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Aims and Scope

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Contents

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Teaching and Learning the English Language through Social Media Platforms (YouTube and Telegram) to Enhance Language Skills "Comparative Analytical Study"

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ABSTRACT

This study explores the analysis and evaluation of the effectiveness of using social media platforms (YouTube and Telegram) in teaching and learning the English language, in comparison with studying the available content and determining language skills, quality and suitability, analyzing users' interaction and influence with the content, platforms and service providers, analyzing preference factors, advantages and disadvantages. It provides the maximum benefit in Enhancing skills and effectiveness.The study aims to determine the quality, suitability, availability, integration of interactivity, and temporal and spatial flexibility. It evaluates the resulting impact through feedback and achieving the goal.The study provides a comprehensive analysis of the YouTube and Telegram platforms in providing content, and the differences in method of delivering information, the design of videos, interactive lessons and exercises, and the level of interaction in the use of educational tools and resources.A poly-stylistic method, namely the descriptive analytical method, is used in addition to the comparative and explorative methods with all the quantitative data of the educative performance in the two platforms, content reviews, and evaluations. The researcher will use statistical techniques, to conduct a comparative study such as measuring the effectiveness of the content, the interactivity of learning, the impact of tools and resources, flexibility, and feedback and evaluation by collecting samples that include different backgrounds and linguistic levels, the performance on the YouTube and Telegram platforms is compared. The study explores which of them has clear advantages in feedback, evaluation, resulting impact, and setting a qualitative vision with recommendations to achieve the desired results and goals.

Keywords— Teaching and learning English, YouTube, Telegram, language skills.

I. INTRODUCTION

Digital world has certainly witnessed an information revolution in the area of education, to emerge as an enjoyable and effective experience on the social media in teaching and learning the English language technology. The study indicates an analysis and evaluation of the effectiveness of using technology on social media platforms; namely, YouTube and Telegram. The study compares between them and provides a variety of relative educational resources and means of communication. This represents a modern and innovative concept in the field of education, from the perspective of stimulating interest and increasing opportunities for assimilation and effective learning of the English language. A proper method of education is to combine traditional and electronic education. Social media platforms can also be considered as an intellectual and cognitive force, capable of cultural guidance.

II. RESEARCH PROBLEM

The digital culture in teaching and learning the English language refers to the skills and concepts necessary for the effective and responsible use of digital media technology. E-learning, then, is the reliance on modern technologies in providing educational contents in an effective and disciplined manner.

1. Ensuring the role of influential factors in enhancing educational skills and improving their procedures.
2. Developing and controlling variables and solutions with recent studies when evaluating the impact of the current result through a comprehensive analysis of the YouTube and Telegram platforms.
3. Comparing between YouTube and Telegram to determine the presentation style, content, communication, and preferences.
4. Implementing the optimal acquisition of information in a way proper to the digital age, providing an interesting and attractive educational environment and looking into the learner's activity, effectiveness and mentality.

III. SIGNIFICANCE OF THE STUDY

1. Developing linguistic knowledge and skills by providing diverse learning and teaching tools.
2. Expanding communication and interaction more effectively through using technical tools such as interactive tutorials and participation in lessons.
3. Enhancing psychological and educational support to stimulate continuous learning, developing critical thinking and enhancing self-confidence.
4. Updating professional and development in the field of teaching and learning English and access to research, articles and updates in this field.

IV. AIMS OF THE STUDY

The aims of the study is to compare between the YouTube and Telegram users in terms of sharing educational content and the methodology enhancing language skills, including:

1. Providing educational resources such as interactive educational programs, applications and websites dedicated to teaching and learning the English language so that it can be available at any time and everywhere.
2. Enhancing and improving various forms of interactive communication, and participation, such as discussions, educational communities, and dedicated social media platforms, exchanging ideas and experiences with colleagues in the area of education and sharing their ideas to improve their concepts.
3. Enforcing and supporting independent learning by providing educational resources and tools that can be used independently, personal improvement quickly and flexibly, and continuous improvement of language skills and teaching methods.
4. Promoting self-confidence in language skills and educational abilities by using available educational resources, communicating, and participating in educational communities.

V. RESEARCH QUESTIONS

1. How can digital media via (YouTube and Telegram) platforms improve language skills?
2. How can social media platforms be used as well as digital tools and technologies (YouTube and Telegram) innovatively to stimulate self-ability so as to understand and acquire the English language?
3. What are the challenges in using social media platforms (YouTube and Telegram) to improve language skills?

4. How can social media platforms (YouTube and Telegram) enhance communication and interaction between learners and trainers in teaching and learning the English language.

VI. METHODOLOGY

1. The descriptive-analytical approach that describes and analyzes phenomena logically and in detail by interpreting the available data, since there are no accurate statistics for the number of websites learners or teachers in educational contents.
2. Exploratory approach: Exploring new or unhandled phenomena through research and collecting available data from different angles on YouTube and Telegram.3. The comparative approach: Comparing the different elements in YouTube and Telegram by analyzing the common aspects and differences between them.

Comparison between the Youtube and Telegram

The study compares between the YouTube and Telegram in terms of the following points:
1. Advantages and disadvantages of social media applications (YouTube, Telegram)
2. Type of communication, method of conveying information and time / place element.
3. Type of educational contents on (YouTube, Telegram).
4. Types of YouTube and Telegram instructors and students.
5. Levels of interactions in using educational tools and resources

YOUTUBE	TELEGRAM
It contains a large collection of various contents, such as educational videos, lessons, and lectures on various aspects of the English language to acquire vocabulary, grammar, and the four skills.	It provides communities and educational channels of a linguistic nature, where you can join and communicate with other learners and professional trainers to develop the four skills.
Myriads of various sources can result in distraction to learners.	Distraction results from myriads of messages or notifications.
Demonstrations, practical stories, and personal experiences can be used to showcase valuable products, as well as provide flexibility of access in terms of time and location.	Providing educational contents through educational articles, assignments, and discussions at any time with pre-scheduled timetables.

Contents often include stories and novels in English, as well as simplified methods of explanation and language exercises.	Includes links, books, apps, live broadcasts for participants, and live discussions.
The trainers are less formal and more intimate. They use simple and attractive methods and tools, and the learners are often amateurs, intruders, or seeking entertainment.	The instructors are more professional and formal in terms of performance and general attire, and learners are often regular students and more serious about learning.
Interacting is by pressing the like or dislike button and sharing the video with others by writing comments.	Interacting is timely in direct discussions, benefiting from the experiences of others, and sharing files, video clips and audios.

VII. RECOMMENDATIONS

1. Providing high-quality and diverse educational contents to improve the four language skills through social media and forums including illustrated lessons, readable texts, educational videos, interactive exercises, and downloadable teaching materials.
2. Supporting, assisting, and encouraging collaborative learning by creating study bodies or collaborative platforms via social media and forums. The study provides guidance and support to learners via social media.
3. Providing learners with a proper mechanism to measure and evaluate their performance via social media and forums, providing exercises and tests to help them improve their language skills.
4. Monitoring contents and encouraging interactions to ensure reliability and appropriateness for each learner's goals and level of language skills.
5. Optimizing the benefit of e-learning and traditional education in teaching and learning the English language.
6. Conducting new studies related to electronic academic practices, for social media platforms themselves may be a major source for teaching and learning the English language and may be a sub source for refining language skills.

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The Impact of Artificial Intelligence on Digital Transformation in the Healthcare Sector in Riyadh in the Light of Vision 2030

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ABSTRACT

This research explores the pivotal role of artificial intelligence in bringing about a digital transformation in the healthcare sector in Riyadh, focusing on how it contributes to the achievement of the goals of Vision 2030. The research addresses the challengesfaced by Riyadh's health sector and examines how artificial intelligence can be used to overcome these challenges, including improvingthe quality of health services, enhancing operational efficiency, and supporting scientific research.By analyzing data and reviewing previous studies, the research shows how AI technologies can contribute to the early detection ofdiseases, providing dedicated health care, and improving the management of health facilities. The research also discusses the impact ofartificial intelligence on medical education and training and explores how it can enhance scientific research in the field of health.The findings indicate that AI has the potential to significantly transform Riyadh's healthcare sector, contributing to the realization ofVision 2030. The research concludes with recommendations for the effective application of artificial intelligence in the health system,emphasizing the importance of innovation and technical integration for the future of healthcare in the Kingdom.

Index Terms—Artificial Intelligence, Digital Transformation, Healthcare, Riyadh, Vision 2030.

INTRODUCTION

Vision 2030 seeks to make Saudi Arabia a leading healthcare destination. Digital transformation plays an important role in achieving this vision, as it can help improve the quality, efficiency, and effectiveness of health care. In the last two decades, the world has witnessed a technological revolution that has changed many aspects of our daily lives, one of the most prominent of which is the evolution of artificial intelligence and its increasing impact on various sectors, including the healthcare sector. This research highlights the vital role that AI plays in driving digital transformation in the healthcare sector in Riyadh, a transformation that is consistent with the vision and objectives of Vision 2030.

Artificial intelligence is one of the most important digital transformation technologies, as it can be used in a variety of healthcare applications, such as:
Diagnosis: AI can be used to analyze medical data and provide more accurate diagnostics.
Treatment: AI can be used to develop new and more effective treatments.
Management: AI can be used to improve the management of hospitals and clinics that reflect positively on customer satisfaction.
Riyadh is one of the most prominent cities in Saudi Arabia, facing various challenges related to providing effective and sophisticated health services to its growing population. In this framework, AI is highlighted as a powerful tool to contribute to improving the quality of these services, accelerating diagnostics and treatments, and enhancing the operational efficiency of health facilities.

Al-Mannaei, Fahd (2022) notes that through Vision 2030,Saudi Arabia is committed to significant development in infrastructure and services, including the health sector. AI is an integral part of this vision, providing broad possibilities to shift towards a more advanced and efficient health system.

Rashid, Ahmed, and Abdulrahman Mohammed (Digital Transformation of the Health Sector during the COVID-19 Pandemic in Saudi Arabia) (2022) seek to explore how to exploit artificial intelligence to meet the current challenges in Riyadh's health sector and analyze the opportunities and challenges associated with its effective application and employment. Through this exploration, a comprehensive vision is presented that contributes to a deep understanding of the potential impact of artificial intelligence on healthcare in Riyadh, and how it can be a catalyst for achieving the goals of Vision 2030.

We, the two researchers, have seen many previous studies in this area and referred to them in the research, and then mentioned our opinion on those studies.

II. RESEARCH PROBLEM

With the growing need to improve the efficiency and effectiveness of health services in Riyadh City, the challenge of integrating and exploiting artificial intelligence technologies to achieve the desired digital transformation in this sector is highlighted. This transformation is vital to keeping pace with global trends and achieving the goals of Vision 2030, but it faces several fundamental challenges.

The first of these challenges relates to technical infrastructure and the ability to effectively integrate AI solutions into the existing health system. There are challenges related to ensuring the quality and protection of health data, which are essential for the successful application of artificial intelligence. In addition, this transformation requires the development of medical and administrative cadres' skills and their training in using new technology efficiently.

Devote relevant bodies such as telecommunications,cybersecurity, and data to policy reformulation and legislation regulating the use and identification of stakeholders in the field. Understanding trends in orientation, quantification, quality, and means of development continues to be inconsistent with daily development.

Additionally, ethics and privacy challenges in the use of AI in health care must be ensured that patients' rights and safety are respected. Also, there are financial and investment challenges related to funding and supporting these modern technologies.

This research aims to understand and analyze these challenges in detail, focusing on how AI affects digital transformation in Riyadh's healthcare sector and how it contributes to the achievement of Vision 2030 goals. By identifying and analyzing these challenges, effective strategies can be developed to achieve the desired digital transformation of health care in a manner that is sustainable and consistent with national goals.

III. THE IMPORTANCE OF RESEARCH

The importance of studying this topic is several points,including:
Strategic Importance: The study is linked to the Kingdom's Vision 2030, which aims to make the Kingdom a leading healthcare destination. Therefore, the study contributes to achieving this vision by assessing the impact of artificial intelligence on the digital transformation of the healthcare sector.

Practical Importance: The study provides valuable information to relevant healthcare sector stakeholders, such as hospitals, clinics, and regulators. The study also provides valuable information to researchers in the field of artificial intelligence and health care.

Academic significance: The study contributes to developing knowledge about the relationship between artificial intelligence and digital transformation in health care.The study also contributes to the development of new tools and techniques to help the healthcare sector benefit from artificial intelligence.

Addressing current and future challenges: Research helps understand the challenges facing the healthcare sector in Riyadh and provides innovative solutions to address them, especially those related to population growth and demographic changes.

Promoting scientific research and development: This research opens the door for further research and studies in the field of artificial intelligence and its applications in health care, supporting academic and scientific growth in this field.

IV. RESEARCH OBJECTIVES

1. Determine the impact of artificial intelligence on the uality of health services: investigate how artificial intelligence is used to improve accuracy in diagnosis and treatment, as well as improve the effectiveness of health operations in Riyadh.
2. Assess digital transformation in health care: Explore how modern technology can enhance operational efficiency and provide innovative solutions to current challenges in the health system.
3. Supporting the achievement of the objectives of Vision 2030: Analyzing the role of artificial intelligence in promoting the goals of Vision 2030, especially concerning improving health care and developing health infrastructure.
4. Study the challenges and opportunities associated with artificial intelligence: Identify the obstacles and challenges that may confront the application of artificial intelligence in health care and explore opportunities to overcome them.
5. Economic and social impact assessment: Study how artificial intelligence affects cost reduction and health outcomes, benefiting Riyadh's economy and society.
6. Propose strategies for effective implementation: develop recommendations for the effective implementation of artificial intelligence technologies in the health system, with a focus on the training and professional development of medical and administrative personnel.

V. PREVIOUS STUDIES

Several studies have been conducted on the impact of artificial intelligence on digital transformation in the healthcare sector. These studies have concluded that artificial intelligence can have a significant positive impact on the sector, as it can help improve the quality, efficiency, and effectiveness of health care.

Analysis of global trends: Here some studies on the use of artificial intelligence in health care are reviewed internationally, focusing on innovations, challenges, and successes. A study by PwC found that artificial intelligence can help improve healthcare quality by up to 30%. A study by McKinsey also found that artificial intelligence can help improve healthcare efficiency by up to 20%.

In a study conducted by the Massachusetts Institute of Technology (MIT), the study indicated solutions for the future of health care with artificial intelligence. As AI plays an increasingly important role in treating patients, due to its ability to accurately predict diseases in the early stages, AI is seen as a powerful tool in today's healthcare industry. As AI offers advantages such as patient care, improving patient safety, and innovative treatment options, it is not surprising that 56% of doctors believe that most of their decisions over the next decade will be made using AI-based clinical decision support tools. owever, doctors face a knowledge gap and report the growing need for professionals who understand AI-based technologies and ways to utilize them for the benefit of healthcare providers and patients.

With a focus on the application of artificial intelligence in modern healthcare, MIT's AI in Healthcare (2020) The Fundamentals and Applications program is designed to allow leading physicians, healthcare IT professionals, and healthcare entrepreneurs to see how AI technologies can make a difference in treating patients and enable them to develop innovative solutions to health care challenges today and tomorrow."

Gordon et al (2020) have discussed with some specialization mobile health applications (MHAs) and medical applications (MAs) that have been popularized and increased significantly in almost all healthcare sectors as influential digital interventions. In the precise medical disciplines, this is evident in the clinical services of gastrointestinal diseases (gastrointestinal system), where in many respects there has been a positive digital shift reflected in the dealings and uses of patients and healthcare professionals. This will have a significant impact on the progress of screening and treatment methods and timing soon (Le Berre et al 2020, Huang et al 2020, Siegel 2017). On the other hand, he (2016) Whitehead and Seaton; Lallo et al. (2017) ٢٠١٨ (و (Thurnheer et al. In successive years, MHAs and MAs have been examined, and have been found to have significant and impactful abilities in many conditions, especially concerning chronic disease patients, where patients have been able to manage their health status in multiple ways such as follow-up, communication, dose regulation, etc., which has helped medical staff greatly in effectively fulfilling their role.

In an independent study prepared by the IMS Institute of Health Care for Information (2013), an objective assessment of its type, role, and functions was made. The study revealed that the most common category in mobile applications is prevention and healthy lifestyles. The category of prevention and healthy lifestyles includes diet and exercise, smoking cessation, stress, relaxation, and sleep. In addition, it provides for the circulation of the Uniform Medical Register, facilitating access to the results of laboratory and radiological examinations of various types to avoid repeated medical examinations and personal trips, as well as reducing the invoice.

Local case studies: Review research on AI applications in healthcare within Saudi Arabia, especially in Riyadh, to identify gaps and opportunities. The Saudi Authority for Data and Artificial Intelligence (SADAYA) reports that the World Health Organization (WHO) is dealing with the coronavirus pandemic. - COVID-19, urging international health organizations to use data and artificial intelligence techniques to accelerate the search for treatment of Virus Corona. Several data-based and artificial intelligence-based applications have been demonstrated to facilitate the detection and diagnosis process, as well as WHO's recommendation to target Rochemicals.

Policy analysis and regulatory frameworks: Consider studies on the regulatory and policy aspects of the application of artificial intelligence in the health sector, and how these factors affect innovation and digital transformation. This contributes to the reliability and governance of information to increase health awareness among users of these applications, and to reduce the dissemination of fake information that may negatively affect human health. In addition to maintaining patients' privacy and dealing with their medical and social data in full confidentiality. Blogger Mohammed El-Arada (2023) says on his online page about the benefits of using AI in the medical field that it improves the accuracy of diagnosis of the disease and saves time and effort as well. He pointed out that one of its disadvantages was that it posed a risk to certain jobs in the future that were currently being performed by human beings.

VI. THEORETICAL FRAMEWORK

Digital transformation theories: Using digital transformation theories to understand how new technology can change the way health care is delivered and managed.
AI models in health care: explore theoretical models related to the application of AI in health care, such as large data analysis, machine learning, and machine diagnosis.
Technology Innovation and Adoption Theory: Applying technology innovation and adoption theories to analyze how health facilities can adopt artificial intelligence technologiesmmand overcome obstacles they face.
Ethics in AI: Integrate AI ethical theories to understand ethical and privacy challenges in its use in healthcare.

VII. RESEARCH HYPOTHESES

Health Care Quality Positive Impact Hypothesis: This hypothesis assumes that the use of AI technologies in health care in Riyadh will contribute positively to improving the quality of health services provided.
Operational Efficiency Impact Hypothesis: This hypothesis assumes that the application of AI will increase the efficiency of health processes and contribute to reducing operational costs.

Research Methodology:

Type of research: desk research to review past literature and Empirical Research to collect data.
Method: Use quantitative research to collect and analyze data.
Document Analysis: Includes analysis of available documents and reports, such as patient records and management reports, to obtain reliable data. Ethical review: related to ethical behavior and standards followed by the researcher during the execution of the research. Ethical norms have been observed, including:
Confidentiality of information: It was confirmed that the confidentiality of the information collected was respected and dealt with during the search.
Obtaining the necessary approvals: Information or data has been collected from individuals working in the health sector after obtaining their prior consent based on confidentiality and privacy standards.
No manipulation: Data manipulation or misrepresentation of results should be avoided to achieve certain goals. Must submit.
Taking into account safety and health: the necessary measures have been taken to ensure the safety of research participants and to preserve health and safety.
Vision 2030 hypothesis: This hypothesis assumes that artificial intelligence will be one of the tools for achieving Vision 2030 goals in Riyadh's healthcare sector.

The hypothesis of challenges and obstacles: this hypothesis presupposes technical, organizational, and ethical challenges to the application of artificial intelligence in health care, and will negatively affect the realization of other hypotheses.
Economic and social impact hypothesis: this hypothesis assumes that the use of smart technologies will have a positive economic impact and provide new economic opportunities in health care.
National Trends Effect Hypothesis: This hypothesis assumes that the directions and strategies of Saudi Arabia's national authorities will have a significant impact on the success of the application of artificial intelligence in healthcare.

VIII. RESEARCH RESULTS

The research concluded that AI can have a significant positive impact on the healthcare sector in Riyadh, as it can help improve the quality, efficiency, and effectiveness of healthcare.
Comparing previous studies shows that collecting these studies focused on the importance of AI uses and applications in the health sector in which it enhances the prediction of early detection of diseases analyses data related to associated symptoms and puts them in a template that helps doctors give appropriate treatment, The use of AI in health is also a step that makes societies more aware leading to a vibrant and healthy community of diseases.

Some of the main findings of the research are as follows:
There are many potential applications of AI in the healthcare sector in Riyadh, such as:
• Use artificial intelligence to analyze medical data and provide more accurate diagnostics.
• Using artificial intelligence to develop new and more effective treatments.
• Using artificial intelligence to improve hospital and clinic management.
• AI can help improve the quality of healthcare in Riyadh by:

1- Provide more accurate diagnostics, leading to more effective treatments.
2- Improve the care of chronic patients, resulting in lower rates of hospitalization and death.
3- Improve patient care in rural areas, reducing health inequalities.

• AI can help improve healthcare efficiency in Riyadh by:
1- Improve the efficiency of operations, such as medical records management and inventory management.
2- Improve resource efficiency, such as medicines and medical devices.
3- Improving the efficiency of information sharing among healthcare providers.

• AI can help increase access to healthcare in Riyadh by:
1- Provide telehealth, making it easier for patients to access the care they need.
2- Improve the efficiency of the management of healthcare providers, resulting in an increase in the number of patients with access to care.

Challenges to the use of artificial intelligence in the healthcare sector in Riyadh
There are also some challenges facing the use of artificial intelligence in the healthcare sector in Riyadh, the most important of which are:
• Lack of skills: There is a lack of skills to develop and apply artificial intelligence technologies in the healthcare sector in Riyadh.
• Cost: The cost of developing and applying AI technologies can be high.

• Privacy and Security: There are concerns about privacy and security when using AI technologies in healthcare.

IX. VIIII. STUDY RECOMMENDATIONS

In the light of the findings of this research, the study recommends that:

• Develop training programs for healthcare workers in Riyadh to increase their skills in the field of artificial intelligence.

• Providing financial support to entities working in the healthcare sector in Riyadh to apply AI technologies.

• Establishing legislation and regulations to protect the privacy and security of health data when using artificial intelligence in Riyadh.

• Digital application governance that publishes prescriptions and therapeutic consultations.

• Supporting infrastructure in line with the rapid growth
of AI applications, especially in Riyadh, which is Saudi Arabia's largest city in terms of population density.

• Supporting research and encouraging researchers to further theoretical and field research studies related to the healthcare sector.

X. CONCLUSION

AI is a promising technology that can help improve the healthcare sector in Riyadh. However, there are some challenges to overcome to make full use of AI in this sector. There is no doubt that AI plays a key role in the development of the health care field, from its early detection of diseases, analysis of data, acceleration of the detection of appropriate medicines for the disease, as well as its ability to assist edical and health-care personnel in the development of medical technology.

As mentioned above, this research focused on the extent to which the Riyadh health sector benefits from artificial intelligence and employs it in the field of medicine and research related to public health and quality of life, which is one of the objectives of the Kingdom of Saudi Arabia's Vision 2030. Using AI and digital applications, the health sector has achieved a distinction that has been witnessed by global health organizations by spreading health awareness among the community in dealing with the coronavirus pandemic. In this research, we emphasize that the need for further studies on the roles of AI still exists especially in the privacy policy, medical research development, training of workers in the uses of AI-related digital applications, as well as infrastructure that must keep pace with the rapid growth of AI especially in Riyadh. We also note in this research that there is still a research gap, especially in field studies on users of different applications of AI in the field of health.

On a related level, research on this subject has found further efforts in the governance of medical data on the validity of the information published and the reliability of its sources, especially concerning the prescriptions sought by patients through available technical means.

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Enhancing Efficiency in Footwear Manufacturing: Reducing Pre-Production Lead Time through Value Stream Mapping and the Cut-to-Box System

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ABSTRACT

This article presents a comprehensive study on enhancing efficiency in footwear manufacturing through the implementation of Value Stream Mapping (VSM) and the innovative Cut-to-Box system. The case study focuses on a Footwear Company, a four-floor factory in Istanbul, Turkey. The current state of pre-production processes is analyzed using time metrics, contributing to the design and implementation of a future value stream mapping system. The newly introduced Cut-to-Box system revolutionizes the traditional production line, streamlining warehouse operations. The study evaluates the challenges faced by the existing system. The Cut-to-Box system is assessed for its transformative impact on lead time using VSM. The results indicate a significant improvement in overall efficiency, with a reduction in lead time, process time, changeover time, transfer time, and waiting time. It concludes by emphasizing the importance of continuous analysis and optimization for maintaining competitiveness and delivering high-quality products on time.

Index Terms— Footwear manufacturing, Value Stream Mapping, Cut-to-Box system, Efficiency improvement.

1. INTRODUCTION

The global footwear industry has witnessed a paradigm shift in recent years. As consumers demand quality, variety, and timely delivery, production processes are being optimized. A footwear manufacturing, based in Turkey, has taken a proactive approach to addressing inefficiencies in its pre-production stage. This is where the focus is on creating a production sample before mass manufacturing.

Traditional pre-production processes involve multiple departments, each contributing to lead times. This article highlights the processing time, waiting time, and transfer time of various departments. Taking advantage of the innovative Cut-to-Box approach, we propose and implement a future value stream mapping system.Cut-to-Box introduces a cellular manufacturing layout within the warehouse, optimizing departmental workflow.

This layout, characterized by a U-shaped conveyor system, minimizes transportation and waiting times, fostering a seamless transition from the cutting department to stitching and assembly lines, packing and shipping to the customer. The article explores Value Stream Mapping to pinpoint inefficiencies. It assesses the transformative impact of the Cut-to-Box system on lead time.

The intervention has been overwhelmingly positive. This includes substantial improvements in lead time from 21.43 days to 16.79 days, process time, changeover time, transfer time, waiting time, and a notable reduction in required personnel. The article concludes by emphasizing the importance of continuous analysis and optimization for companies to remain competitive in the footwear industry.

II. LITERATURE REVIEW

Efficiency is a key component of footwear manufacturing, directly affecting the industry's ability to meet the growing demand for customized and fast-paced products [1]. The term value stream was first used by Womack, Jones and Roos in their 1990 book The Machine That Changed the World, and by Womack and Jones in their 1996 book Lean Thinking. According to Martin and Osterling, value stream mapping reduces operational waste. In addition to transforming leadership thinking and defining strategy and priorities, value stream mapping can ensure that customers receive high levels of value. Value stream mapping has been discussed in the manufacturing environment since Toyota Motor Corporation used it [2]. In addition, researchers describe VSM as a method for visualizing the flow of information and objects. From human resources to data flow, it visualizes the time sequence for every stage of the supply chain. During the manufacturing process, VSM identifies and processes value-added activities to reduce non-value-added [3]. A value-added action is an activity or step in a process that contributes directly to meeting customer requirements and specifications. In other words, these are activities that the customer is willing to pay for to improve the product's form, fit, or function. The term non-value-added action refers to actions that do not contribute to the product's value from the perspective of the customer. Despite consuming resources, these activities do not improve the quality or functionality of the product [4]. Lead time measures the time between the initiation and completion of a process. It directly affects productivity. Producing more output in a short time period adds more value. From order to delivery, a value stream map provides a good overview.[5] Pre-production or prototyping is a very critical stage of new product development, where many decisions have to be made to get high-quality, zero-defect products on time at the lowest cost. As a result, any value-added prototyping improvements will increase manufacturers' competitiveness. It aims to benchmark best practices in prototype part manufacture to support early product introduction. [6]. Also, a similar study was conducted in Bangladesh to reduce lead time by utilizing lean tools such as Value Stream Mapping (VSM), Process Cycle Efficiency (PCE) and Pareto [7]. According to researchers' knowledge, a comprehensive review of the existing literature reveals that there are no studies specifically addressing the "Cut-to-Box" system in footwear manufacturing. This observation underscores the innovative nature of our research, positioned at the forefront of advancements in operational efficiency within the industry. In this paper, VSM is applied to enhance efficiency in footwear manufacturing by reducing waste and non-value-added activities, and a new concept of cut-to-box is proposed for the pre-production phase.

III. METHODOLOGY

Value stream is a complete group of some performance containing value added and non-value added actions. VSM is regarded as the flow of products that is initiated by the raw material and ending by consumer. VSM aims to reduce waste by reorganizing all types of waste in the value stream. The footwear industry in this study was the population, and its court shoe production line was the sample. Based on the researcher's observations of a leading export-oriented footwear industry in Turkey at the pre-production stage, the primary data was collected. A stopwatch was used to record the observed time. Every stage of the production line was observed for cycle time, changeover time, processing time, transferring time, waiting time, lead time, and material and labor flow. The factory has a 10-hour shift on a five-day workweek. In addition, each workday includes a one-hourbreak, and the factory works

20 days each month. The factory's total monthly working hours are 200 hours, and its net monthly available working hours are 180 hours after deducting rest hours.

The cycle time is the amount of time required to complete the production of one unit (in this case, a pair of footwear). A changeover time refers to the period of time spent in transitioning from one type of production to another. The batch quantity is the number of pairs of shoes needed for preproduction and shipping to the customer, which in this study equals 200 pairs. The processing time is the total amount of time required to complete a particular task or operation, which consists of both cycle time and change over time.

Processing Time= (Cycle Time of 200 pairs) + Changeover Time (1)Lead time in this study refers to the comprehensive period of time required for a product to progress through different stages. The process begins with the initiation of a customer order and ends with the completion and delivery of a sample production. In general, this entails processing times, waiting times, and transfer times associated with tasks such as placing orders and procuring materials, planning, quality control, laminating, cutting, stitching, assembling, and completing final quality checks prior to packaging and shipment. The waiting time is the period during which materials or products do not undergo processing or are inactive. Transferring time represents the time taken to move materials or products between different stages or locations within the manufacturing process.

Lead Time= Processing Time + waiting Time + Transferring Time (2)
A pre-production stage is started by the footwear company before mass production begins with 200 pairs of shoes produced to better understand the entire process. Pre-production consists of the following stages in Fig. (1):

Fig. 1 PRE-PRODUCTION STAGE

Current Value Stream mapping Stages:

Step I- On-Site Data Collection: Utilizing stopwatches, we conducted a floor-by-floor analysis of the Footwear Company's pre-production processes, capturing cycle times, changeover times, transferring times, and waiting times.Step II- Quantitative analysis: We calculated key metrics for each department, generating Table I as a reference for total cycle time, changeover time, transferring time, and waiting time.

Table I. Pre-production time measurements Current State

PRE-PRODUCTION STAGES	CYCLE TIME (200 PAIRS)(HOUR)	CHANGE OVER TIME (HOUR)	PROCESSING TIME (HOUR)	TRANSFERING TIME (HOUR)	WAITING TIME (HOUR)	LEAD TIME IN DAYS	VALUE-ADDED TIMES (HOUR)	NON-VALUE ADDED TIMES (HOUR)
PRE- PRODUCTION PLANNING	2.5	0.42	2.92	0.50	1.53	0.55	2.5	2.5
INVENTORY RECEIVING & DATA ENTRY	6.3	0.97	7.30	6.92	2.80	1.89	6.3	10.7
QUALITY CONTROL OF RAW	4.7	0.77	5.43	2.00	2.43	1.10	4.7	5.2
LAMINATION	1.9	0.80	2.72	1.70	1.48	0.66	1.9	4.0
CUTTING	13.3	0.68	14.02	3.42	2.82	2.25	13.3	6.9
STITCHING	50.0	0.60	50.60	3.25	6.12	6.66	50.0	10.0
QUALITY CONTROL OF UPPERS	3.3	0.42	3.75	1.43	0.42	0.62	3.3	2.3
ASSEMBLING	40.0	0.63	40.63	2.47	4.75	5.32	40.0	7.9
QUALITY CONTROL OF SHOES	10.0	0.47	10.47	0.92	0.60	1.33	10.0	2.0
PRE PRODUCTION PACKING & SHIPMENT	6.7	0.58	7.25	1.10	1.12	1.05	6.7	2.8
TOTAL	138.8	6.3	145.1	23.7	24.1	21.4	138.8	54.1

Step III- Visual representation:

Fig. 2 illustrates the current value stream mapping, offering a visual overview of sequential activities and their corresponding time metrics across all four floor.

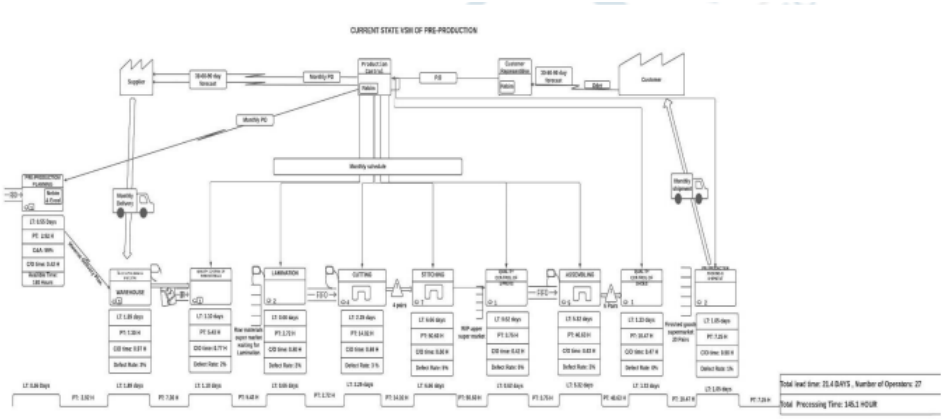

Fig. 2 Current Value Stream Map for Pre-Production

Step IV- Analyzing the challenges in the current situation:

The current value stream mapping of this footwear company's pre-production process revealed several significant inefficiencies and challenges. There were prolonged lead times, substantial waiting periods, and excessive material transfers between floors and departments in the linear production line. Inefficiencies led to bottlenecks, longer cycle times, and higher error rates. The production floor layout also contributed to logistical challenges, requiring materials to traverse multiple floors, increasing handling times and transportation delays. Cut-to-Box was implemented to streamline and optimize this convoluted workflow. With a U-shaped conveyor layout, the Cut-to-Box system sought to minimize unnecessary material movements, reduce waiting times, and foster a more efficient and lean pre-production process.

In the dynamic footwear manufacturing industry, this approach was driven by a desire to enhance perational flow, decrease lead times, and ultimately improve competitiveness.

Future Value Stream Mapping:

Our proposal advocates a strategic departure from the current four-floor production line at the footwear factory. We favor a consolidated warehouse environment augmented by the Cut-to-Box cellular manufacturing system. This transformative initiative involves the meticulous arrangement of departments, the introduction of a U-shaped conveyor layout, and the streamlining of material transitions. Fig. 3 visually articulates the harmonized workflow envisioned in this reimagined state. Anticipated outcomes include a significant reduction in lead time, cycle time, changeover time, transferring time, and waiting time. This is detailed in Table II. This strategic move not only addresses existing challenges but positions the footwear factory as a trailblazer in operational excellence within the competitive footwear manufacturing industry. This is evidenced by the tangible results derived from our future value stream mapping.

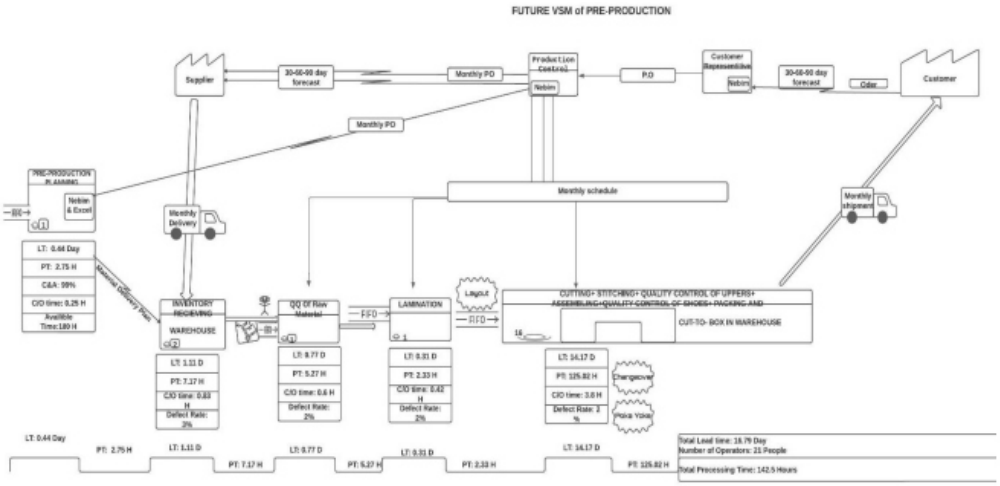

Fig. 3 Future Value Stream Map for Pre-Production

Table II. Pre-production time measurements Future State

PRE-PRODUCTION STAGES	CYCLE TIME(200 PAIRS)(HOUR)	CHANGE OVER TIME (HOUR)	PROCESSING TIME (HOUR)	TRANSFERING TIME (HOUR)	WAITING TIME (HOUR)	LEAD TIME IN DAYS	VALUE-ADDED-TIMES (HOUR)	NON-VALUE-ADDED - TIMES (HOUR)
PRE- PRODUCTION PLANNING	2.50	0.25	2.75	0.50	0.67	0.44	2.5	1.4
INVENTORY RECEIVING & DATA	6.33	0.83	7.17	1.72	1.08	1.11	6.3	3.6
QUALITY CONTROL OF RAW MATERIALS	4.67	0.60	5.27	1.03	0.60	0.77	4.7	2.2
LAMINATION	1.92	0.42	2.33	0.27	0.23	0.31	1.9	0.9
CUTTING	13.33	0.53	13.87	0.57	0.53	1.66	13.3	1.6
STITCHING	50.00	0.30	50.30	0.00	0.28	5.62	50.0	0.6
QUALITY CONTROL OF UPPERS	3.33	0.17	3.50	0.08	0.15	0.41	3.3	0.4
ASSEMBLING	40.00	0.40	40.40	0.13	0.35	4.54	40.0	0.9
QUALITY CONTROL OF SHOES	10.00	0.13	10.13	0.07	0.10	1.14	10.0	0.3
PRE PRODUCTION PACKING & SHIPMENT	6.67	0.15	6.82	0.08	0.17	0.79	6.7	0.4
CUT-TO-BOX TOTAL	123.33	1.68	125.02	0.93	1.58	14.17	123.33	4.20
TOTAL	138.8	3.8	142.5	4.5	4.2	16.79	138.8	12.4

IV. RESULTS AND DISCUSSION

The comparative analysis between the traditional four-floor pre-production system and the newly implemented Cut-to-Box system with U-shaped conveyors reveals a transformative impact on key metrics, substantiating the efficacy of the strategic shift.

1. Lead Time Reduction:

The implementation of the Cut-to-Box system has resulted in a substantial reduction in lead time, decreasing from 192.85 hours to 151.15 hours (21.43 working days to 16.79working days). This equates to a remarkable 21.62%decrease in lead time, enhancing the company's ability to respond faster to customer orders.

2. Waiting Time and Transfer Time:

Total waiting time has decreased drastically, plummeting from 24.07 hours to 4.17 hours, an impressive 82.68% improvement. Simultaneously, transferring time has been reduced from 23.70 hours to 4.45 hours, reflecting an 81.22%decrease. These reductions underscore the streamlined material flow and minimized delays facilitated by the Cut-to-Box system.

3. Changeover Time and Processing Time:

Changeover times have notably decreased from 6.33 hours to 3.78 hours, indicating a 40.26% reduction. This reduction is emblematic of enhanced efficiency in transitioning between production phases. Additionally, processing time has been trimmed by 1.75%, contributing to overall time savings during pre-production.

4. Resource Utilization:

The number of required personnel for the pre-production process has seen a significant decrease, dropping from 27people to 21 people. This 22.22% reduction in workforce aligns with operational efficiency goals but also contributes to cost-effectiveness.

5. Operational Efficiency and Quality improvement:

The accrued reductions in lead time, waiting time, transferring time, changeover time, and workforce requirements attest to the operational efficiency gains realized through the implementation of the Cut-to-Box system. The newly implemented Cut-to-Box system not only enhances operational efficiency but also positively influences product quality through centralized and streamlined workflow, ensuring meticulous monitoring at each pre-production stage. A visual representation of the transformational impact of the Cut-to-Box system on the footwear company's pre-production processes can be found in Fig. 4 and a quantitative analysis can be found in Table III.

Based on this comparative analysis, we can clearly see the stark differences between the traditional four-floor production system and the innovative Cut-to-Box system with U-shaped conveyors.

Table III. Quantitative Comparison

METRIC	TRADITIONAL SYSTEM	CUT-TO-BOX SYSTEM	REDUCTION (%)
TOTAL LEAD TIME	192.85	151.15	21.62
TOTAL PROCESS TIME	145.08	142.53	1.76
CHANGE OVER TIME	6.33	3.78	40.26
TRANSFERING TIME	23.70	4.45	81.22
WAITING TIME	24.07	4.17	82.69
NUMBER OF PEOPLE	27	21	22.22

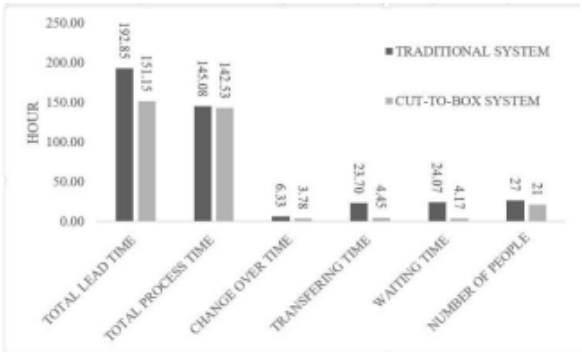

Fig. 4 Comparative analysis of traditional and new system

V. FUTURE WORK

As we delve into future discussions, the associated cost savings and increased efficiency will be integral considerations for the Footwear Company's sustained competitiveness in the industry.In summary, the comprehensive data comparison underscores the tangible benefits of the Cut-to-Box system, positioning the footwear company for heightened efficiency, reduced lead times, and increased competitiveness in the dynamic landscape of footwear manufacturing. The observed improvements not only validate the strategic shift but also lay the foundation for continued operational excellence.

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Opportunities of Using Artificial Intelligence Algorithms to Improve the Sourcing Process

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ABSTRACT

The article examines applications of AI algorithms in the field of procurement and sourcing. Based on a common project with a German enterprise the use of machine learning methods to determine the price of purchased parts and components will bepresented and discussed. The project implementation is described in detail using the CRISP procedure model. The price estimates of the AI model can be used in particular for new products. Although there is not any quotation for a new product we can estimate how much should it cost at the procurement market by our machine learning model. When price negotiations with suppliers begin, the responsible purchaser has received helpful information on the expected or target price and can therefore better evaluate any offers from the potential supplier. An innovative two-stage technique with Clustering and Artificial Neural Nets showed the best results. The basis for this approach is a large data collection of previously supplied components with their specifications and their procurement prices.Additionally to the price forecast one get the most important price and delivery cost driver so it gives some hints for reducing the delivery price or to control the negotiation process.

Keywords: Artificial Intelligence and sourcing, product price, procurement cost data, price forecast, neural networks, machine learning algorithms.

1. INTRODUCTION

One important function in industrial enterprises is sourcing and procurement. It has the task to supply the enterprise with the resources it needs to provide its production processes. Its objective is to ensure timely and cost-effective supply. The resources to be procured are primarily materials, preliminary products, auxiliary products, but also machines, tools and services. The resource "staff" is usually the responsibility of the HR department and therefore not part of procurement department. The procurement processes can be differentiated into strategic and operational procurement. While the operational area includes the actual implementation of procurement with order monitoring and goods delivery, and thus the day-to-day business, strategic procurement provides the necessary framework conditions. This includes the long-term sourcing strategy and the determination of requirements, as well as the search for and selection of suppliers and the negotiation of conditions and prices with suppliers.

In this strategic area in particular, new approaches to planning support with the help of Artificial Intelligence (AI) algorithms can open up potential for improvement. Over the years, ERP systems (e.g. SAP S/4 HANA) have collected a large amount of purchasing and procurement-relevant data (e.g. supplier offers, prices, delivery conditions, procurement market developments etc.) that can be meaningfully evaluated using machine learning methods. A PwC study from 2022 shows the progress of digitalization and thus also the possibility of using AI processes for data analysis in procurement

Coopers 2022). According to the study, the digitization rate will be 72% by 2025. In addition, the 800 companies participating in the study intend to spend an average of EUR 1.28 million annually on the digitalization of procurement processes. In addition to cost reduction and digital transformation, the strategic priorities of the procurement department are risk management, supplier procurement and supplier selection (PricewaterhouseCoopers 2022).

Some of the potentials of using AI methods are outlined below. Using the example of the provision of adequate price data by AI methods, the selection of suppliers and the assessment of supplier quotations will be significantly improved. Based on a practical project with a company in the electrical industry, the price assessment for new products using machine learning methods will be described and discussed in detail.

II. LITERATURE REVIEW AND AI POTENTIALS

AI potentials in strategic procurement and sourcing were primarily examined with regard to rationalization, demand forecasting and supplier evaluation and selection.

Cost reduction potential in procurement and sourcing can be identified by analyzing historical order and consumption data. For example, (Tako and Robinson 2012) used AI methods to uncover inefficiencies in the stock management. The bullwhip effect is the result of such inefficiencies. Using historical data, it could be identified and avoided in the future with suitable behavioral rules - generated by AI models. The bullwhip effect in particular also highlights deficits in risk and information management that could be avoided through better digitalization. In the area of digital transformation, software agents can be used to open up new purchasing sources or systematically evaluate tendering and auction platforms. Electronic product catalogs and purchasing platforms open up further potential for rationalization.

Dedicated forecasting models such as those described in (van Steenbergen and Mes, 2020) can be used to determine the quantitative purchasing volumes. They use various machine learning methods and combine K-means, random forest and quantile regression forest methods. Product characteristics of existing and new products as well as historical demand data of existing products are used to make predictions about overall demand (van Steenbergen and Mes 2020). The K-means algorithm is used to group the demand patterns into profiles. Random forest algorithms are then used to forecast the profiles, total demand and distributions for new products. This supports inventory management and reduces the risks associated with introducing new products.

AI models for forecasting sporadic demand can be found in (Nikolopoulos et al. 2016).
The selection of suppliers is one of the most important tasks of a company's procurement department (Mohammed et al. 2018). The classification of suppliers can be implemented using powerful criteria through a k-means or self-organizing map method as well as neural networks (Segura and Maroto 2017; Tavana et al. 2016).

In supplier search and selection, AI models can also be used to provide data that improve both the negotiation process itself and the (potential) further search for suppliers. In particular, the negotiation process can be significantly improved by providing condition-relevant data such as price information and delivery times. This means that the AI models should provide the buyer with price data in advance, which, according to the AI models, are "fair" or expected product prices. Equipped with this important information, he can then better enter into price negotiations with a supplier.

Furthermore, supplier offers can be better assessed. In the case of price quotations for a product that is to be newly procured, the usual procedure lacks a reference value that can be used to assess whether the quotation is good or bad. The procedure to demand several quotations (e.g. 3) doesn't solve the problem because it implies to choose only the relatively best quotation without ensuring that all the available quotations are not possibly too expensive.

However, the AI could - even for completely new products - determine "typical" prices to be expected by scouring previous deliveries and quotations for similar products (Ćwikła et al. 2020) and evaluating the price data there by an AI model. These price data corresponds with the cost data that the enterprise will be faced when the delivery will start. Previous research focused mostly on (artificial) neural networks or linear regression (Bode 2000; Bodendorf et al. 2021; Cavalieri et al. 2004; Sonmez 2011) while some authors have started benchmarking these methods against gradient boosting trees or support vector regression (Loyer et al. 2016).

Another approach was to estimate delivery price resp. cost data based on its similarity to other products (Mousavi et al. 2015; Ben-Arieh 2000). Our findings are based on a similar approach but is distinguished by the machine learning model and our two-stage architecture to get the price forecast.

III. AI BUSINESS PROJECT

A. Business and Data Understanding

We investigated a case study with a procurement dataset from a German company that manufactures home and electrical products that we accessed during an industry project. Our study's focus is specifically on (electrical) resistor delivery price estimation. For this purpose, we got access to the procurement database of the ERP-system. In figure 1 the data model for our project is depicted.

Figure 1. Sourcing Data Base (excerpt of ERP)

Suited SQL statements selected the records for resistor quotations with their attributes. Summarized we got a data table with about 180.000 rows. Each row describes the quotation of a part number at a special date with its price data and attributes respectively its features that are shown in Table 1.

Because we wanted to perform our price estimate before the procurement market analysis, we did not integrate the supplier data and only used the technical characteristics of the resistors. Resistors are standardized products that can be characterized by their technical specifications like (nominal) resistance, wattage, etc. The ResType characterizes different materials. The attribute Size (JEDEC) references only to a special code in the JEDEC table that contains data like length, width, height, and wattage of electronic components. JEDEC is an abbreviation for Joint Electronic Tube Engineering Council and is the global leader in developing open standards for the microelectronics industry. For the later used mining table, we substituted the size resp. JEDEC-code by its technical content features. Higher electrical powers also cause the resistor material to heat up and heat causes the material's electrical resistance to decrease. The temperature coefficient (TempCoeff) is used to quantify this reduction. Resistors can deviate from the nominal resistance value as a result of variations made during the manufacturing process. The attribute tolerance of a resistor is used to measure these variances. The tolerance and temperature coefficient can both be thought of as quality indicators.

B. Data Preparation and Feature Engineering The records within this data set belong to the procurement activities of the domestic appliance manufacturing company and reflect the real usage of the procurement software database. To determine the features of our mining table, we first had to cleanse the database. For that we verify if there are only records in the database that accurately reflect the real-world entities and identify entries that are not consistent, with the latter definition: Empty records, zero prices and duplicates were removed, as a result of our verification procedure.

Table 1. Overview of Features (m = metric, c = categorical)

Name	Val	Description
Part.Number	ID	Unique ID.
Date	ID	The date on which the quotation was recorded, used as an additional ID.
Price	m	Price quotation at a date and current prices.
Resistance	m	Nominal resistance in ◆◆◆◆.
Wattage	m	How much electrical power a resistor tolerates.
Size(JEDEC)	c	JEDEC-code with a reference to the data in the JEDEC table (length, width, height, wattage).
ResType	c	Material and construction type of resistors (e.g. Carbon-Composit, Cermet, wire-wound).
Temp.Coeff	c	Indicator of deviation from nominal resistance when exposed to temperature changes.
Tolerance	c	Deviation from nominal resistance under real circumstances and load measured as a percentage.

The label of a data set is the attribute that should be learned by machine learning algorithms and is ofmajor importance for the business utility of the entire machine learning solution. Because we aim toestimate the price of a component (identified by thepart number), we choose the attribute price, asindicated on the quotation of a supplier, as our label f prices.

Several problems associated with this had to besolved. At first, you can maintain that there wereabout 180.000 data records representing differentcomponent quotations and only about 2000 differentpart numbers. On average about 90 different pricedata for one part number. Which one should be selected?

Given that the quotations were obtained between 2014 and 2018, the second challenge was determining how to make the price data independent of inflation and technical progress. Therefore, one needs to analyze the historical development of the price over time and modify the respective price data of a quotation to make them comparable. All price data was adjusted to the base level of 2019. For the transformation, we used a producer price index for electronic and optical products issued by Eurostat to account for price developments specific to that sector. Therefore, this price index reflects the cost that is typically relevant for procurement departments. That way, we can see the "true" level of prices. After that price adaptation, we aggregate our dataset (in SQL grouped by part number and without the date attribute) and decide to use the mean price of each number as our label. For the estimation of procurement price risk, the standard deviation was also recorded.Regarding feature engineering, we choose to add features that affect the price of a resistor (table II). By the JEDEC data, we included the dimensions width, length and height and derived the corresponding volume. In addition, after discussing with engineers, an important observation was that the surface area on a circuit board is more limited than the volume.

Therefore, we include the new feature area, the occupied space on a circuit board. To reflect the performance of a resistor relative to its dimensions, we calculate the ratio of resistance and wattage compared to the surface area of a resistor (Resistance_area, Wattage_area). Similarly, we proceeded with volume and its derived attributes (Resistance_volume, Wattage_volume). Area efficiency and volume compactness indicator were also constructed. The mining table for the machine learning algorithms contains the identifier part number, also five attributes from Table I (excluding Size(JEDEC), Date, Price) and eight additional features from Table II and the new label Price_adj.

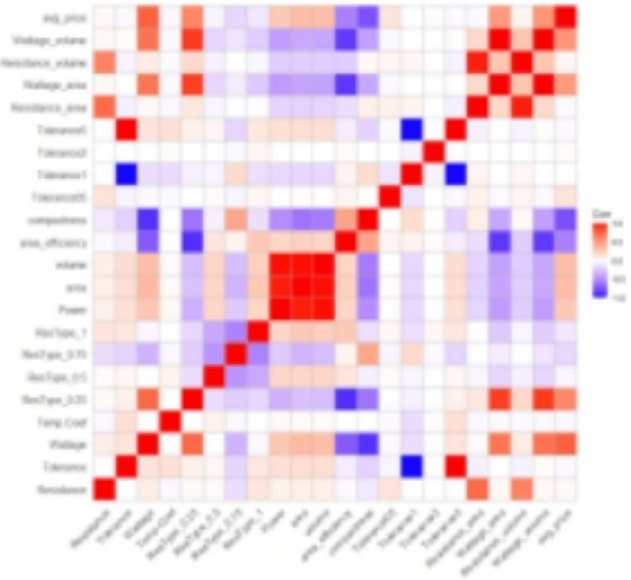
Table 2. Overview of Derived Features (m=metric, C=Categorical)

Name	Val	Description
Price_adj	m	Price adjusted for inflation in 2019 prices according to the ECB's producer price index of electronic components published.
Area	m	◆◆◆◆◆◆◆◆◆$h \times$ ◆◆◆◆◆◆◆◆◆◆h
Area efficiency	m	◆◆◆◆◆◆◆◆ $\left(\frac{1}{2}(◆◆◆◆◆◆◆◆◆h + ◆◆◆◆◆◆◆◆◆◆h)\right)^2$
Compactness	m	◆◆◆◆◆◆◆◆◆◆◆◆ $\left(\frac{1}{3}(◆◆◆◆◆◆◆◆◆h + ◆◆◆◆◆◆◆◆◆◆h + ◆◆◆◆◆◆◆◆◆h◆◆)\right)^3$
Resistance_area	m	Performance indicator that relates the resistance to the area of a resistor.
Resistance_volume	m	Performance indicator that relates resistance to the volume of a resistor.
Volume	m	◆◆◆◆◆◆◆◆◆$h \times$ ◆◆◆◆◆◆◆◆◆◆$h \times$ ◆◆◆◆◆◆◆◆◆h◆◆
Wattage_area	m	Performance indicator that relates wattage to the area of the resistor.
Wattage_volume	m	Performance indicator that relates wattage to the volume of the resistor.

C. Data Modeling

To get a first impression concerning the relationship between the chosen features and the price data a correlogramcan be used. High correlations are indicated by a more intense coloring.

Figure 2: Correlogram of features and label



For example, wattage, ResType=0.25, width and compactness appear to be the most important predictor variables. The first two have a price-increasing effect, the last a price-reducing effect.

We decide to use a neural network (NN) model to solve our price/cost estimation problem as an instance of the class of nonlinear regression problems. For prediction tasks, NN is a popular and often quite performant method. In our case, we employed a feedforward NN with 30 input neurons and one output neuron. Category features were replaced by suitably coded dummy variables (one-hot encoding). Furthermore, we normalize the input data to handle the very different data domains of the features.

As a normalization method, we tried both min-max-normalization and z-transformation. The z-transformation calculates each value by referencing the mean value and standard deviation. It indicates the multiplier to the standard deviation that corresponds to the difference between the initial value and the mean value.
To get the right parameter setting, we execute hyperparameter-tuning by experimenting with different network topologies. Various numbers of hidden layers and different sizes of the hidden layers were simulated. According to our analysis, none of these topologies is superior to the X-X-1 structure (X=30). To evaluate the predictive model, a 70:30 split was performed, resulting in a training data set and a test data set. The performance indicator is the standard deviation of the average price.

D. Model Performance and Results
After predictive validation, the mean scaled average error was 16.9% (z-normalization) and 17.6% (min-max-normalization). In comparison with a "naive" estimation (the overall average price) that results in an average error of approximately 44% the NN model has a considerably better performance. In the following, we concentrate on the better results of the z-normalization procedure.

Nevertheless, we wanted to improve this result. The basic idea was that an NN for all components might perform less well than a NN that differentiates the components according to their specifications in subgroups. Then, for each subgroup of parts, a dedicated NN can be modeled. To implement this idea, we used a two-stage clustering before prediction. In the first step, the k-means algorithm is used to define subgroups. In our case, k = 3 was the best choice.

Remarkably, the largest group has on average the lowest price level (2.24 $), the second largest group has medium-price level (4.08 $) and the smallest group has the highest price level (6.53 $). The standard deviation is quite similar in all groups. In the second step, a distinct NN was trained for each cluster. Using these approaches, we obtain NN1, NN2, and NN3 using the same network structure, but different weights, to assess the price of their constituent parts. During the test and deployment process, a new component whose price should be predicted must first be right subgroup. This can be done by calculating the distance to the cluster centroids based on their technical characteristics and assigning the component to its nearest cluster. According to this decision, the cluster-specific NN can be used to make a price prediction.

Using this two-stage procedure we obtained the performance data shown in Figure 3. The red line indicates the performance in the one-stage case. Surprisingly, not all results can be improved by subgrouping. For components in the class of mid and low-range prices, the prediction has deteriorated slightly (around 3 to 4 percentage points). On the other hand, it is possible to predict high-priced components with great accuracy. Only a 4% deviation to the right value is an excellent result.

Because these parts are the most expensive ones, they determine the final product costs to a large extent. And therefore, it is decisive to get a good estimation of their price data. The lower-priced parts have a minor influence on total procurement costs and therefore although their percentage deviation has worsened this has only minor implications. Measured in absolute values, even larger percentage deviations for the low-priced item yield only small dollar amounts.

Figure. 3: K-means clustering with k=3 and z-Norm.

To get more information about the price drivers of electronic components one can investigate which features are important. By that, the design decision concerning alternative components can be considerably facilitated. Therefore, we analyzed the feature importance separately. Several features have an importance value greater than 0.15. Especially the wattage, the temperature coefficient, and the wattage-area are important for the prediction.

Moving on to the two-stage case we can detect a different view. In all clusters, only a few features have an importance value above 0.15. In cluster one with the high-price components, only two features are above 0.15. The temperature coefficient, representing the needed quality, has by far the greatest influence, followed by Wattage_area with just over 0.15. The last feature represents the power per area unit.

In the second cluster with the medium-price components we got a similar situation whereby here the temperature coefficient as quality indicator completely dominates (the only feature above 0.15). With a value of 0.225, it is more than twice as high as the second most important parameter.The last cluster with the lowest price components gives a completely different picture.

Only the feature Resistance_volume gets an importance value above 0.15. It characterizes the resistance value (measured in ohm) per volume unit. Quality indicators are of minor importance.

IV. DISCUSSION

A. Managerial Implications

We discover that the neural network's predictive performance is quite strong, particularly when utilizing the z-transformation. The average prediction error has a standard deviation between 15 and 20%, which corresponds to the typical price premium. An intriguing finding of the investigation is that embracing variability by forming subgroups can boost performance. This discovery is interesting because most of the previous research studied an alternative machine learning approach, but we employ neural networks that are specialized for specific types of resistors. Therefore, we demonstrate that two-stage models are more accurate predictors than one-stage models. Specifically, the two-stage approach provides a solid foundation for an accurate price estimate of new goods that can be used during the negatiations with a potential supplier or to judge a quotation.

Regarding the assessment of features, it is possible to determine if some specifications are really necessary (i.e. some quality requirements) because they can be an important price driver. As demonstrated, the temperature coefficient, as a quality characteristic, has the greatest impact on pricing.Concerning the search for suited suppliers one can use the estimated price data for a new component as a kind of benchmark to compare it with the quotation of found supplier. If it will be judged as to high the search process can be continued. In the other case one can stop the searching process and choose the best supplier.

B. Future Research

This study lays the foundation for future research into the potential of machine learning to support the price negatiations for the sourcing department. From a technical standpoint, future research on applied machine learning should examine not only the price level but also the price deviation. Predicting the price deviation could be accomplished by the same method as predicting the average price, with the added advantage of obtaining a range of probable price data, which is a valuable indicator of procurement price risk. In addition, additional research might be conducted on the benefits of utilizing additional market data (i.e., procurement market characteristics, supplier data) to improve the estimates' precision. From a decision science and business intelligence perspective, it is promising that machine learning techniques can be used in supply chain operations to create awareness regarding uncertainties in the product price.

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The Place of Culture in Moroccan English Classes: Towards Investigation

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ABSTRACT

undoubtedly, culture plays a vital role not only in our society, but in all societies as well. It has become an important part of people's everyday life. The reason behind this truth is that culture is closely connected to everything that is human-made. In the field ofeducation, for instance, culture has proven to be an integral part of language learning, which implies that culture cannot be availablewithout language. The latter is considered as the cornerstone of culture because it is strongly shaped and influenced by culture. So,following this fact, many scholars mention that language and culture are closely connected to each other and can never be separated.This is why they confirm that culture should not be taught as a separate subject, but rather in connection to language. The present paperaims, on the one hand, to shed some light on the importance of culture in the field of second language education in Morocco and, other hand, it tends to investigate whether culture should be taught as a separate subject, or alongside the foreign language itself.

Keywords: English Importance in Morocco, Culture Definition, Role of English Textbooks in Morocco, Methods of Teaching Culture.

1. INTRODUCTION

Language is a means of expression; it not only helps people to express their feelings, emotions and needs, but also allows them to get in touch with each other since it is an important form of communication (Jim Wang, 2011). Today, English is considered the most important language of wider communication in the world thanks to the British colonial power in the nineteenth century. More importantly, English has become the main language of science and technology as well as popular culture and globalization. Similar to many countries in the world, Morocco is giving much importance to English, because it really plays a vital role in the country, especially in the educational system. For instance, English is regarded as the third foreign language after French and Spanish among the educated youth, and is taught in all public and private schools from the third year onward. Morocco has one private, English-language university, Al-Akhawayn. It was founded in 1993 by King Hassan II and King Fahd of Saudi Arabia, and its curriculum is based on the American educational model. However, in the last few years, many scholars and researchers, especially those from the field of linguistics and sociolinguistics, have been concerned with the question whether "culture" should be taught along with English, or as a separate subject.

II. ENGLISH IMPORTANCE IN MOROCCO

Definitely, most people around the globe acknowledge that English has become one of the most important languages in the world. The reason behind this fact is that English is able to unify people, makes them gather and share new ideas, opinions and experiences. In Morocco, for instance, English is widely believed to have gained a very big prominence over the last several years, and it has become very necessary and crucial to various domains such as education, tourism and business.

It is true that the French and Spanish languages were forced on Moroccan people during the years of colonialism. Nevertheless, people, in the last several years, started to feel an urgent need to learn and deal with another language, which is English. This is why one may safely claim that English, nowadays, has become in a position that allows it to compete with French and Spanish in many realms of the Moroccan society. The proof for this fact is that English tends to take advantage from the wide support of the government in different domains especially business, economy, tourism and education. In an attempt to shed some light on the crucial role of English, F. Vahdany (2005:96) who is one of the most significant anthropologists of language and culture, explains that "speaking English is the key to employment". He also stresses that "speaking English helps you to join the international community."

Before going further into more important details and trying to investigate the close relationship that exists between English and culture, I would like, first, to raise an important question, which is of great significance to this topic. The question is "why do people give much importance to learning English?" And "is there a real relationship between language and culture?"

As a matter of fact, numerous researchers such as Edward Said (1993), for instance, have been trying to provide an appropriate answer to this question. For the majority of them, the most significant reason behind this interest is related to political and economic powers. This means that since the United States and Britain are powerful countries politically and economically speaking, they tend, as a consequence, to impose their linguistic domination over other countries. To confirm this fact, a close look at Said's book titled Culture and Imperialism, for example, will offer insight into thisidea.

Said shows that colonialism, today, is taking different ways and forms; unlike the past when the colonizer needed to move militarily to intervene in other states, today it is possible to talk about a new form of colonialism_ linguistically, politically and culturally speaking.

Recently, a huge number of young Moroccans started to feel a strong desire to learn English for a variety of reasons: First, they look at English as a Lingua Franca. This means that English is widely spoken all over the globe and, therefore, can be useful in several domains. Second, most young individuals think that English has become a vital language in the world and even more useful than their native languages such as Arabic or French, for instance, and, therefore, learning it will certainly yield positive consequences either in Morocco or elsewhere. A third suggestion shows that people in Morocco are interested in studying English because they want to use it as a means of learning about other cultures. To put it differently, the Moroccan young generation wants, on the one hand, to learn English as a language and, on the other hand, to discover everything related to American and British habits, customs, traditions and cultures through their language. This idea is clearly shown by Vahdany (p.97) when he explains that "although people are not necessarily prisoners of their language, it is undoubtedly true that the way a culture sees the world is reflected in its language."

In fact, a close examination of the educational system in Morocco reveals that English is truly considered a significant school subject. Clearly, English is taught at the final year of middle schools, and also at high or secondary schools. More significantly, English began to enjoy a cultural prestige over the last several years as most young students tend to give it much importance and would prefer to learn it more than French or Spanish. In trying to make reference to this reality, Fatima Saddiki (2007), who is one of the well-known Moroccan scholars of gender and language, reports in a survey that was conducted in 1991 that more than 87 per cent of people welcomed the idea of seeing English spread in Morocco, and more than 81 per cent believe that English will be very useful for Morocco and Moroccans.

In addition to Saddiki, the famous Moroccan scholar named Moha Ennaji (2005), who is also concerned with the field of language and culture, has tried to contribute to this notion by showing how important the English language is to the Moroccan educational system. Ennaji bases his arguments on the fact that English is compulsory for Moroccan students since it is required to pass the high school graduation exam. More specifically, English is needed to pursue higher education either in Morocco or abroad, where most countries insist that foreign students should have an acceptable level of English so that they would be able to join the educational system there. Other reasons reported by Ennaji are related to the efficiency of learning English. For him, the latter remains the unique and best language that allows students to make research and get in touch with foreigners.

III. CULTURE DEFINITION

Since the present paper is devoted to investigate the relationship that exists between English as a language and the host culture, I will be concerned with the case of English textbooks that are used in Moroccan schools such as Gate way1 and 2 or Visa to the world. However, before doing so, I think that I should start by trying to provide a brief definition for the word culture. Generally speaking, culture as a concept is believed to have a very long history; most anthropologists still find it very difficult to understand because they believe that culture is closely attached to human orientation, and is present in almost every interaction. Therefore, they argue that culture can have a strong impact on everything people do in their society, which proves that language and culture are closely connected to each other. To explain this fact, Nieva and Hickson (quoted in Salwen and Stacks, 1996:299) mention that "Culture is human-made; it includes ideas, values, and codes known to all members of the group; it is transmitted from generation to generation. A culture does not exist until it is shared with other human beings. It influences the way in which a person behaves toward others in the group and also the way that a person expects others to behave."

Definitely, the difficulty and complexity of the concept of culture lies in the fact that culture tends to cover everything that is human-made. This implies, for most theorists, that culture has to do not only with material objects such as houses and means of transport, for example, but also with other aspects of life such as behaviors, languages, values and customs. This is why it is believed that it will be quiet unreasonable to mention that either culture or human connections can occur before the other. Following this fact, Trompenaars and Wooliams (2004:148), who are also two of the major anthropologists interested in culture, dealt with this concept from a different perspective. For them, culture is likened to an onion and the outer layer of it is quite different from the inner one. They put it as follows: "The outer layer contains that which we can perceive easily: for example, buildings, clothes and people. Beneath this skin lies a deeper layer in which its people behave. Here are to be found the beliefs, values, norms and expectations that frame the way in which people perceive and engage with the world. These differences stem from the "innermost layer."

As mentioned earlier, the present paper aims at placing an increasing emphasis on the role of culture within ELT in particular. So, it will be worth noting to say that there has always been a lot of discussion among scholars such as Kramsch (1993), for instance, who strongly insists that culture must be taught alongside the foreign language itself. This necessity is related to the fact that both language and culture are believed to be closely attached to each other and can never be separated. To exemplify this idea, Kramsch argues that when someone, for example, decides to study a language like English, he or she not only learns about its linguistic components with regard to grammar, phonology, or morphology, but it also means everything related to Britain and America's_ customs, traditions, norms and habits. This fact is emphasized by Kramsch (p.12) when she points out that 'language-culture connections must be highlighted by teaching not only the language, but cultural customs, values and ways of thinking."

Basically, when we try to link the idea of culture to the teaching of English in Morocco, we come to the conclusion that it is almost impossible to teach English without making reference to cultural presentations. As a matter of fact, Moroccan teachers of English are forced to go through textbooks like Visa to the World, which is devoted to common core students and gateway 1 and 2 that are addressed to 1st and 2nd year students of the Baccalaureate degree. But, this does not mean that teachers are obliged to follow all the activities and programs of these books without having the right to add, skim or delete some activities, in case they see them unnecessary. Of course, teachers are asked to stick to the program of these textbooks because pupils will have to pass their final exam in order to be able to join their higher studies.

IV. THE ROLE OF ENGLISH TEXTBOOKS

In the educational system, textbooks are very important tools because they help teachers to provide good lessons and include culture in most of their activities. In other words, textbooks are very significant to the teaching and learning process, as they help to convey knowledge and culture by making them available and apparent to the learners in a selected, easy and organized way. To shed some light on the role of textbooks, Hutchinson and Torres (1994:317) point out that "The textbook has a very important and a positive part to play in teaching and learning of English. The state that textbooks provide the necessary input into classrooms lessons through different activities readings and explanations.

Thus, they will always survive on the grounds that they meet certain needs."
Indeed, the English textbooks designed to Moroccan students reveal that they try to carry the cultural representation alongside the English language. This fact can be clearly observed if we look carefully, for example, at the topics, characters, places and other components of the textbooks, which are, most of the time, reflecting the idea of culture. Numerous essays and articles about the history of Morocco and some ancient or modern places like Fes, Tangier or Volubilis, for instance, try to provide a vivid representation of the Moroccan culture. In addition to this, exposing students to various types of clothes and food like the "Jellaba" and "Harira", for instance, can also help students to discover about their culture and be proud of their cultural heritage.

Nevertheless, the negative point, which is, most of the time, observed is that Moroccan textbooks tend to focus more on the target culture than the host one. This gives the impression that English textbooks in Morocco try to deprive English from its cultural specificities by directing the student's

attention to the target culture and neglecting the host one. A close examination of the textbooks titles mentioned earlier show that it is almost impossible to find an activity or a skill, where students are exposed to the English or American culture. For example, Moroccan students are usually asked to read or write a short paragraph about how to prepare tea with mint or 'Harira', but their attention is never drawn to talk about English people, who would prefer black tea with milk together with a big breakfast in the morning in contrast to Moroccans, who prefer a big lunch or dinner with too much bread.

V. METHODS OF TEACHING CULTURE

Indeed, the question whether or not culture should be taught alongside the language itself because it seems to be something that troubles teachers and creates a lot of confusion. This is due to the fact that teachers do not really understand if they should include cultural presentations in their classes or not (Teresa Pica, 1994) .It should be noted that a number of anthropologists have expressed their greement for involving cultural presentations while teaching English in classes for a variety of reasons. One of the best examples is Kramsch, who believes that there are three principles, which bounds both language and culture.

The first principle revolves around the shaping of cultural reality. This means, for kramsch, that only few people can view their language as a representation of their cultural reality and, as a result, they try to align themselves with the culture once they start using the language (William Littlewood, 1982). It should be admitted that language is more than just words; it embodies the values, beliefs, customs, and traditions of a particular culture. In other words, language shapes how people perceive the world around them and influences their thoughts, behaviors, and interactions with others. Through language, individuals express their unique identities and assert their place within the society.

The second principle, for Kramsch, is related to what is known as cultural identity, which implies that people themselves are conscious that language can also help in the shaping of their cultural identity (Fengping Gao, 2005).

Generally, people do not only use words because they want, on the other hand, to express facts and ideas, and on the other hand, reflect their attitudes and behaviors, which proves that culture is implicitly used and expressed in their language. It should be acknowledged that language is acting as a tool for social integration, because when individuals learn and use the language of their new community, they become more connected to its people and customs, facilitating cultural assimilation. In short, language acts as a vehicle for cultural exchange, enabling individuals from different backgrounds to share ideas and experiences.

As for the third and last principle, it has to do with what is called cultural preservation. Undoubtedly, language preserves the cultural heritage by allowing communities to pass down traditions, stories, and values from one generation to another. Language also plays a crucial role in preventing language extinction and ensuring the conservation of diverse linguistic heritages. This means that when a language dies, it ignifies more than just the loss of grammatical rules and vocabulary; it represents the disappearance of an entire way f life, history, and cultural identity. So, by actively engaging in language revival initiatives, communities can maintain their unique cultural practices, values, and worldviews. Additionally, language maintenance helps foster intergenerational transmission of knowledge and strengthens social cohesion within communities because it provides individuals with a sense of belonging and pride in their heritage while contributing to a global linguistic diversity.

Therefore, efforts towards language preservation are not only about words, but also about sustaining cultural preservation for the coming generations.

Within the same vein, another two important researchers whose names are Tomalin and Stempelski (1993) have also tried to contribute to this discussion. They have enumerated a number of reasons behind the necessity of bounding language with culture. More importantly, both researchers have pointed out that students need to learn English in association with culture for a variety of reasons among which we can speak about:

Students should recognize that each group of people all over the globe has their own culture which might be different and, consequently, they should distinguish theirs from the host ones in order to come across the differences and similarities.One of the best ways to understand other people's cultures is to, first, examine your own. Most people take their background for granted and don't even realise that their customs and beliefs might seem strange to someone else.

When people think of their own way of life as the default and everyone else's as a strange variation, it's hard to approach those differences with respect.
Concerning the second reason, students need to understand that social environments such as places, ages and sexes are all to be considered while dealing with culture. This implies that the signs of culture, which are accepted in an area by a category of people, may not be necessarily accepted in other places by other individuals. Also, it means that some words or gestures may have different meanings and, as a result, may deprive people from reaching mutual understanding and effective communication. Of course, the word culture is a real omplex idea; the term refers to various things like food, holidays, clothing, music, and religion, but it also goes much deeper than that because behaviours, customs, beliefs, and values are also part of people's culture. So when individuals from different cultural backgrounds interact, they may sometimes find that there are big differences in how they see the world, even if they dress in a similar way or speak the same language.

The third and last reason is closely connected to the fact that students are strongly recommended to develop the necessary skills that allow them for locating and organizing information about the target culture so that they would be able to deal with it in the right way. Of course, this can be done via various strategies such as making friends, talking to foreign people, reading books, watching movies or listening to radio and broadcasts. These strategies will certainly allow individuals to stop stereotyping others and deal with them in a more appropriate manner. It should be understood that life would be very boring if all people were alike. This is why it is of paramount importance to understand that the best way is to respect peoples of other cultures, embrace their differences and enjoy a win-win process with all partners.

In the field of education and in an attempt to help teachers in their classes, H. Stern (1992), who is one of the famous anthropologists of language and culture, tries to suggest some solutions that may be very helpful to English teachers. He distinguishes between three suggestions in which the teaching of culture can take place:

The first solution proposes that learning English culture requires that students should be immersed in the English community by knowing about native speakers' ways of thinking and styles of life. For example, when an English man says, "It is a piece of cake!" or "It is not my cup of tea!", only those who know about the English culture can understand the meaning of these expressions.

It is a piece of cake!" or "It is not my cup of tea!",only those who know about the English culture can understand the meaning of these expressions. It is not a matter of knowing about words to understand the meaning of these sentences, but it is a matter of being aware of the English culture. Students can learn English only when they have a full understanding of the English cultural settings. In this regard, D. W. Johnson and Stanne, M. B. (2000 :53) explains that "Humans learn through the cultures in which they are reared, gaining competence as they mature and often possessing passionate loyalty totheir cultural origins."

The second solution warns that in case English is learnt a part from its cultural context, this will, surely, lead to a big failure in interacting with native English speakers in authentic situations. Today, students are living in the 21st century, the era of technology and globalization, and it has become much easier than any time before for them to contact each other. The most prominent obstacle they might encounter while communication is using the English language, which may not be very understood by either party.

Furthermore, students might misunderstand each other because each language associates connotative meanings for words according to its own culture. For example, the word "dog" has a positive connotative attitude in the English culture. So, English people use the sentence "You are my lucky dog" to mean "You are my faithful friend." In contrast, the word "dog" has a negative connotative attitude in the Arabic culture. Arabs use dogs for guarding only, and they consider dogs dirty. Therefore, the same sentence is judjed disgracefully.

As for the third solution, it strongly recommends that students need to understand that learning English is not a mechanical process; it is rather a mental process. More importantly, it is mainly based on the knowledge of English in its cultural context. Of course, this indicates that culture includes all aspects of life shared by people who live in that community. However, for those who do not belong to that community, it really remains very difficult to penetrate these ethnocentric layers unless they become part of that cultural setting. Accordingly, Johnson and Stanne, (p.48) emphasizes that "much of what we know and believe to be real has no concrete manifestation at all, but is made concrete only through its applications in everyday life.'

VI. CONCLUSION

As mentioned earlier, Cultural differences exist all over the globe; they can represent the way in which other groups, societies or countries are socially organized, developed and communicated. Cultural differences involve customs, laws and lifestyles from other ethnographic groups. Therefore, understanding the target language can never be an easy task without being aware of the cultural context of that language.

Generally, it is widely acknowledged that students cannot truly master the language until they have also mastered the cultural contexts in which the language occurs. Linguistic competence alone is not enough for learners to be competent in a language. Culture proves to be an integral part of the language learning curricula. This is why teachers are expected to make their students aware of the cultural features reflected in the English language. To reach this goal successfully, teachers are forced to make cultural features an explicit topic of discussion when appropriate. As a result, students will be globalized and able to come across the similarities and differences that exist between the target culture and the host one.

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