors are evaluated with details. The purpose of this questionnaire in this section is: "To

discover expectations of participants from “Music information system” on affecting the main factors which are important for stores”.

Twenty employees, from outstanding bookstores in İzmir, Turkey, participated in this questionnaire. The characteristics of the participants and bookstores are given with its details in the second part of the study. The system that controls the music within bookstores is explained to the participants before they start the questionnaire. The questionnaire includes six questions about effects of this new system to the mentioned factors and eight questions about their expectations and willing to use this system. Results can be seen at Table-4.

Table 4: Expected Effects of “Music Information System” to the Given Factors

Music Information System will affect positively:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Mood of customers	6	11	3	0	0
Satisfaction of customers	3	9	7	1	0
Total time spent by the customers	7	9	4	0	0
Performance of Salespeople	4	9	4	3	0
Total sales of the bookstore	3	6	9	2	0
Possibility to revisit of the customers	6	9	3	2	0

3.1.1. Mood of Customers

Using the background music in a proper way, may influence mood of the customers positively in a store according to the previous studies that are mentioned in the first part of this study. “Moods of the customers” is important to affect their perceptions about the store and their buying intention. Studies that go in the same direction with the idea: “There is a relation between background music and mood of customers.” can be listed as: (Alpert J, Alpert M, 1990), (Chebat et al, 1993), (Dubé et al, 1997), (North & Hargreaves, 1996), (Babin et al, 2004), (Garlin and Owen, 2006), (Petruzzellis, 2014), (Oakes, 2003). Study that goes in the same direction with

the opposite idea which is “There is no relation between background music and mood of customers.”: (Yalch and Spangenberg, 1990).

The expected effects of the “Music information system” to the “Mood of the Customers” were asked to the participants. The results can be seen on Table-4. Six of the participants strongly agreed and eleven of the participants agreed that “Music information system” will influence this factor in a positive way. There are no participants who disagreed or strongly disagreed but three of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is strongly supported by questionnaire results.

3.1.2. Satisfaction of Customers

Second factor that can be affected by background music is “Satisfaction of Customers” according to the previous studies that are examined in the first part of the study. “Satisfaction of customers” is important for the stores to increase possible future trades and popularity of the store between other people. Studies that go in the same direction with the idea: “There is a relation between background music and satisfaction of customers.” can be listed as: (Yalch and Spangenberg, 1990), (Baker, Levy and Grewal, 1992), (Dubé et al., 1995), (Baker et al., 2002), (Babin et al., 2004), (Eroglu et al., 2005), (Ferreire and Oliveira-Castro, 2011), (Morrison et al., 2011), (Petruzzellis, 2014). Study that goes in the same direction with the opposite idea: “There is no relation between background music and satisfaction of customers.” can be listed as: (Smith & Curnow, 1966).

The expected effects of the “Music information system” to the “Satisfaction of the Customers” were asked to the participants. The results can be seen on Table-4. Three of the participants strongly agreed and nine of the participants agreed that “Music information system” will influence this factor in a positive way. One of the participants disagreed, none of the participants strongly disagreed with this idea and also seven of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is supported by questionnaire results because more than half of participants are agreed or strongly

agreed with this idea but on the other hand a considerable amount of participants decided to stay neutral.

3.1.3. Total Time Spent by Customers

According to many previous studies that are mentioned in first part of this study, a proper usage of background music can increase “Total time spent by customers”. “Total time spent by customers” is important for stores because the more time spent in the store means a higher probability to sell something to a customer. Studies that go in the same direction with the idea: “There is a relation between background music and total time spent by customers.” can be listed as: (Smith & Curnow, 1966), (Milliman, 1982), (Yalch and Spangenberg, 1988), (Chebat et al., 1993), (Dubé et al., 1995), (Donovan, 1994), (Yalch & Spangenberg, 2000), (Caldwell & Hibbert, 2002), (Garlin and Owen, 2006), (Vida et al., 2007), (Morrison et al., 2011), (Andersson et al., 2012), (Gaygen, 2013). Studies that go in the same direction with the opposite idea: “There is no relation between background music and total time spent by customers.” can be listed as: (Areni and Kim, 1993), (Herrington, 1996).

The expected effects of the “Music information system” to the “Total Time Spent by Customers” were asked to the participants. The results can be seen on Table-4. Seven of the participants strongly agreed and nine of the participants agreed that “Music information system” will influence this factor in a positive way. None of the participants disagreed or strongly disagreed and four of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is strongly supported by questionnaire results.

3.1.4. Performance of Salespeople

“Performance of salespeople” also affect customer which makes it an important factor for the bookstores according to previous studies that are examined in the first part of the study. Studies that go in the same direction with the idea:

“There is a relation between background music and performance of salespeople.” can be listed as: (Dubé et al., 1995), (Baker et al., 2002).

The expected effects of the “Music information system” to the “Performance of salespeople” were asked to the participants. The results can be seen on Table-4. Four of the participants strongly agreed and nine of the participants agreed that “Music information system” will influence this factor in a positive way. Three of the participants disagreed, none of the participants strongly disagreed with this idea and also four of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is supported by questionnaire results because more than half of participants are agreed or strongly agreed with this idea but on the other hand some of the participants decided to stay neutral or disagreed with this idea.

3.1.5. Total Sales of the Bookstore

The effect of music on “Total sales of the bookstore” is a much-discussed situation according to the previous studies that are examined in the first part of the study. Approximately half of the studies support that there is a positive correlation with proper usage of music and total sales while the other half of them are supporting that there is no positive correlation. It usually depends on characteristics of environment and location of the store. Studies that go in same direction with the idea: “There is a relation between background music and total sales.” can be listed as: (Milliman, 1982), (Milliman, 1986), (Yalch and Spangenberg, 1993), (Areni and Kim, 1993), (Donovan, 1994), (Caldwell & Hibbert, 2002), (Vida et all, 2007), (Ferreire and Oliveira-Castro, 2011), (Morrison et al., 2011), (Andersson et al., 2012), (Gaygen, 2013), (Zeeshan, 2013). Studies that go in same direction with the opposite idea: “There is no relation between background music and total sales.” can be listed as: (Smith & Curnow, 1966), (Herrington, 1996), (Liaw, 2007), (Hussain and Ali, 2015).

The expected effects of the “Music information system” to the “Total sales of the bookstore” were asked to the participants. The results can be seen on Table-4. Three of the participants strongly agreed and six of the participants agreed that

“Music information system” will influence this factor in a positive way. Two of the participants disagreed, none of the participants strongly disagreed with this idea and also nine of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is not supported by the questionnaire results because more than half of participants are disagreed or decided to stay neutral about this idea. Anyways, almost half of the participants supported this idea which is the bright side of the results.

3.1.6. Possibility to Revisit of Customers

“Possibility to revisit of customers” also can be affected by the background music according to the previous findings of this study. The music information system may come interesting to customers because it’s not common thing for bookstores to use different background music in different departments. Thus it may increase customers’ intention to revisit the bookstore. Possibility to revisit of customers can be also evaluated as a result of customer satisfaction.

The expected effects of the “Music information system” to the “Possibility to revisit of customers” were asked to the participants. The results can be seen on Table-4. Six of the participants strongly agreed and nine of the participants agreed that “Music information system” will influence this factor in a positive way. Two of the participants disagreed and none of the participants strongly disagreed with this idea three of the participants decided to stay neutral about this subject. It can be said that expected effects of the “Music Information System” on this factor is supported by questionnaire results because just five of people disagreed or decided to stay neutral about this subject.

3.1.7. Review of the Results of the Questionnaire

Music and customer relations are examined by many previous studies for many different kinds of shops and they are mentioned in the first part of this study. According to findings of those studies, the most significant factors that may be affected by music are taken as main factors and a field study is conducted to discover

ideas of the local bookstores about the “Music information system” and its effect to these factors. This part of the study is made to obtain a foresight about the success of the “Music information system” with the help of these experienced participants.

The previous studies show that proper usage of the background music has a positive influence on these main factors except of “Total sales of a store”. The positive effect of proper music usage on total sales is supported by almost half of the previous studies while the opposite idea is supported by the other half. Expectations from the “Music information system” are also similar according to the field study. Most people think that this system will positively influence these factors excluding “Total sales of the bookstore”. About this factor, people are mostly neutral. So it can be said that the results of this field study usually go in the same direction with the previous studies.

3.2. FURTHER EXPECTATIONS

As an addition to the possible effects of the system to these main factors, some subjective opinions of participants about the system are also investigated (See Table-5). Answers of participants are generally encouraging and hopeful. According to these results, participants are usually supporting the conclusions about “Music information system”.

The first conclusion was questioned to understand participants’ opinion about different music genres and their evocations in the human mind. This conclusion shows that customer expectations about music in different departments can also be different. Eighteen of twenty participants agreed or strongly agreed that different music genres affect the human brain in a different way.

The second, fourth and fifth conclusions were questioned to understand participants’ ideas about success variations of different music genres in different departments. The fourth conclusion is the reverse of the second conclusion and the expectation from participants about it was to disagree with it. Fourteen of twenty participants agreed or strongly agreed with the second conclusion while nine of twenty participants strongly disagreed or disagreed with the forth conclusion and eight of them were neutral. The fifth conclusion was about the main function of the

"Music Information System" which plays different kinds of music in different departments. Fifteen of twenty participants agreed or strongly agreed with this idea. It can be said that the expectations are mostly supported.

Table 5: Further Possible Expectations from "Music Information Systems"

CONCLUSION	**S.A.**	**A.**	**N.**	**D.**	**S.D.**
1-Different music genres cause different evocations in human mind.	9	9	1	1	0
2-One music genre which is successful in one bookstore department may not be as successful in another department.	7	7	5	1	0
3- It will catch customers' attention if music starts at the moment when the customers come close.	6	3	8	3	0
4-One music genre which is successful in one bookstore department will also be successful in other departments.	0	3	8	8	1
5-Using different genres of music in different departments of a bookstore will catch customers' attention and effects of it will be positive.	5	10	3	1	1
6- Effects of using "Music Information System" in a bookstore will generally be positively.	4	9	4	2	1
7-Effects of using "Music Information System" will be positive for this bookstore.	4	5	7	3	1
8-"Music Information System" may also be successful in different kinds of stores.	4	12	3	1	0

The third conclusion was asked to understand participants' idea about the dynamic ambiance of music when it starts and stops with customer interaction. This conclusion shows that it is important to play and pause music according to customer arrival. Nine of twenty participants agreed or strongly agreed while eight of them decided to stay neutral.

The sixth conclusion was asked so to evaluate the system with its advantages and disadvantages. General ideas of the participants are usually positive. Thirteen of twenty participants agreed or strongly agreed that effects of “Music Information System” will be positive for a bookstore.

The seventh conclusion was asked so to understand the desire of participants to use “Music Information System” in their own bookstore. Nine of twenty participants think that effects will be positive while seven of them are neutral. The biggest reason of being negative or neutral about this question is the physical conditions of the bookstores. Some of them are not big enough and it is impossible to apply this system. Also some corporate bookstores aren’t able to choose music that is playing inside of the store and answer negatively because of that. Even still, almost half of the participants want to use the “Music information system” in their own bookstores.

The eighth conclusion was asked so to understand opinions of participants about success of the “Music Information System” in different kinds of stores. Results show that the system can also be useful for different kinds of stores like supermarkets. Sixteen of them agreed that the “Music Information System” will be successful in different kinds of stores which will also provide an insight for further studies.

Significantly most of the participants perceived that different music genres cause different evocations in the human mind. Most of the participants also responded that different music genres can be more successful in different departments of a bookstore and the effects of using “Music Information Systems” for a bookstore will generally be positive. Opinions varied when it is asked if this system is installed to their own bookstore. The main reason for this was the characteristics of the bookstores. If the bookstore is too small or it is a member of a franchise, participants usually decided to stay neutral about using this system in their own bookstores. Some participants were worried about the possible mess of the music which may confuse people if the bookstore is small.

As a final conclusion it can be said that “Music information system” which plays different thematic background music for each department has a good probability to influence the main factors positively which are important for a

bookstore. These results provide a foresight but they are not that much confidential because the system wasn’t seen in practice by any participants of the questionnaire. Thus, the music information system is decided to be implemented for a bookstore in İzmir, Turkey. “Kırmızı Kedi Kitabevi” is chosen as the first bookstore to install the system because allocation of departments and physical characteristics of the bookstore are suitable for design and installation.

CHAPTER FOUR
SYSTEM DESIGN AND IMPLEMENTATION

4.1. PURPOSE OF THE RESEARCH

Using appropriate music in proper departments is a way to increase its efficiency on customers. According to a study of Yalch and Spangenberg, the effects of s store's music may be altered by department and customer characteristics (Yalch and Spangenberg, 1993). The questionnaire results support that "One music genre which is successful in one bookstore department may not be as successful as in another department". So this new system design focuses on using different background music in different departments depending on consistence of music with the department.

Interactivity of customer with background music is also another concern of this system. The questionnaire results also partially supported that "It will catch customers' attention if music starts in that moment when customers come close". So the designed system starts playing music when a customer approaches to the related department and pauses if there is no customer around. When another customer approaches, the system resumes playing the rest of the playlist. The system plays a playlist in a loop which means it returns to the beginning whenever it ends.

Collecting statistics of the visited department aim to provide an insight to the bookstore owner. The popularity of departments can be gathered day by day and necessary precautions can be taken to increase visitation times for each department by customers. These statistics also give the idea about the success of the chosen music tracks. More successful tracks can be identified and music lists can be updated to increase benefits of the store's music.

As a conclusion, the main purpose of this research is "To increase efficiency and benefits of background music in a bookstore with the help of "Music information system". To accomplish this purpose the desired system uses different background music in different departments according to their relations. The system starts music whenever a customer approaches the related department and pauses when they move away to provide interactivity with customers. Statistics of the visited departments are

also saved in a central computer which allows the bookstore owner to monitor day by day the visiting popularity of the department.

4.2. SCOPE OF THE RESEARCH

The scope of this research consists of bookstores but this research can be also applied to other kinds of stores. Possible effects of this system are defined by analysis of previous studies and questionnaires that was applied to local bookstore personnel (usually managers). According to results, using different music in different departments of the bookstore can affect positively some factors such as: “Mood of the customers“, “Satisfaction of the customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Possibility to revisit of customers”. Participants also approved that the system can be successful in different kinds stores. Thus, the scope of the “Music information system” can be expanded with future researches. But the scope of current study is oriented toward the bookstores which give service in İzmir, Turkey, managers, other employees of these bookstores and the customers who will be affected by the system.

The system tries to answer all of these requirements of a bookstore without any user intervention. When default playlists are set, the system starts to play music according to the customer’s arrival to the related department and pauses whenever there is no customer around allowing the bookstore to use store music in a smart and interactive way. The questionnaire was applied to twenty different local bookstores to find out the expectations of the target audience from the system. Expectations were significantly positive about using appropriate music in different departments. People generally agreed that using this system will affect these mentioned factors in a positive way and also supported that using music in an interactive way is also important. It can be said that the opinions of the target audience were usually positive about the system.

4.3. TYPE OF THE RESEARCH

Type of this research is problem-oriented and exploratory. The main focus of this study is a specific problem which is being unaware of the power of background music on customers. Thus, “Using the background music in an inefficient way in store” makes this research problem-oriented.

To solve this specific problem, this study offers a solution with the help of previous studies and insight of quantitative data from questionnaires that were applied to local bookstores. With encouragement of the results, the system design becomes apparent. There were no guarantees for this system to solve this problem completely which makes this research exploratory.

To measure the system’s success level; usually quantitative research methods are used. A questionnaire about “Music Information System” is applied to customers who visit “Kırmızı Kedi Kitabevi” where the designed system is applied and an interview is made with the managers of that bookstore. In light of results, conclusions are made about the success of the system.

4.4. DATA COLLECTION METHOD

As a first step, observations of popular universal and local online bookstores were made to define main categories for a bookstore. Then, these observations were tested with a questionnaire which was applied to local bookstore employees with the help of 1-5 scale rating. Results are mostly in the same direction with observations. With the help of these results, it was possible to define the main departments that required to be focused to find appropriate thematic music.

With the same questionnaire, the possible effects of the “Music Information System” to the main factors were questioned, these are: “Mood of the customers“, “Satisfaction of the customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Possibility to revisit of customers”. 1-5 scale rating was used to measure the expectations of the participants from this system. Results were good enough to implement this system for a bookstore and test it.

After the design and installation of the system was made for the “Kırmızı Kedi Kitabevi”, a questionnaire was applied to customers who experienced the bookstore with the “Music Information System” design. Effects by the system on the mentioned factors were asked and conclusions were made according to these results. Most participants supported that it will be wise to use that kind of system to increase efficiency of background music for a bookstore. As an addition they usually agreed that this system can be also successful for a different kind of store like a supermarket.

An interview was also made with managers of “Kırmızı Kedi Kitabevi”. Effects of system to the mentioned factors and their satisfaction about the designed system were asked. In light of responses of the managers, conclusions were made about the effects of the system on these factors.

4.5. LIMITATIONS OF THE SYSTEM

The system design should be unique for each bookstore. Because physical characteristics like size, location, etc. of each store are unique. This means the design part should be done from beginning for each store according to their requirements. Even some of these physical characteristics may make it impossible to apply this system to that store. If a store is generally small and distances between different departments are short, different music tracks from different sources can be mixed and generate an unpleasant noise which may turn advantages of the system into disadvantages.

Corporate principles of bookstores are another limiting force for this system. Because some of the franchised bookstores have corporate principles like “no store music” or “same pre-defined music playlists for every store”. This situation takes away the authority of store managers to choose background music of the store and makes it impossible to implement “Music Information System” for that store.

Allocation of departments isn’t appropriate for the “music information system” in some stores. Reallocating departments properly according to requirements of the system may cost some time and labor force. Every part of the system that is used in appropriate department should be connected to a central computer with and

Universal serial bus (USB) cable to be able to monitor and record the arrival of customers. This requires long USB cables to be installed inside of store which may cause some disarrangement and visual pollution. Both “Music control devices” and speakers need to be powered up by 220 Volts Alternative Current (AC) so if there is no close plug socket, the power need to be delivered with a cable from distance which occurs same problems about disarrangement.

The solution to get rid of USB cables is to use wireless communication between devices and a main computer. But the wireless fidelity (Wi-Fi) modules that can be attached to the microcontroller use a serial port with 9600 baud rate to communicate. The music playing module that is used in the system also uses a serial port with the same baud rate and both of them do not work properly in a different baud rate which makes it impossible to use both of these modules at the same time. So it is not possible to use a Wi-Fi module in the system design.

4.6. SYSTEM DESIGN

All the work that is done thus far can be summarized in three parts. In the first part, previous studies were examined to understand the benefits and losses of background music for businesses when it is used in an efficient or inefficient way. The main factors which are important for a business and affected by the background music are defined as: “Mood of the customers“, “Satisfaction of customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Possibility to revisit of customers”. Also some previous studies like the study of Yalch and Spangenberg (1993) indicated that playing appropriate thematic music in different departments increase the benefits of music for the business (Yalch and Spangenberg, 1993). This situation was a source of inspiration to implement a system which uses different thematic music in different departments and helped to measure benefits of it on the mentioned factors that is important for a business.

In the second part, departments which are essential for a bookstore are examined with help of a study on local and universal online bookstores and a questionnaire was applied to local bookstores in the light of this examination to

confirm the results. The main departments that “Music information system” should give service were defined in this part.

In the third part, the possible effects of the “Music information system” on the defined factors, which are important for a bookstore and further expectations from the system, were measured. A questionnaire was applied to the local bookstore managers and questions were asked to obtain a foresight about the system. Results were evaluated for each factor which was mostly positive enough to implement and try this system at a bookstore.

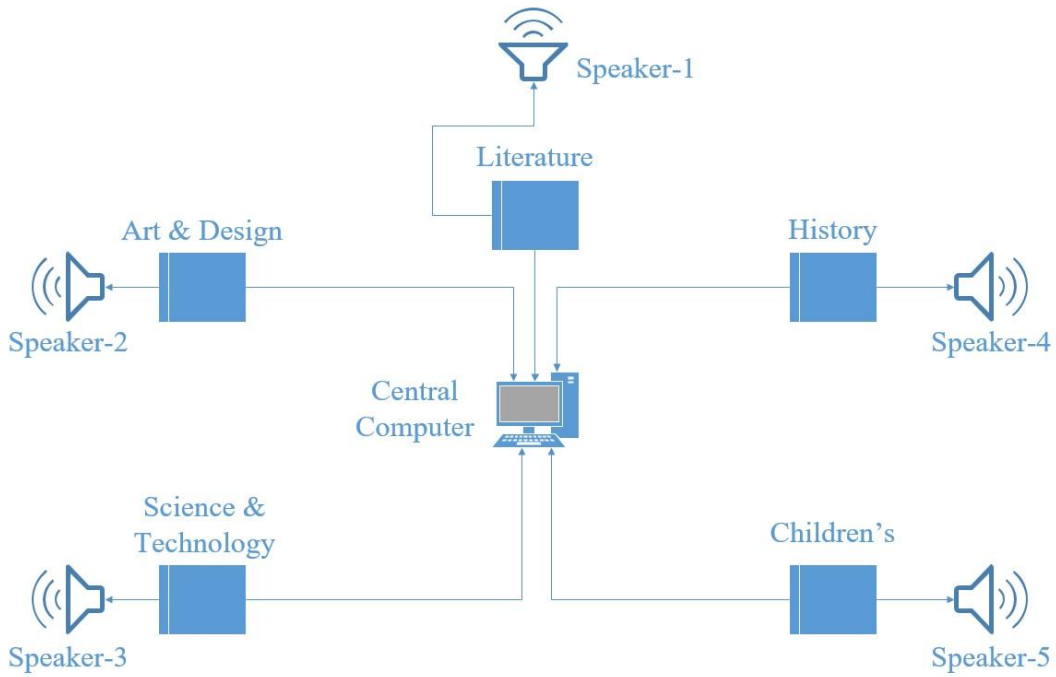
In this part, “Music information system” was installed on “Kırmızı Kedi Kitabevi” which gives service in Karşıyaka, İzmir, Turkey. Allocation of the departments of the bookstore was suitable for the system because the books belong to departments such as: “Children’s”, “Art & Design”, “History” and “Literature” are usually separated from each other. Small relocations were made to increase the effects of the system. “Science & Technology” department was also added to system because characteristics of the bookstore were suitable to use background music for fifth main department.

4.6.1 System Architecture and Working Principle

In this part, a system prototype is designed for “Kırmızı Kedi Kitabevi”. System provides service for five different departments that are “History”, “Art & Design”, ”Literature”, “Children’s” and “Science & Technology”. Five devices with the same hardware specifications are placed in five departments and each one is named as a “Music Control Device”. Each “Music Control Device” is connected to an active speaker, which belongs to the related department, and also to a central computer via a USB cable (See Figure 4). 2+1 speaker systems are used for each different department. Positions of the speakers and the voice levels are adjusted properly so as to not mix-up music which belongs to different departments.

Physical characteristics of the bookstore were suitable to use five devices. For a different bookstore, it might be possible to design with more or less than five devices. This situation makes it impossible to use the same system design for more than one bookstore and creates necessity to design system uniquely for any targets.

Figure 4: Network Scheme



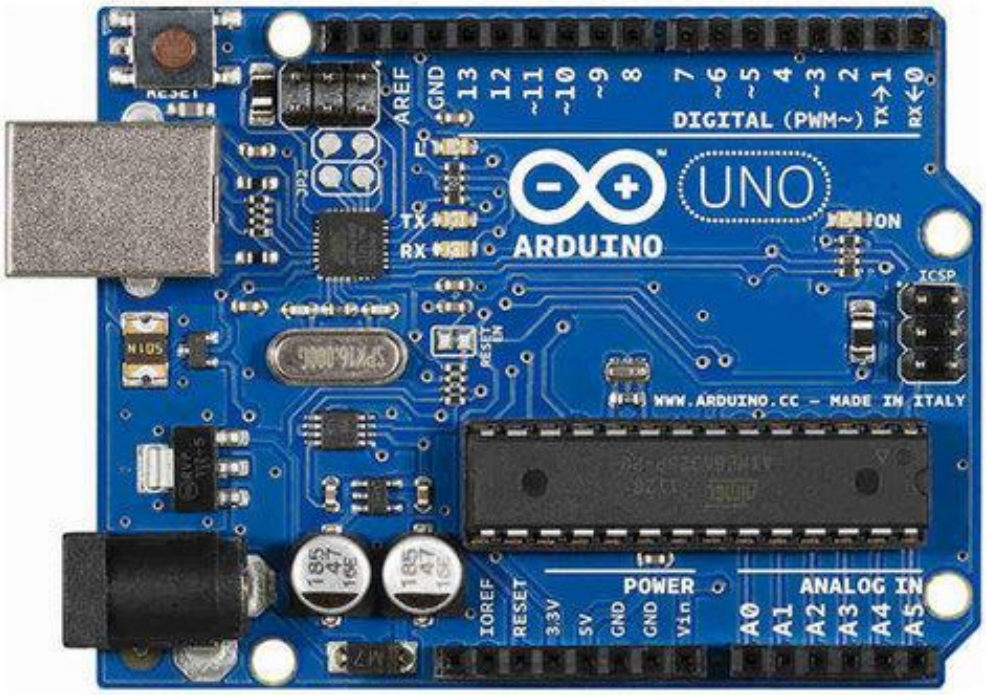
A PIR sensor for each "Music Control Device" detects customer existence in the related department. After the system plays music for one minute, the PIR sensor checks for customer existence again. If the sensor detects any customer, it keeps playing music and increases the visitation time of the related department in the records. Otherwise music is paused until the next customer arrival to the related department and the sensor keeps checking for customer existence ever continuously.

4.6.2. Hardware and Software Specifications

Five "Music Control Device" with the same hardware specifications are used for five different departments. Each of these devices is connected to a main computer with a USB cable and sends information about customer arrival to be recorded. Each "Music Control Device" includes one Arduino UNO R3 microcontroller (See Figure: 5), one DF Player Mini MP3 module (See Figure 6) with an attached micro SD card and one PIR (Passive Infra-Red) sensor. The PIR sensor has two adjustments which are: "Delay Time" and "Distance". Delay Time is stabilized to 25 seconds with the software. Distance is adjusted to maximum amount which is between 6 and 7 meters

(See Figure: 8). Each device can be supplied by 9V or 12V DC power supply. In this system, 12V/1.5A AC/DC power adapters are used. All these parts of the designed circuits are combined in a 13.5*7.5 cm² device box and constituted "Music Control Device" (See Figure 10). Tigoes SP60 2+1 Speaker System (See Figure 7) is placed to each department as a speaker set.

Figure 5: Arduino UNO R3 Microcontroller



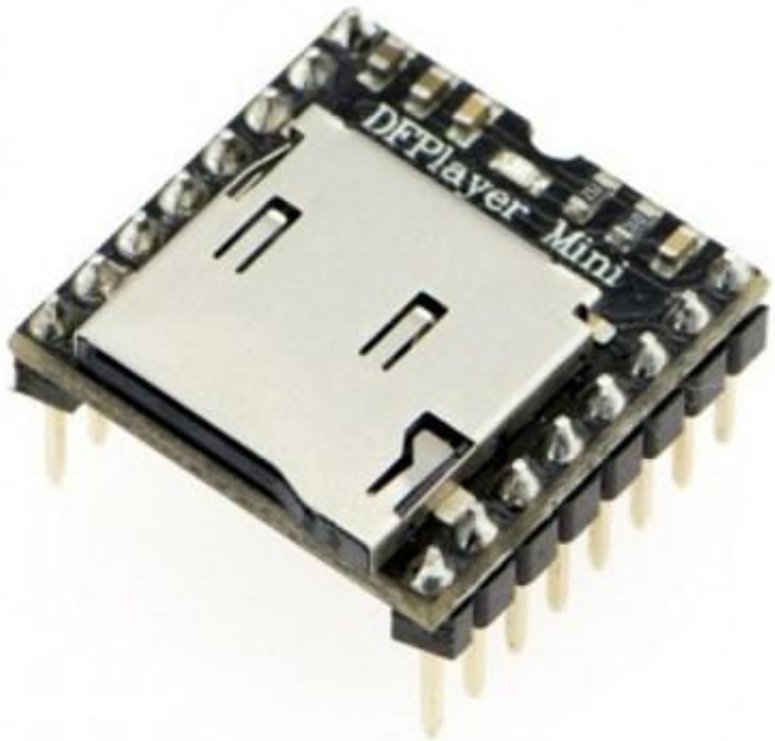
Source: http://www.nkcelectronics.com/Arduino-UNO-R3-Open-Box_p_265.html

Arduino UNO is a microcontroller board which has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connecting it to a computer with a USB cable or power it with a AC-to-DC adapter is enough to get it started. R3 means that its third revision of this model.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino

platform; for an extensive list of current, past or outdated boards see the Arduino index of boards (Arduino Store, 2018).

Figure 6: DF Player Mini MP3 Module



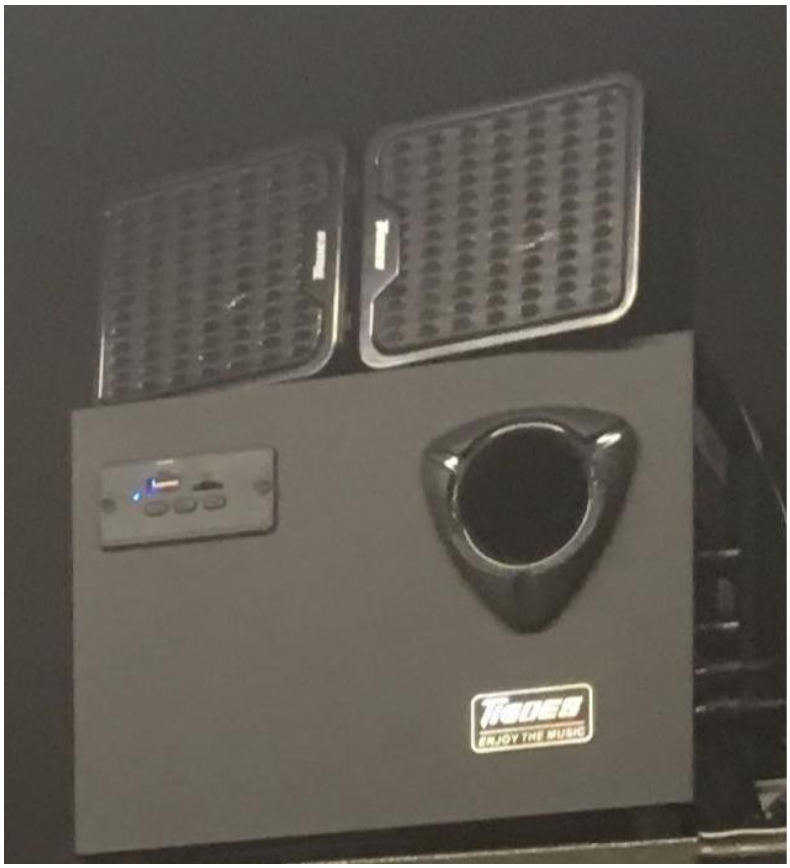
Source: https://www.robotizmo.net/Uploads/UrunResimleri/c9f72d19-e9f2-42f5-a77c-8cfe2db6d240.jpg

The DFPlayer Mini is a small and low cost MP3 module player with a simplified output directly to the speaker. The module can be used as a standalone module with attached battery, speaker and push buttons or used in combination with an Arduino UNO or any other with RX/TX capabilities.

The DFPlayer perfectly integrates hard decoding module, which supports common audio formats such as MP3, WAV and WMA. Besides, it also supports TF card with FAT16, FAT32 file system. Through a simple serial port, you can play the designated music without any other tedious underlying operations (DFRobot, 2018).

“In an active speaker, the word active commonly refers to the crossover components/system. The crossover components in an active speaker split the frequency band of the audio signal into smaller parts (low, high, and sometimes mid-range), which are then sent to individual speaker drivers designed to handle those frequencies.

Figure 7: Tigoes SP60 2+1 Speaker System



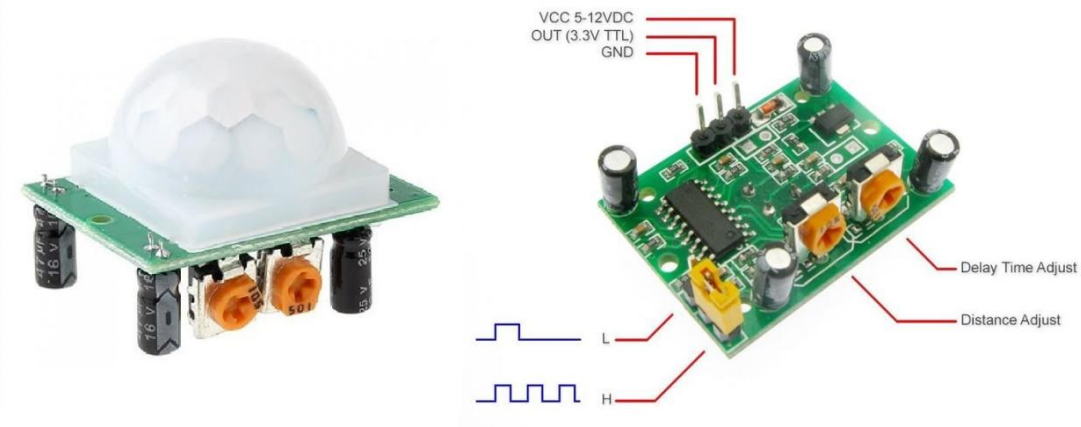
Where active speakers’ electrical crossover components and powered amplifiers for each driver, these speakers are “powered”. This is why active and powered are often used synonymously. So, when a speaker is referred to as an active speaker, it is nearly always referring to the crossover components, which by definition require amplifiers for each band, and separate power” (EH Staff, 2005).

As a speaker system, an active speaker set had to be chosen which includes an amplifier. Tigoes SP60 2+1 which is an active speaker system is used for each

department. This speaker system works with 220V AC and has 10W + 5W x 2 power output.

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m. PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation. For numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are flat control and minimal effort, have a wide lens range, and are simple to interface with.

Figure 8: Passive Infra-Red (PIR) Sensor



Source: http://www.ifuturetech.org/ifuture/uploads/2012/10/PIR-MOTION-DETECTOR-SENOR-configration-iFuture-baroda-vadodara-gujarat-india.jpg

Most PIR sensors have a 3-pin connection at the side or bottom. One pin will be ground, another will be signal and the last pin will be power. Power is usually up to 5V. Sometimes bigger modules don't have direct output and instead just operate a relay which case there is ground, power and the two switch associations. Interfacing PIR with microcontroller is very easy and simple. The PIR acts as a digital output so all you need to do is listening for the pin to flip high or low. The motion can be detected by checking for a high signal on a single I/O pin. Once the sensor warms up the output will remain low until there is motion, at which time the output will swing high for a couple of seconds, then return low. If motion continues the output will

cycle in this manner until the sensors line of sight of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity fittingly. This is because of the settling time included in studying nature's domain. This could be any place from 10-60 seconds.

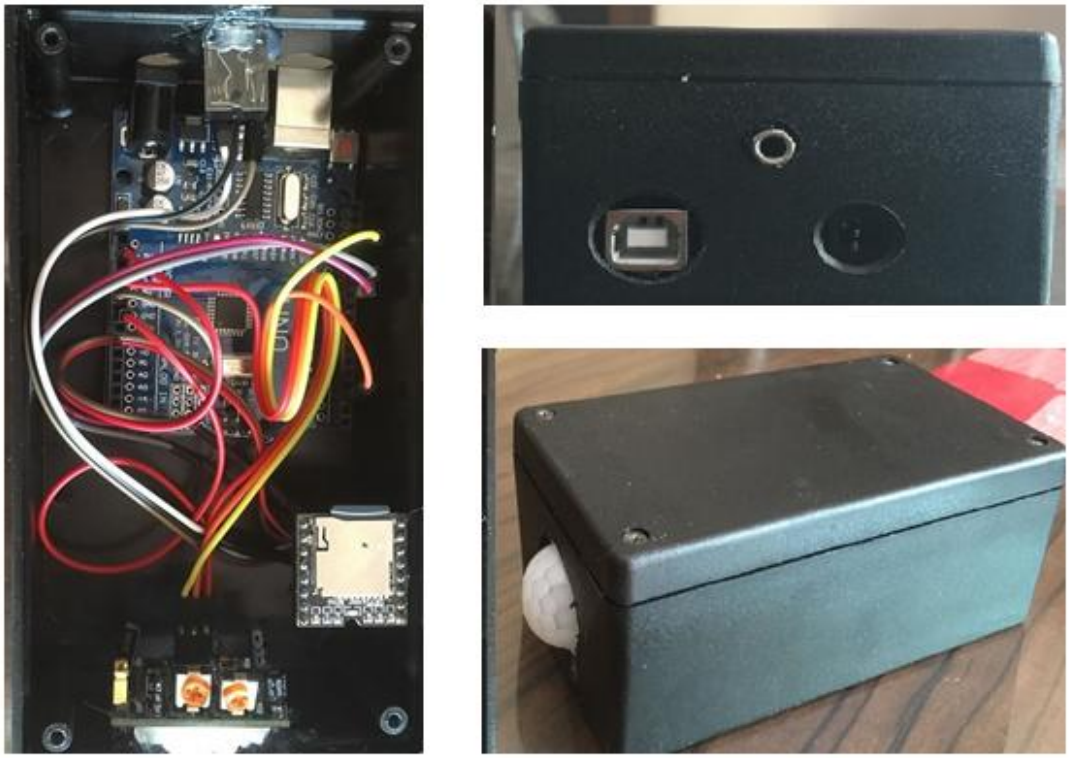
A PIR sensor detects the infrared light radiated by a warm object. It consists of pyro electric sensors which introduce changes in their temperature (due to incident infrared radiation) into electric signal. In presence of human IR radiations, when infrared light strikes a crystal, it generates an electrical charge that sensor detects the radiations and converts it directly to electrical pulses which is fed to the inverter circuit. The inverter circuit consists of a transistor which gets into saturation with application of high base current and eventually develops a low collector voltage. Thus the transistor output is low. This low inverter output is connected to the microcontroller. Based on the input received by the microcontroller, it controls the motor driver, which in turn controls the motion of the motor (Agarwal, 2015).

Figure 9: Screenshot of Device Communication with Central Computer

Microcontroller software is prepared in a Java based and open-source Arduino Software version 1.8.2. Communication between microcontroller and MP3 module is provided by serial port with 9600 baud rate. Pin-2 is chosen as an input pin for PIR sensor. The microcontroller controls music according to information that is received from this pin. Communication between the microcontroller and the central

computer is also provided by the serial port with a 115200 baud rate. The information about customer arrival for each department can be monitored in the central computer (See Figure 9).

Figure 10: Device Box and Circuit Appearances

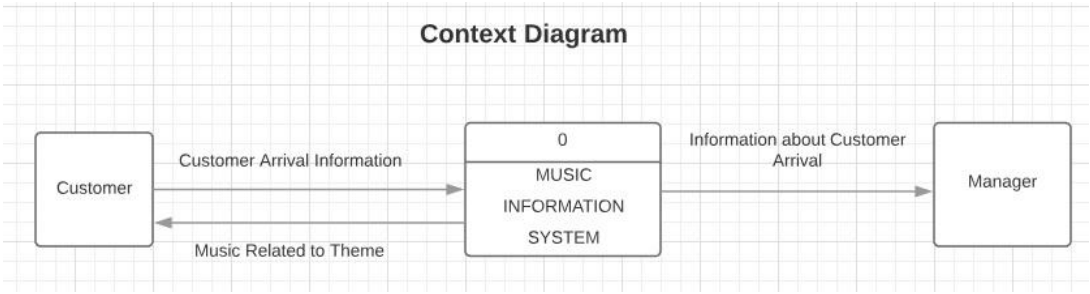


When customers approach the related department, the PIR sensor spots the customer and sends a signal to the microcontroller. After the microcontroller receives this signal, it gives an order to the MP3 Module to play music for 60 seconds. After 60 seconds ends, the sensor checks for customer appearance again. If it spots any customer in the department, it sends a signal to the microcontroller to continue to play music. If it doesn't spot any customers, it sends a signal to pause music until the next customer arrival. After the playlist finishes, the system returns back and plays that playlist from the beginning and repeats this loop.

4.6.3. Database Contents and Music Choices

A context-level data flow diagram (DFD) for the designed system can be seen at Figure 11. This diagram demonstrates the working principle of the system as a whole and its relations with customers and managers. “Music Information System” receives information about customer arrival from the related department and starts to play music in there and related to the theme of that department. After one minute, the system pauses music until the next customer arrival. The system also records the customer arrivals in a central computer to let the manager obtain information about customer frequency for each department.

Figure 11: Context-level Data Flow Diagram

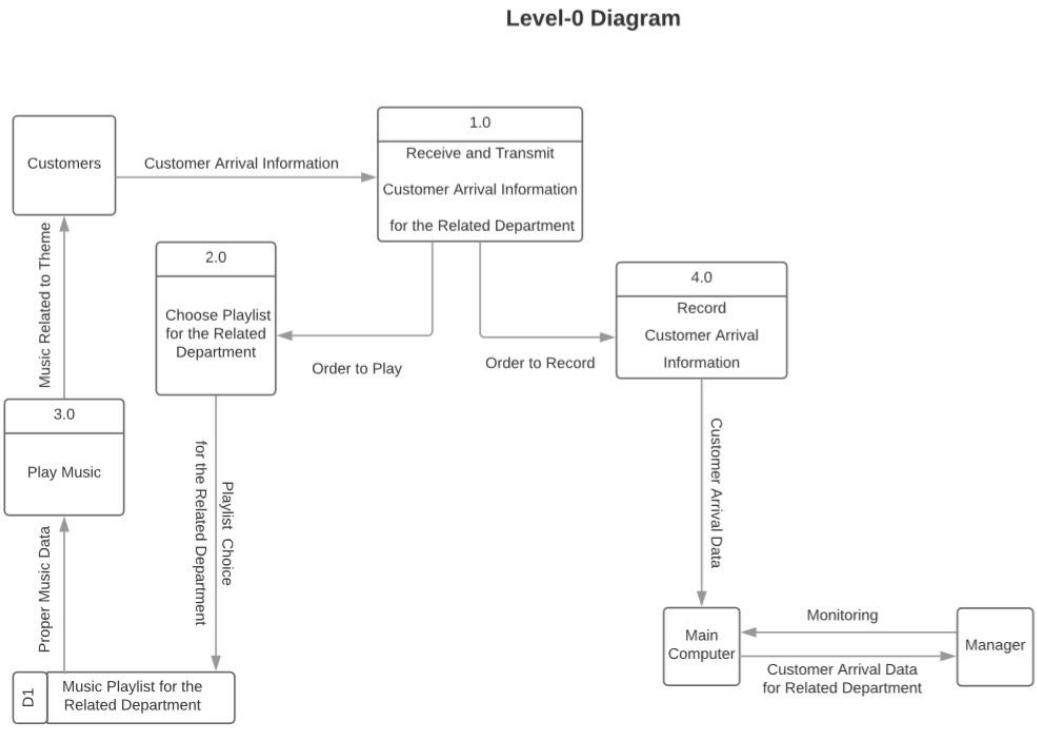


Each device belongs to one different department and works separately from each other. The working principle and data flows of each “Music Control Device” are all the same. Level-0 DFD of one department can be seen at Figure-12. When a customer approaches to the related department, “Music Control Device” perceives that and sends orders to prepare the playlist to a music player and record the customer arrival information to a central computer. After that, music is played in the related department and the customer arrival information is being recorded in the main computer.

Customer arrival data for each department can be monitored by managers and necessary precautions can be taken in case that popularity of a department decreases. If visiting rate of one department decreases, managers can make some changes in this department to increase attraction of the customer. Success of these changes can be

also evaluated with the help of customer arrival data. If the changes are not found beneficial, more changes may be applied until an efficient solution is found.

Figure 12: Level-0 Data Flow Diagram

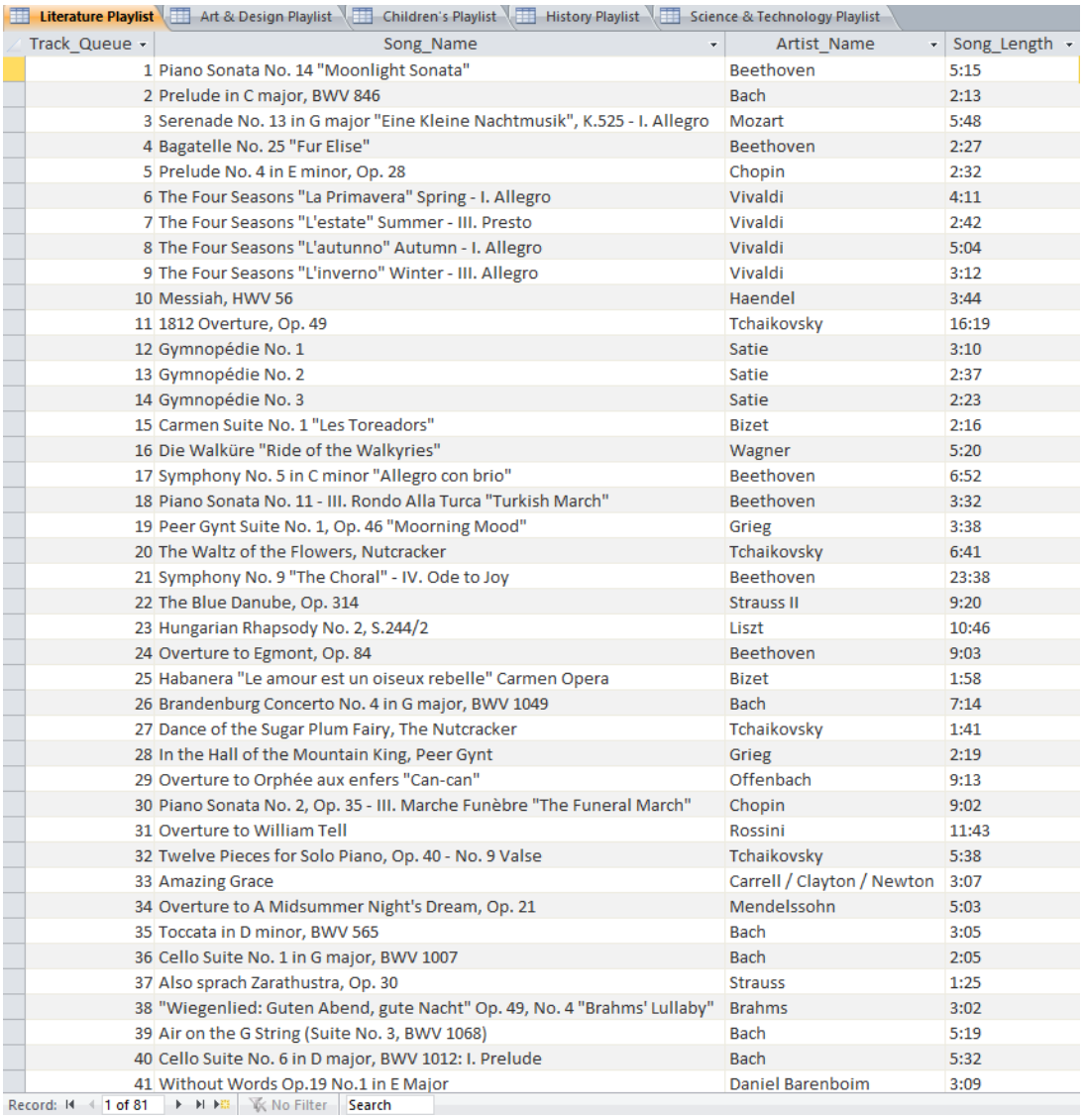


Database creation is made with Microsoft Access. Chosen music tracks are added to related tables for each department (See Figure 13). The system has flexibility on this point because music choices can be different according to many factors like principles and geographical locations of stores, corporate agreements, etc. So track lists can be changed by the interaction of store owners anytime and can be unique depending on the requirements of the store. It means it can also be updated according to new popular trends to increase efficiency of music.

There are five different tables and four different fields in each table which are “Track_Queue”, “Song_Name”, “Artist_Name” and “Song_Length”. “Track_Queue” field shows the place of the song in the related playlist. “Song_Name” field displays the full name of the song that is given by artist. “Artist_Name” field shows the name of the composers and “Song_Length” field shows the duration of the songs. The primary key is chosen as “Track_Queue”. This

design makes it easy to monitor contents of playlists and easy to update when it is required.

Figure 13: Screenshot of "Literature" Department Database



Literature Playlist | Art & Design Playlist | Children's Playlist | History Playlist | Science & Technology Playlist

Track_Queue	Song_Name	Artist_Name	Song_Length
1	Piano Sonata No. 14 "Moonlight Sonata"	Beethoven	5:15
2	Prelude in C major, BWV 846	Bach	2:13
3	Serenade No. 13 in G major "Eine Kleine Nachtmusik", K.525 - I. Allegro	Mozart	5:48
4	Bagatelle No. 25 "Fur Elise"	Beethoven	2:27
5	Prelude No. 4 in E minor, Op. 28	Chopin	2:32
6	The Four Seasons "La Primavera" Spring - I. Allegro	Vivaldi	4:11
7	The Four Seasons "L'estate" Summer - III. Presto	Vivaldi	2:42
8	The Four Seasons "L'autunno" Autumn - I. Allegro	Vivaldi	5:04
9	The Four Seasons "L'inverno" Winter - III. Allegro	Vivaldi	3:12
10	Messiah, HWV 56	Haendel	3:44
11	1812 Overture, Op. 49	Tchaikovsky	16:19
12	Gymnopédie No. 1	Satie	3:10
13	Gymnopédie No. 2	Satie	2:37
14	Gymnopédie No. 3	Satie	2:23
15	Carmen Suite No. 1 "Les Toreadors"	Bizet	2:16
16	Die Walküre "Ride of the Walkyries"	Wagner	5:20
17	Symphony No. 5 in C minor "Allegro con brio"	Beethoven	6:52
18	Piano Sonata No. 11 - III. Rondo Alla Turca "Turkish March"	Beethoven	3:32
19	Peer Gynt Suite No. 1, Op. 46 "Moorning Mood"	Grieg	3:38
20	The Waltz of the Flowers, Nutcracker	Tchaikovsky	6:41
21	Symphony No. 9 "The Choral" - IV. Ode to Joy	Beethoven	23:38
22	The Blue Danube, Op. 314	Strauss II	9:20
23	Hungarian Rhapsody No. 2, S.244/2	Liszt	10:46
24	Overture to Egmont, Op. 84	Beethoven	9:03
25	Habanera "Le amour est un oiseux rebelle" Carmen Opera	Bizet	1:58
26	Brandenburg Concerto No. 4 in G major, BWV 1049	Bach	7:14
27	Dance of the Sugar Plum Fairy, The Nutcracker	Tchaikovsky	1:41
28	In the Hall of the Mountain King, Peer Gynt	Grieg	2:19
29	Overture to Orphée aux enfers "Can-can"	Offenbach	9:13
30	Piano Sonata No. 2, Op. 35 - III. Marche Funèbre "The Funeral March"	Chopin	9:02
31	Overture to William Tell	Rossini	11:43
32	Twelve Pieces for Solo Piano, Op. 40 - No. 9 Valse	Tchaikovsky	5:38
33	Amazing Grace	Carrell / Clayton / Newton	3:07
34	Overture to A Midsummer Night's Dream, Op. 21	Mendelssohn	5:03
35	Toccata in D minor, BWV 565	Bach	3:05
36	Cello Suite No. 1 in G major, BWV 1007	Bach	2:05
37	Also sprach Zarathustra, Op. 30	Strauss	1:25
38	"Wiegenlied: Guten Abend, gute Nacht" Op. 49, No. 4 "Brahms' Lullaby"	Brahms	3:02
39	Air on the G String (Suite No. 3, BWV 1068)	Bach	5:19
40	Cello Suite No. 6 in D major, BWV 1012: I. Prelude	Bach	5:32
41	Without Words Op.19 No.1 in E Major	Daniel Barenboim	3:09

Record: 1 of 81 | No Filter | Search

There are five different departments where five different thematic music tracks are needed to be chosen for: "Literature", "Art & Design", "History", "Children's" and "Science & Technology". Music tracks aren't chosen according to their musical characteristic like tempo or rhythm because the main focus of the design is "To choose proper music according to the theme" and it is seen that proper music tracks belonging to the same theme sometimes have different musical

characteristics. For example there are both slow tempo and fast tempo music tracks which are related with the same theme.

Although the main characteristics of music are usually similar for the same themes, these characteristics aren't important criteria for the music choices. At this point, the criterion for music choice is "To find the most popular and successful music tracks related to these themes". Proper music tracks for each theme are searched with the help of soundtracks of popular movies, popular "Spotify" playlists and "Youtube" videos related to target themes. The most followed music playlists, the most listened and liked music tracks are the main focus for the music choices.

Classical music compositions which are performed by various famous composers are mostly chosen for "Literature" departments. Songs from popular "Spotify" playlists related with "Architecture", "Art" and "Design" (Mostly with low tempo and inspirational) are chosen for "Art & Design" departments. Soundtracks of famous Sci-Fi movies and computer games are chosen for "Science & Technology" departments. Also, the most viewed background music tracks with science and technology theme on "Youtube" are selected for these departments. Popular cartoon and animation soundtracks, children playlists on "Spotify" and most viewed music tracks for children on "Youtube" which are mostly with high tempo and positive feelings are selected for this departments. The most viewed music tracks on "Youtube" from many different ancient cultures like (Egyptian, Viking, Arabian, Greek, Native American, etc.) are selected for the "History" departments.

These music choices are made to obtain a default database. According to this database, playlists are created for each department. All music tracks belonging to each playlist are combined to one huge music file which has a very long duration between 8 and 10 hours and placed into the SD Cards what belongs to each department.

These playlists can be changed anytime by the interaction of the store manager. Moreover, it should be updated according to changing expectations from music, success level of the chosen tracks which can be measured with help of customer arrival numbers and feedbacks that are given by customers. So the system can be more interactive and meet requirements of the ever-evolving music tastes of

people. Thus, business profits which are obtained by proper usage of background music can be increased in a considerable amount.

4.7. FIELD STUDY

The system was desired to be implemented for five different bookstores which were suitable to install it. Four of the managers of these bookstores responded negatively with various reasons. These reasons are lack of authority to change music, franchise policies, agreements to play defined music and lack of time and labor force to make required changes in the bookstore. Unlike others, “Kırmızı Kedi Kitabevi” became a volunteer to try this system and got necessary permissions to test the system in the bookstore. The manager of the bookstore also attended the questionnaire that was applied to bookstores in the previous part and had positive expectations about the system. This situation made it easier to persuade the manager to try the “Music Information System” in this bookstore.

4.7.1. Installation of the System at “Kırmızı Kedi Kitabevi”

The system was installed and tried in “Kırmızı Kedi Kitabevi” (See Figure 14). Physical design of the bookstore was suitable to build this system. Allocation of departments was suitable because related kinds of books were close to each other and different departments got much distance between each other which prevents the mixture of different kind of songs and the possible sound chaos that may occur because of it. It eased the relocation job. The bookstore was also big enough which consists of two floors and different departments were usually much far from each other which increases the sound isolation between these different departments. These are the reasons to choose “Kırmızı Kedi Kitabevi” to implement and install the “Music Information System” for the first time. Test period of the “Music Information System” started at 15 May 2018 and ended at 22 May 2018.

“Music Control Devices”, which belong to five different departments, are installed to each one, such as: “Literature”, “Art & Design”, “History”, “Science & Technology” and “Children’s” with handmade artworks on them which is proper to

the theme of the department (See Figure 15). One week permission was taken to test the system which was enough to see general success of the system and the effects of it on the main factors (Defined in previous part of this study): “Mood of the customers“, “Satisfaction of the customers”, “Total time spent by customers”, “Performance of salespeople”, “Possibility to revisit of the customers” and “Total sales of the bookstore”.

Figure 14: Kırmızı Kedi Kitabevi

Installation on the “Literature” department was completed with one “Music Control Device” and one (2+1) speaker system (See Figure 16). This department was at the first floor. Necessary relocations were made to approach related products close to this department. To power up the tools, 220V AC power is required and the closest place to take it is at a 10m distance. Power was taken from that plug and cables were carried out by ceilings to prevent visual pollution and mess.

Installation on “Children’s” department was completed with one “Music Control Device” and one (2+1) speaker system (See Figure 16). This department was at the first floor. Most of products that are oriented to children were gathered around this department already, so there was no necessity to relocate products. The closest

place was at a 15m distance to take 220V AC power. Power was taken from that plug and cables were carried out by ceilings to prevent visual pollution and mess.

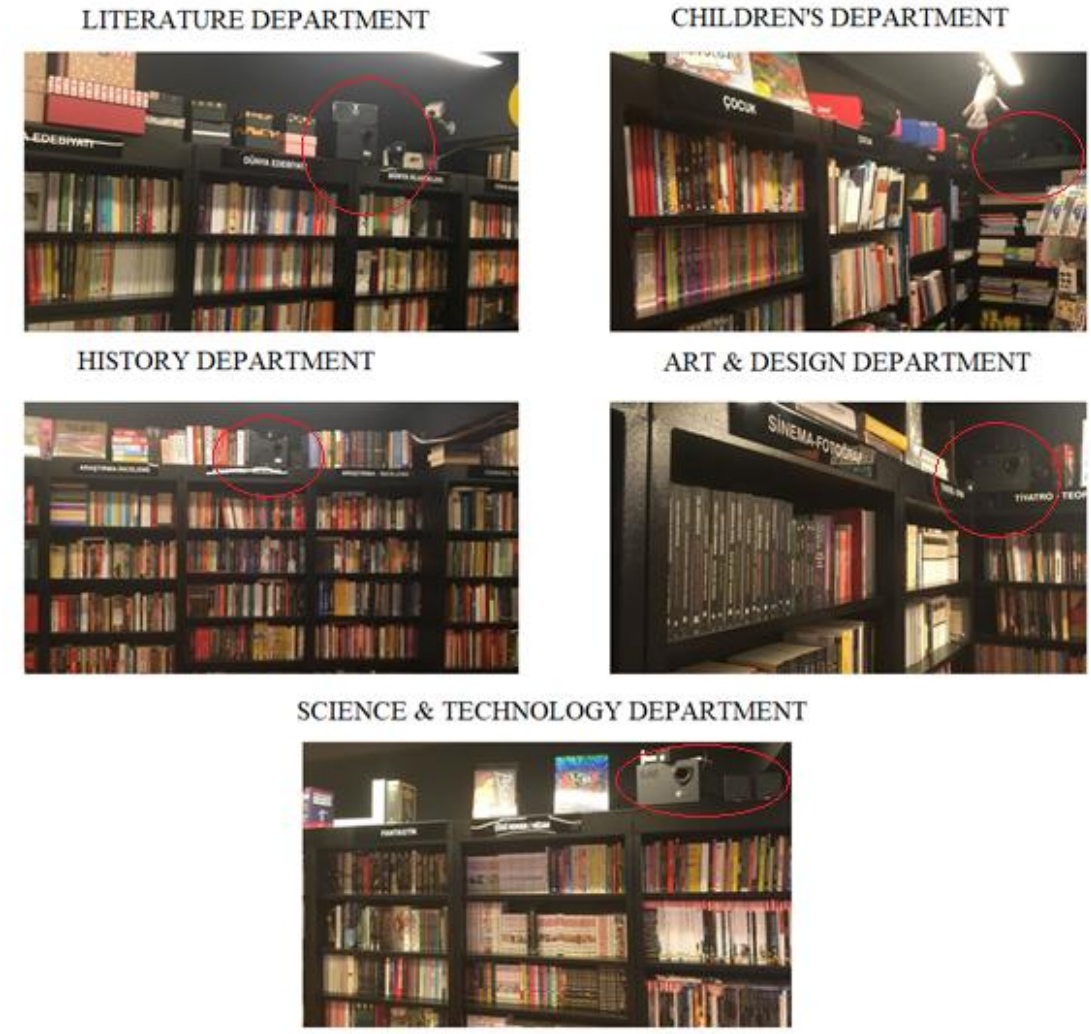
Figure 15: Artworks of Related to Themes of the Departments

Installation on “Science & Technology” department was completed with one “Music Control Device” and one (2+1) speaker system (See Figure 16). This department was also at first floor. Necessary relocations were made to approach related products close to this department. To power up the tools, there was a close 220V AC plug socket because of a computer located to below of this department, so a 2m long cable was enough to take power.

Installation on “History” department was completed with one “Music Control Device” and one (2+1) speaker system (See Figure 16). This department was at the second floor. Products related to this category were gathered around already, so there was no necessity to relocate. The closest plug to take 200V AC Power was at 10m distance. Power was taken from that plug and cables were carried out by ceilings.

Installation on “Art & Design” department was completed with one “Music Control Device” and one (2+1) speaker system (See Figure 16). This department was at the second floor. Products related to this category were gathered around already, so there was no necessity to relocate. To power up the tools, the closest place to take 220V AC was at 25m distance. This department had the longest distance from the closest plug socket comparing to all other departments. 25m cable was used to take the required power for this department.

Figure 16: Placement of the System on the each Department



After the installation of the system was completed, system was tried for one week in this bookstore. Questionnaire papers were left to the bookstore manager to be applied to the customers. After one week, questionnaire papers which were filled by customers were collected and interviews were made with managers of the bookstore. The impressions of the employees about the system were usually positive. There was one general complaint about the system which was the mess occurs because of cables which was an expected complaint because the cables were stabilized to the walls with duct tapes not to harm the walls. The trial time of the system was defined as just one week and there were no permissions to use any nails

or other stuff which might damage the environment. That's why it wasn't possible to prevent this visual pollution.

4.7.2. Questionnaire and Interview Results

A questionnaire was filled by 20 different customers who visited the bookstore while the system was active. Their awareness and opinions of the customers about the system are investigated with this questionnaire. Also interviews were applied in the end of one week to manager and assistant manager of the bookstore to measure their satisfaction from the system and the effects of the system to the mentioned factors. Also further expectations from the system were asked to both customers and employees.

4.7.2.1. Interview Results

The interview questions which were asked to the manager and the assistant manager of the "Kırmızı Kedi Kitabevi" and their responses are given in this part. The interview includes 11 questions. The questions are designed to understand the general satisfaction from the system and the effects of the system to important factors for a bookstore which are defined in the first part of this study.

Question-1: What do you think about the effects of "Music Information System" to the "Total time spent by customers"?

Answer-1 – Interview with the Manager

System increases the "Total time spent by customers" in some cases. If the customer plans to spend some time in the store already, the system is increasing that time period but if customer doesn't plan to spend much time already, the system cannot affect that customer.

Answer-1 – Interview with the Assistant Manager

Usage of the system increased "Total time spent by customers" in this store.

As a result of first question, it can be said that “Music Information System” affects “Total time spent by customers” in a positive way but the effects of it may be limited according to types of the customers. The impact of the system to this factor is changeable. It’s mostly effective on the customers who already decide to spend some time in the store but it’s not that much effective if customer already doesn’t plan to spend much time in the store.

Question-2: What do you think about the effects of “Music Information System” to the “Mood of the customers”?

Answer-2 – Interview with the Manager

It is hard to observe the mood of customers. Because the appearances of the people usually don’t represent their emotions so it is hard to make a definite judgment about this situation in a short time period.

Answer-2 – Interview with the Assistant Manager

It is observed that the system affects the “Mood of customers” according to the emotions that is aimed to be given by music.

As a result of second question, it can be said that “Music Information System” affects “Mood of Customers”. Even if the manager says it is hard to observe that factor, the assistant manager indicates that the moods of customers are affected by the changeable music. This situation increases importance of the music choices because if the chosen music contains negative emotions, it may also affect the customers’ mood in a negative way.

Question-3: What do you think about the effects of “Music Information System” to the “Satisfaction of customers”?

Answer-3 – Interview with the Manager

Yes, usage of the different music related to theme surprises the customers and increases their satisfaction.

Answer-3 – Interview with the Assistant Manager

Effects of the "Music Information System" to "Satisfaction of customers" are generally positive.

As a result of third question, it can be said that "Music Information System" affects "Satisfaction of customers" in a positive way. Both the manager and the assistant manager supported this idea. The system meets expectations of the managers by its effects on this factor.

Question-4: What do you think about the effects of "Music Information System" to the "Total sales of the bookstore"?

Answer-4 – Interview with the Manager

It is hard to come to a conclusion about this situation. The system was used in this bookstore for one week and it's hard to see the impacts on this factor in this short duration.

Answer-4 – Interview with the Assistant Manager

"Music Information System" may affect this factor indirectly but the impacts of it on this factor are not going to be much strong.

As a result of fourth question, it can be said that "Music Information System" doesn't affect "Total sales of the bookstores" directly. The manager thinks that it requires much more time to be able to measure the effects of this system on this factor. The assistant manager thinks that even if the system doesn't affect this factor directly, effects of the system on the other factors may end up by increasing the total sales indirectly.

Question-5: What do you think about the effects of "Music Information System" to the "Performance of salespeople"?

Answer-5 – Interview with the Manager

It is observed that the system increased the motivation of the personnel and the feedbacks were usually positive.

Answer-5 – Interview with the Assistant Manager

The effects of the "Music Information System" were positive on the performance of the salespeople and the other employees.

As a result of fifth question, it can be said that "Music Information System" affects "Performance of the salespeople" in a positive way. Both the manager and the assistant manager supported this idea. The system met expectations of the managers by its effects on this factor.

Question-6: What do you think about the effects of "Music Information System" to the "Possibility to revisit of customers"?

Answer-6 – Interview with the Manager

I don't think that the system will affect the possibility to revisit of customers.

Answer-6 – Interview with the Assistant Manager

I don't think that "Music Information System" will affect this factor in a positive or negative way.

As a result of sixth question, it can be said that "Music Information System" doesn't affect "Performance of the salespeople". Both the manager and the assistant manager supported this idea. There is no positive correlation between the system and this factor according to managers.

Question-7: Is it good idea to start music at the moment when the customers approach to the related department and pause when they leave?

Answer-7 – Interview with the Manager

It might be better if the music wouldn't stop ever because it may annoy the customers if system fails to spot for one point of the department and pauses the music.

Answer-7 – Interview with the Assistant Manager

I think it is a good idea. It creates a positive effect on customers.

As a result of seventh question, there is no certain conclusion about this feature of the "Music Information System". The manager thinks that it is wise to play the music continuously meanwhile the assistant manager thinks that it is better to play and pause the music according to customer interaction. It is easy to cancel this feature so it can be changed by user interaction whenever it is necessary.

Question-8: Is it important to monitor the information about customer arrival in the departments?

Answer-8 – Interview with the Manager

Yes it is important. The visiting times of the departments should be monitored.

Answer-8 – Interview with the Assistant Manager

Of course it is important. The necessary precautions can be taken with the help of this data.

As a result of eighth question, this feature of the "Music Information System" is important for a bookstore. Both the manager and the assistant manager indicated that it is good to monitor visiting times of the different departments. This feature of the system met the expectations of the managers.

Question-9: Did "Music Information System" generally meet your expectations?

Answer-9 – Interview with the Manager

Yes it did. If the durations of the playlists were longer, it could be even better.

Answer-9 – Interview with the Assistant Manager

Yes effects of it were generally positive.

As a result of ninth question, it can be said that managers generally satisfied with "Music Information System". Opinions of the both managers were positive. The durations of the playlists can be increased according to the responds of the managers.

Question-10: Can the "Music Information System" be successful in another bookstore?

Answer-10 – Interview with the Manager

Yes it can be successful. It depends on the characteristics of the bookstore. The distance between departments should be long enough to increase the benefits of this system.

Answer-10 – Interview with the Assistant Manager

Yes it can be successful.

As a result of tenth question, it can be said that "Music Information System" can be also successful in the other bookstores. Both managers agreed on that idea but the characteristics of the bookstore, especially the distances between the departments, are important. The characteristics of the bookstores may affect the success of the system.

Question-11: Can the "Music Information System" be successful in different kind of stores?

Answer-11 – Interview with the Manager

Yes it can be successful in some stores which categorize their departments according to age and gender.

Answer-11 – Interview with the Assistant Manager

Yes it can be successful especially for the supermarkets and the clothing stores.

As a result of eleventh question, it can be said that "Music Information System" can be also successful at the different kind of stores. Both managers agree on this idea. The most sensitive spot is the categorization of the departments. They should be specified very well so the system can provide a proper music according to themes of these departments.

As a general result, managers approve that "Music Information System" affects the factors: "Satisfaction of customers" and "Performance of salespeople" in a positive way. It is also partially supported that the system affects the factors: "Mood of the customers", "Total time spent by the customer" and "Total sales of the bookstore" by the managers. The effects of the system to "Possibility to revisit of the customers" are not supported by managers. The features of the system to record the customer arrival information for each department is liked by the both managers, on the other hand the feature to play and pause the music with the customer interaction is liked by half of the managers. The system has flexibility on this point already because this feature can be turned off by user interaction. They also informed that "Music Information System" can be also successful at different bookstores and other kinds of stores.

4.7.2.2. Questionnaire Results

A questionnaire was applied to the customers who experienced the "Music Information System". Twenty customers attended to this questionnaire. Questionnaire consists of eight questions which aim to measure the effects of the system to the factors which is important for a bookstore, success level of the some

features of the system and the expectations from the system in different work areas. The results can be seen at Table-6.

Table 6: Results of Questionnaire about “Music Information System”

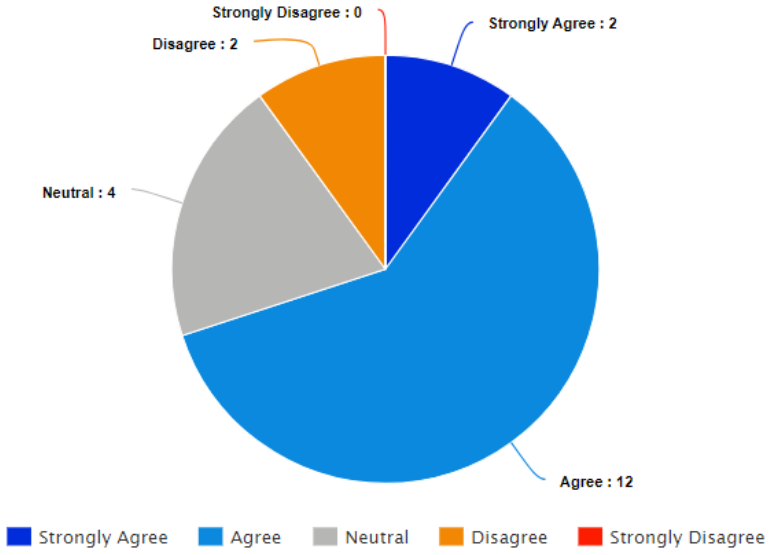
Conclusions	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1-There is a positive effect of different thematic music usage in different departments.	2	12	4	2	0
2-"The Music System" which is used in this bookstore is attracting and building up passion to visit different departments.	4	8	3	5	0
3-I am satisfied with "The Music System" that is used in this bookstore.	5	11	4	0	0
4-It is good idea to start music at the moment when the customer comes close to the related department.	1	9	6	4	0
5-I want to revisit this bookstore and "The Music System" contributes me to decide so.	1	5	9	5	0
6-I would like to see the usage of a music system like this at my workplace.	3	9	4	4	0
7-Usage of this music system will affect “Total Sales of the Bookstore".	0	5	13	1	1
8-"Music Information System” may also be successful in different kinds of stores.	7	7	5	1	0

Questions are designed to understand customers’ opinions about success of the system on affecting these factors: “Mood of the customers”, “Satisfaction of the customers”, “Total Time Spent by Customers”, “Performance of the salespeople”, ”Possibility to revisit of customer” and “Total Sales of the bookstore”. Opinions of customers are also asked about the function of the system: “To play and pause the music with customer interaction.” Conclusions are made about these functions in light of the responses of the customers.

Seventeen of twenty participants report that they noticed the usage of the "Music Information System" in the bookstore. This result shows that the system is easy to be recognized by the customers and the most of the customers noticed the differences with the background music. It can be said that "Music information system" is successful about catching attention of the customers when it is used in a bookstore.

The first conclusion was questioned to understand the effects of the system on "Mood of customers". Two participants strongly agreed and twelve of them agreed with this conclusion meanwhile four of them stayed neutral and two of them disagreed with it. This results show that the most of the participants agreed that the system affects "Mood of the customers" in a positive way (See Figure 17).

Figure 17: "Music Information System" and "Mood of the Customers"

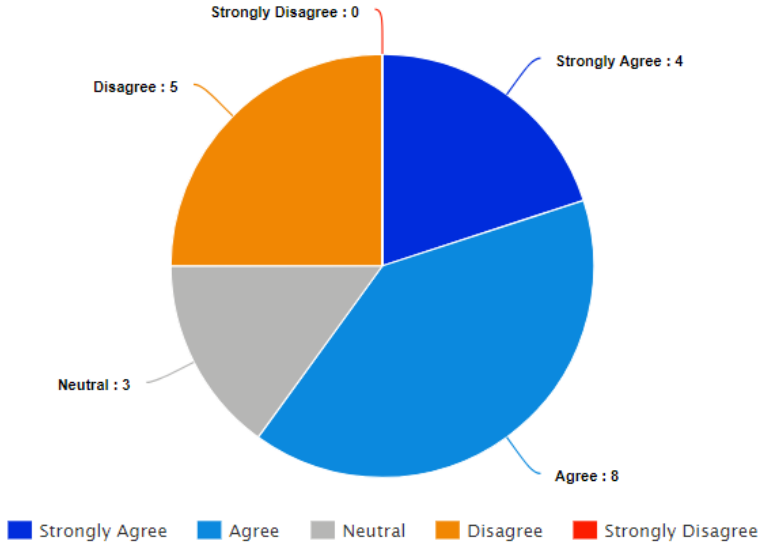


Studies which defend that background music affects "Mood of the customers" are: (Alpert J, Alpert M, 1990), (Chebat et all, 1993), (Dubé et all, 1997), (North & Hargreaves, 1996), (Babin et all, 2004), (Garlin and Owen, 2006), (Petruzzellis, 2014), (Oakes, 2003). The study, which defends that background music doesn't affect "Mood of the customers", is: (Yalch and Spangenberg, 1990). The previous questionnaire, which was applied in section three, shows that "Music Information System" affects "Mood of the customers" positively. The results of this

questionnaire go the same direction with the studies, which defend that background music affects “Mood of the customers”, and the previous questionnaire so it can be said that “Music Information System” affect this factor positively.

The second conclusion was questioned to understand the effects of the system on the “Total time spent by the customers”. Four participants strongly agreed and eight of them agreed with this conclusion. On the other hand, three of them stayed neutral and five of them disagreed with this conclusion. This results show that the most of the participants agreed that the system affects “Total time spent by the customers” in a positive way (See Figure 18).

Figure 18: “Music Information System” and “Total Time Spent by Customers”

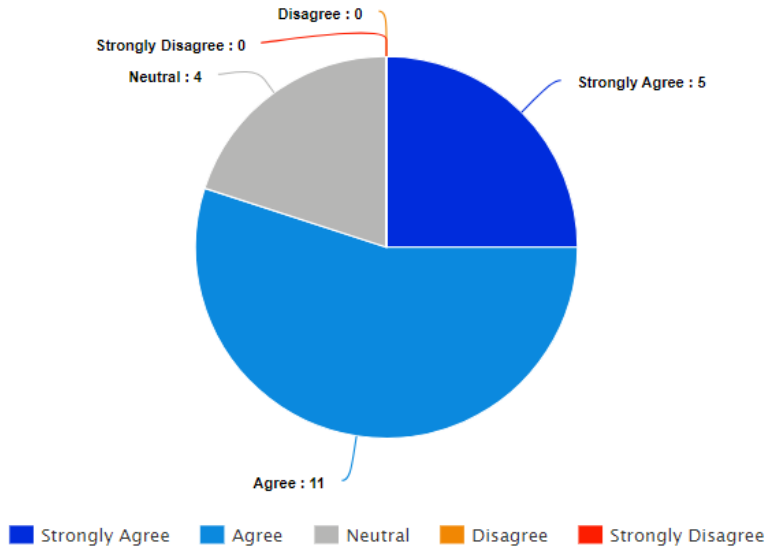


Studies, which defend that background music affects “Total time spent by customers”, are: (Smith & Curnow, 1966), (Milliman, 1982), (Yalch and Spangenberg, 1988), (Chebat et al., 1993), (Dubé et al., 1995) (Donovan, 1994), (Yalch & Spangenberg, 2000), (Caldwell & Hibbert, 2002), (Garlin and Owen, 2006), (Vida et al., 2007), (Morrison et al., 2011), (Andersson et al., 2012), (Gaygen, 2013). Studies, which defend that background music doesn’t have any effects on “Total time spent by customers”, are: (Areni and Kim, 1993), (Herrington, 1996). The previous questionnaire, which was applied in section three, shows that “Music Information System” affects “Total time spent by customers” positively. The results

of this questionnaire go the same direction with the studies, which defend that background music affects “Total time spent by customers”, and the previous questionnaire which shows that “Music Information System” affects “Total time spent by customers” positively.

The third conclusion was questioned to understand the effects of the system on the “Satisfaction of the customers”. This conclusion took the strongest support from the participants. Five participants strongly agreed and eleven of them agreed with this conclusion. There were no participants who disagreed or strongly disagreed with it, just four of them decided to stay neutral. The results of this questionnaire show that participants usually satisfied with the system and strongly agreed that the system affects “Satisfaction of the customers” in a positive way (See Figure 19).

Figure 19: “Music Information System” and “Satisfaction of the Customers”



Studies, which defend that background music affects “Satisfaction of customers”, are: (Yalch and Spangenberg, 1990), (Baker, Levy and Grewal, 1992), (Dubé et al., 1995), (Baker et al., 2002), (Babin et al., 2004), (Eroglu et al., 2005), (Ferreire and Oliveira-Castro, 2011), (Morrison et al., 2011), (Petruzzellis, 2014). The study, which defends that background music doesn’t have any effects on “The satisfaction of customers”, is: (Smith & Curnow, 1966). The previous questionnaire, which was applied in section three, shows that “Music Information System” affects

“Satisfaction of the customers” positively. The results of this questionnaire go the same direction with the studies, which defend that background music affects “Satisfaction of the customers”, and the previous questionnaire. This situation shows that “Music Information System” will affect “Satisfaction of the customers” positively.

The fourth conclusion was questioned to understand the customer satisfaction about feature of the system: “To play and pause the music with customer interaction“. One participant strongly agreed and nine of the participants agreed with this conclusion meanwhile six of them stayed neutral and four of them disagreed with it. The results of the previous questionnaire about this feature, which was applied in section three, were mostly neutral. The results of this questionnaire shows that half of participants satisfied with this feature of system but again there is no certain support of a big majority

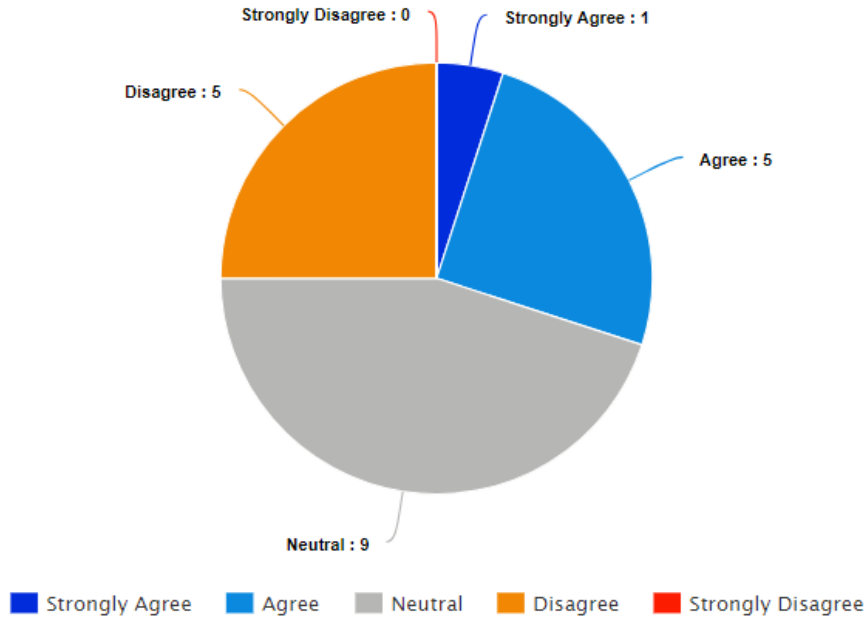
The fifth conclusion was questioned to understand the effects of the system on the “Possibility to revisit of customers”. One participant strongly agreed and five of the participants agreed with this conclusion. There were no participants who strongly disagreed with it, five of them disagreed and nine of them decided to stay neutral. The previous questionnaire, which was applied in section three, shows that “Music Information System” affects “Possibility to revisit of customers” positively. The results of this questionnaire show that the most of participants decided to stay neutral about the effects of system to “Possibility to revisit of customers” and effects of the system on this factor is not supported by this questionnaire unlike the previous one (See Figure 20).

The sixth conclusion was questioned to understand the effects of the system on the “Performance of the salespeople”. Three participants strongly agreed and nine participants agreed with this conclusion. On the other hand, four participants disagreed and four of them decided to stay neutral about this situation. This results show that participants usually approved: “Music Information System” affects “Performance of the salespeople” in a positive way (See Figure 21).

Studies which defend that background music affects “Performance of the salespeople” are: (Chebat et al., 1995), (Baker et al., 2002). The previous questionnaire, which was applied in section three, shows that “Music Information

System" affects "Performance of the salespeople" positively. The results of this study also go the same direction with the studies, which defend that background music affects "Performance of the salespeople", and the previous questionnaire. This situation shows that "Music Information System" affects "Performance of the salespeople" positively.

Figure 20: "Music Information System" and "Possibility to Revisit of Customers"

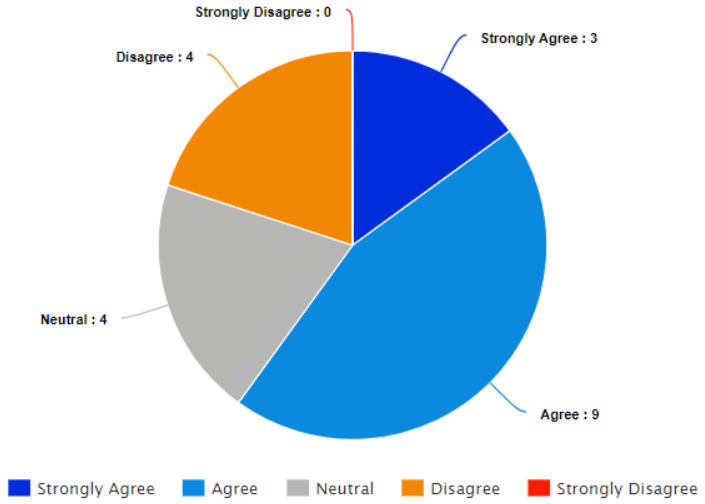


Studies which defend that background music affects "Performance of the salespeople" are: (Dubé et al., 1995), (Baker et al., 2002). The previous questionnaire, which was applied in section three, shows that "Music Information System" affects "Performance of the salespeople" positively. The results of this study also go the same direction with the studies, which defend that background music affects "Performance of the salespeople", and the previous questionnaire that shows that "Music Information System" will affect "Performance of the salespeople" positively.

The seventh conclusion was questioned to understand the effects of the system on the "Total sales of the bookstore". None of the participants strongly agreed and five of the participants agreed with this conclusion. One participant strongly disagreed, one of them disagreed and thirteen of them decided to stay

neutral about this situation. This results show that most of participants decided to stay neutral about the effects of system to "Total sales of the bookstore" so the effects of the system on this factor is not significant according to this questionnaire (See Figure 22).

Figure 21: "Music Information System" and "Performance of the Salespeople"

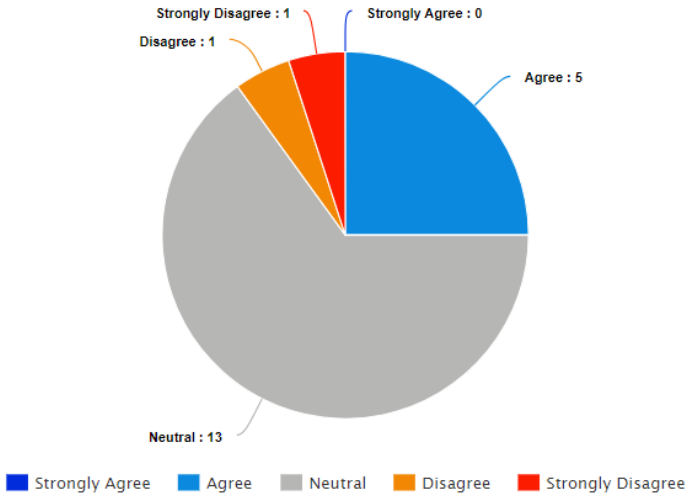


The seventh conclusion was questioned to understand the effects of the system on the "Total sales of the bookstore". None of the participants strongly agreed and five of the participants agreed with this conclusion. One participant strongly disagreed, one of them disagreed and thirteen of them decided to stay neutral about this situation. This results show that most of participants decided to stay neutral about the effects of system to "Total sales of the bookstore" and effects of the system on this factor is not supported by this questionnaire (See Figure 22).

Studies which defend that background music affects "Total Sales of the Bookstore" are: (Milliman, 1982), (Milliman, 1986), (Yalch and Spangenberg, 1993), (Areni and Kim, 1993), (Donovan, 1994), (Caldwell & Hibbert, 2002), (Vida et all, 2007), (Ferreire and Oliveira-Castro, 2011), (Morrison et al., 2011), (Andersson et al., 2012), (Gaygen, 2013), (Zeeshan, 2013). Studies which defend that background music doesn't have any effects on "Total Sales of the Bookstore" are: (Smith & Curnow, 1966), (Herrington, 1996), (Liaw, 2007), (Hussain and Ali, 2015). The previous questionnaire, which was applied in section three, shows that

"Music Information System" doesn't have a significant effect on "Total sales of the bookstore". The results of this study go the same direction with the studies, which defend that background music doesn't affect "Total sales of the bookstore", and the previous questionnaire.

Figure 22: "Music Information System" and "Total Sales of the Bookstore"



Studies which defend that background music affects "Total Sales of the Bookstore" are: (Milliman, 1982), (Milliman, 1986), (Yalch and Spangenberg, 1993), (Areni and Kim, 1993), (Donovan, 1994), (Caldwell & Hibbert, 2002), (Vida et all, 2007), (Ferreire and Oliveira-Castro, 2011), (Morrison et al., 2011), (Andersson et al., 2012), (Gaygen, 2013), (Zeeshan, 2013). Studies which defend that background music doesn't have any effects on "Total Sales of the Bookstore" are: (Smith & Curnow, 1966), (Herrington, 1996), (Liaw, 2007), (Hussain and Ali, 2015). The previous questionnaire, which was applied in section three, shows that "Music Information System" doesn't have a significant effect on "Total sales of the bookstore". The results of this study go the same direction with the studies, which defend that background music doesn't affect "Total sales of the bookstore", and the previous questionnaire.

The eighth conclusion was questioned to understand the possibility of the system to be successful in the different work areas. Ten participants strongly agreed and sixteen participants agreed with the possibility of the system to be successful in

different work areas. On the other hand, one participant strongly disagreed, five participants disagreed and nine of them decided to stay neutral about this situation. The results of the previous questionnaire about this conclusion, which was applied in section three, are mostly positive. The results of this questionnaire also show that “Music Information System” can be successful in different work areas.

As a total conclusion of this questionnaire it can be said that “Music Information System” affects the factors in a positive way which can be listed as: “Mood of the customers”, “Satisfaction of the customers”, “Total time spent by the customers” and “Performance of the salespeople”. On the other hand, there is no significant support about the effects of it on the factors: “Total sales of the bookstore” and “Possibility to revisit of customers”. The feature of the system: “To play and pause music according to customer interaction” is supported by half or participants. There are also positive expectations from the system to be successful in different work areas according to the questionnaire results.

FINDINGS

In the first section of the study, background music and its effects on businesses are examined. Previous studies about background music are investigated to understand positive and negative impacts of background music for a business. Also important factors for businesses that can be affected by background music are defined in the first section.

In the second section, local and universal online bookstores are investigated to define main categories for a standard bookstore. Most common categories are defined for both universal and local online bookstores. “History”, “Science”, “Art & Design”, “Children’s”, Economics & Business”, “Literature”, “Religion & Mythologies”, “Education”, “Hobbies & Crafting”, “Philosophy”, “Travel” and “Entertainment” categories are seen most frequently for both online and local ones. Priority of these categories is examined with a questionnaire to local bookstores that provide service in İzmir, Turkey. Results are investigated and categories are graded according to these results. “Children’s”, “History”, “Art & Design” and “Literature” categories are the ones with the highest points while the “Philosophy” category is surprisingly the lowest one. Thus, the main categories that must be used in the design of “Music Information System” are defined. “Education”, “Economics & Business”, “Travel”, “Entertainment” and “Science & Technology” are defined as secondary important main categories which should be used by “Music Information System” if it is possible according to characteristics of the bookstore.

In the third part, for the bookstores, the six factors that can be affected by background music are examined which are defined in the first part of the study as: “Mood of customers“, “Satisfaction of customers”, “Total time spent by customers”, “Performance of salespeople”, “Total sales of the bookstore” and “Possibility to revisit of customer”. The previous studies which support that background music influences these factors in a positive or negative way are stated. The studies which indicate that background music has no relation with these factors are also stated. The impacts of the “Music information system”, which plays different thematic music in different departments, on these main factors are investigated with the help of a questionnaire which was applied to local bookstores that provide service in İzmir,

Turkey. Results showed that the “Music information system” is estimated to be successful on effecting in a positive way to all main factors are except of “Total sales of the bookstore”. Further expectations about technical details and installation of the system on different kind of stores are also investigated with this questionnaire. Expectations are clearly positive and encouraging to use the “Music Information System” in different kind of stores.

In the fourth part technical details and specifications of the “Music information system” are explained. The system is designed to be tested in “Kırmızı Kedi Kitabevi” which gives service in İzmir, Turkey. The system had been tried in this bookstore for one week.

At the end of one week, an interview was made with the bookstore manager and assistant manager. Interview results approve that “Music Information System” affects the factors: “Satisfaction of the customer” and “Performance of the salespeople” in a positive way. It is also partially supported that the system affects the factors: “Moods of the customers”, “Total time spent by the customers” and “Total sales of the bookstore” by the results. The effects of the system to “Possibility to revisit of the customers” are not supported by the interview results.

Also a questionnaire was applied to the customers who experienced the “Music information system” in “Kırmızı Kedi Kitabevi”. Results of the questionnaire show that “Music Information System” affects the factors in a positive way which can be listed as: “Mood of the customers”, “Satisfaction of the customers”, “Total time spent by the customers” and “Performance of the salespeople”. On the other hand, there is no significant support about the effects of it on the factors: “Total sales of the bookstore” and “Possibility to revisit of customers”.

Benefits of the function of “Music Information System”, “To play and pause the background music according to customer interaction” are partially supported by results of questionnaires and the interviews. At the same time, benefits of another function of “Music Information System”, “To monitor customer arrival data belongs to different departments of the bookstore” are mostly supported by interview results. User has freedom to deactivate these functions whenever it requires but it is seen that these functions have generally positive effects on customers.

Allan (2008) makes some conclusions about previous studies which work on effects of background music. In light of this studies, main factors which are affected by background music are listed as: “Mood”, “Pleasure and arousal”, “Salesperson perception and affiliation”, “Store perception”,” Time waiting”, “Time spent”, “Willingness to buy”, “Money spent”. This study also confirmed the effects of background music on “Mood”, “Pleasure and arousal”, “Salesperson perception and affiliation”, “Store perception”,” Time waiting”, “Time spent”. Study of Yalch and Spangenberg (1993) approved that playing the appropriate music in specific departments resulted in more purchases and more spending money from shoppers. This study goes in same direction with these two studies and confirmed that playing appropriate music in specific departments affects the factors in a positive way such as: “Mood of the customers”, “Satisfaction of the customers”, “Total time spent by the customers” and “Performance of the sales people” but there is no significant support about more purchases or more spending money from shoppers but these specifications are also supported partially by some amount of customers and managers.

CONCLUSIONS

In this study, the main factors that can be affected by background music for a bookstore are defined in light of previous studies. The essential departments, where the "Music Information System" must give service for, of a bookstore are defined with help of a search on online bookstores and a questionnaire that was applied to local bookstores in İzmir, Turkey. The expectations about "Music Information System" on affecting the main factors are also examined with the help of this questionnaire. According to results of these mentioned parts, "Music information system" was designed for "Kırmızı Kedi Kitabevi" and tested for one week. A questionnaire was applied to customers who experienced "Music Information System" and interviews were made with managers of "Kırmızı Kedi Kitabevi" to measure the effects of the system on the main factors. Also some functions of the "Music Information System" and satisfaction of managers and customers about these functions were questioned.

According to findings of this study, "Music Information System" affects "Mood of the customers", "Satisfaction of the customers", "Total time spent by customers" and "Performance of the salespeople" in a positive way. These factors are affecting customers which are the most important external stakeholders for businesses. This situation increases the importance of "Music information system". It is also seen that "Music Information System" affects performance of the salespeople which also affects relations with the customers and profitability of the bookstore. As a conclusion it can be said that usage of a "Music Information System" may help a bookstore to acquire a competitive advantage against the competitors which don't use this system.

The findings of the study also show that "Music Information System" has no significant effect on the factors which are: "Total Sales of the Bookstore" and "Possibility to revisit of customer". Effects of the "Music information system" on these factors partially supported in this study because these factors are affected by many different variables and it is hard to observe a significant difference of the system on them. On the other hand, it is also seen that the "Music information system" may affect these factors positively in an indirect way because of enhancing

the factors such as “Total time spent by customers”, “Mood of the customer”, “Satisfaction of the customer” and “Performance of salespeople”.

As a conclusion, in terms of businesses it can be said that the “Music information system” fulfills its task. The main purpose of this system is to help the business in a specific task to make it a better and an easier way with the usage of technology. This situation shows that “Music Information System” enhances factors positively which are important for a business and also provides an insight about being successful for different stores or work areas.

RECOMMENDATIONS

This study revealed that using a “Music information system”, which plays different background music in different departments according to their themes, affects important factors for a bookstore in a positive way. Enhancing these factors in a positive way helps a bookstore to obtain a competitive advantage against the competitors in market. Moreover it is important for every business to orientate alterations of technology and use them for their advantages. So usage of “Music information system”, which increases efficiency of the background music in a store, is strongly recommended for the bookstores.

Results of usage of different background music in different departments are usually positive for a bookstore according to findings of this study. So it is recommended to consider using different background music in different departments of a store instead of one stable background music which is dominant to every place of the store for the further studies. It is fact that everyone has different expectations about music and the usage of different background music in different parts of a store helps this business to answer requirements of bigger ratio of people.

The feature of the “Music information system” that lets the user to monitor the information about customer arrival can be evaluated in the future designs. In the current system, “Music information system” only monitors the customer arrival data on the main computer. This feature of the system can be evaluated to monitor this information in different devices like mobile phones, tablet computers, etc. Usage of internet or another network instead of USB cable for data transfer can make it easier to transfer this data to various devices.

The “Music information system” plays and pauses music according to customer arrival and departure. This function of the system aims to increase interactivity of the background music with the customer. This function is partially supported by this study and it seems like need for this function depends on the user and environment. This feature of the system can also be reconsidered and developed in the future designs. Different kinds of sensors can also be used to detect customer arrival to a department.

Communication between “Music control devices” and the main computer is made by an USB cable in the current system which creates some visual pollution with cables and causes to extra costs. A wireless communication between these units can be more practical and useful. The possible Wi-Fi module for the microcontroller that is used in the current system communicates with a serial port with a same baud rate with the music player module that is used in this system design which makes it impossible to use wireless communication. But in future studies the usage of the Wi-Fi module should be reconsidered because this wireless communication may even make it possible to remove the music player modules from the system design completely. A proper application that runs in main computer can play music for every department. It is strongly recommended to consider this option.

In this study, the targets were chosen as bookstores for the system design because of various reasons that was explained in previous parts. However it doesn’t mean bookstores are the only or the best possible target to design this system for. The system can be also successful at supermarkets, restaurants and many other different kinds of shops. Responds of participants of questionnaires and interviews also give an insight about that “The music information” system can be successful in different kinds of stores. So it’s recommended to use “Music Information System” design for different kind of stores in the further studies.

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APPENDICES

Appendix 1: Questionnaire for Personnel of the Bookstores

MUSIC INFORMATION SYSTEM QUESTIONNAIRE

This Questionnaire was prepared by DEU - Graduate School Social Sciences - Business Information Systems student Mert CANBAY and Asst. Prof. Dr. Ferkan Kaplanseren to be used in a scientific publication and thesis.

Name of Bookstore:					
Your Corporate Position:					
Years of Service					
○ 0-1	○ 1-3	○ 3-5	○ 5-10	○ 10+	
According to our studies these are the main departments that should be in a bookstore. Do you agree with which of them?					
The categories that given below should be a main department in a bookstore.	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
History					
Literature					
Art & Design					
Science & Technology					
Religion & Mythologies					
Education					
Children's					
Hobbies & Garden					
Philosophy					
Economics & Social Sciences					
Travel & Nature					
Entertainment & Comics					
The Music Information System aims to play different background music in different departments according to their themes also play and pause the music with the customer interaction.					
Music Information System will affect positively:.	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
The mood of customers					
The satisfaction of customers					
Total time spent by the customers					
Performance of Salespeople					
Total sales of the bookstore					
Possibility to revisit of the customer					

Further Possible Expectations from "Music Information Systems"	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Different music genres cause different evocations in human mind.					
One music genre which is successful in one bookstore department may not be as successful in another department.					
It will catch customers' attention if music starts at the moment when the customers come close.					
One music genre which is successful in one bookstore department will also be successful in other departments.					
Using different genres of music in different departments of a bookstore will catch customers' attention and effects of it will be positive.					
Effects of using "Music Information System" in a bookstore will generally be positively.					
Effects of using "Music Information System" will be positive for this bookstore.					
Music Information System" may also be successful in different kinds of stores.					
Thanks for your contributions.					

Appendix 2: Questionnaire for Customers

MUSIC INFORMATION SYSTEM CUSTOMER QUESTIONNAIRE

This Questionnaire was prepared by DEU - Graduate School Social Sciences - Business Information Systems student Mert CANBAY and Asst. Prof. Dr. Ferkan Kaplanseren to be used in a scientific publication and thesis.

"Music Information System" which allows you to hear different background music in different department is used in this bookstore.	
Did you notice that "Music Information System" is used in this bookstore?	
○ Yes	○ No

Conclusions	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
There is a positive effect of different thematic music usage in different departments.					
"The Music System" which is used in this bookstore is attracting and building up passion to visit different departments.					
I am satisfied with "The Music System" that is used in this bookstore.					
It is good idea to start music at the moment when the customer comes close to the related department.					
I want to revisit this bookstore and "The Music System" contributes me to decide so.					
I would like to see the usage of a music system like this at my workplace.					
Usage of this music system will affect "The Total Sales of the Bookstore".					
"Music Information System" may also be successful in different kinds of stores.					
Thanks for your contributions.					

Appendix 3: Interview Questions

Q1: What do you think about the effects of “Music Information System” to the “Total time spent by customers”?

Q2: What do you think about the effects of “Music Information System” to the “Moods of the Customers”?

Q3: What do you think about the effects of “Music Information System” to the “Satisfaction of the customers”?

Q4: What do you think about the effects of “Music Information System” to the “Total sales of the bookstore”?

Q5: What do you think about the effects of “Music Information System” to the “Performance of salespeople”?

Q6: What do you think about the effects of “Music Information System” to the “Possibility to revisit of customers”?

Q7: Is it good idea to start music at the moment when the customers approach to the related department and pause when they leave?

Q8: Is it important to monitor the information about customer arrival in the departments?

Q9: Did “Music Information System” generally meet your expectations?

Q10: Can the “Music Information System” be successful in another bookstore?

Q11: Can the “Music Information System” be successful in different kind of stores?