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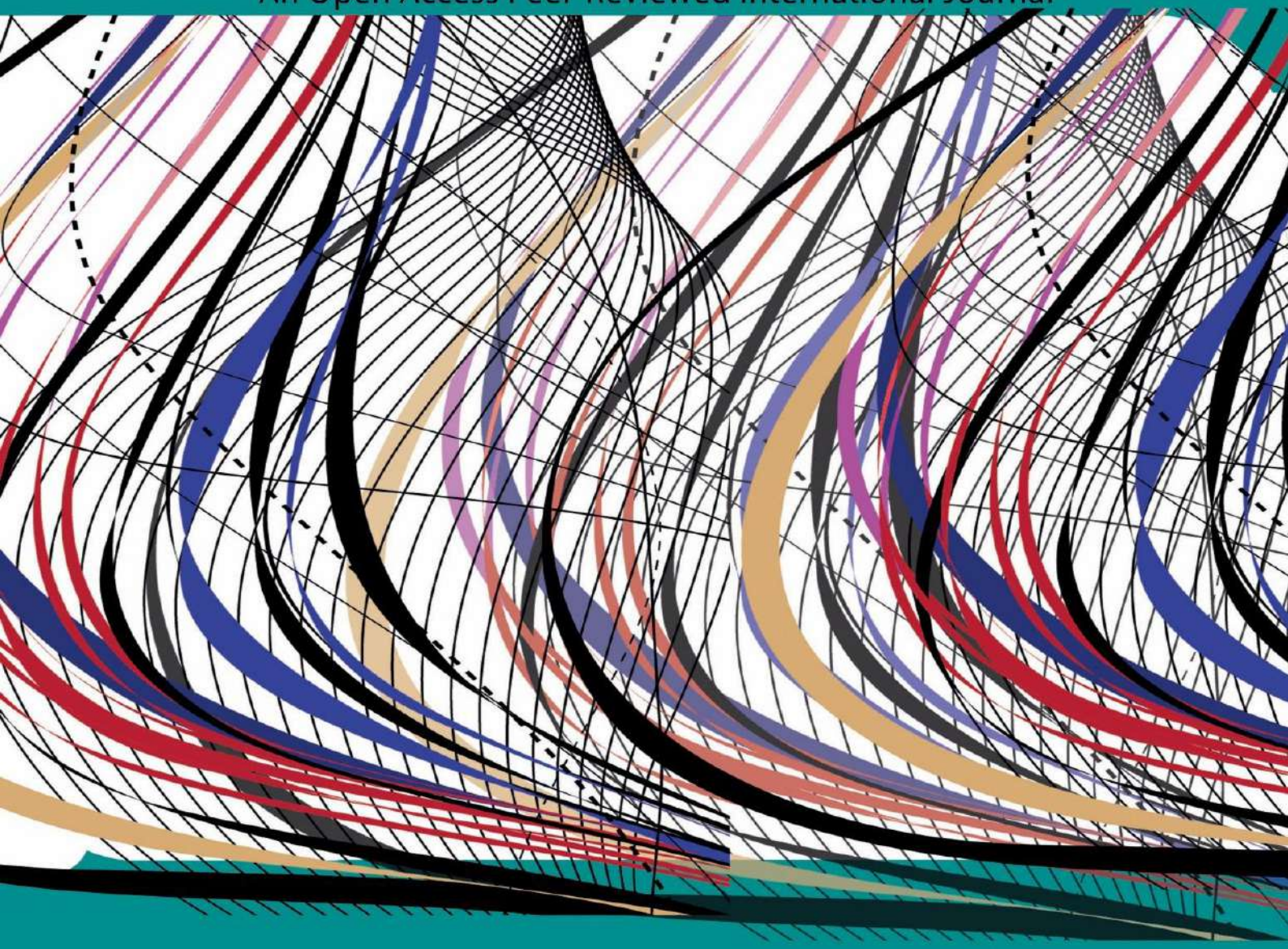

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Project Team Management: The significance of various leadership approaches in work environments when managing ICT project teams

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Abstract**—** *Although the majority of project teams perform better when leadership is shared (rather than centralized with the nominal team leader), team leaders are frequently unprepared to assess leadership potential or share leadership responsibility. The study applied quantitative research method by using online survey to analyze the significance role of various leadership in managing ICT project team. The findings revealed that leadership had a significant role in managing ICT project team. In conclusion, firms should invest in developing digital leaders who will champion digital competence and entrepreneurial processes in the design and implementation of IT solutions. This may push certain government officials to step outside their usual sphere of technical expertise. Therefore, it's crucial to recognize and promote the required change in skill levels. If a company cares about its key leaders, it should think about giving them chances to improve their communication, delegation, and motivation skills through professional development.*

Keywords**— Leadership, Team Management, ICT, Project Management.**

I. INTRODUCTION

An internationally leading automotive company, which had previously relied on a leader-centered approach to new product development, was taken aback by the fact that the most successful new development project in recent years, which actually succeeded in reducing thirty percent of the product development time and also decreased deficiency claims, was characterized by two aspects: the first was that it was characterized by a collaborative effort bet; the second was that it was characterized by a collaborative effort bet to begin with, the leader of the team made it a point to delegate decision-making authority to other members of the group and purposefully adopted a rather passive leadership style (Afzal et al., 2018). Second, the members of the team, each of whom was a well-known expert in their own field, exhibited high levels of leadership. This was unexpected for the organization, which is often characterized by high levels of authoritarian leadership. This example demonstrates that in order for leadership to be shared effectively within a team, not only the team leader but also the members of the team must be willing to participate in the process. According to the findings of our study, however, formal team leaders have a tendency to underestimate the willingness of their teams to share leadership, which hinders the efficacy of leadership in teams (Rajhans, 2018).

As a consequence of this, the potential benefits of working in teams are frequently not realized. The use of teams to undertake difficult organizational tasks, such as product creation, is continuing to grow, which has attracted a significant amount of academic attention. Scholars have begun to better understand the concept of virtuality in project teams as in more continuous terms (rather than a dichotomy of virtual versus co-located) and multi-dimensional (including geographic, temporal, and configurational dispersion) (Grass et al., 2020). This is in contrast to earlier research on project teams, which (at least implicitly) compared co-located with virtual teams (Anwar and Shukur, 2015). As a result, almost every project team will engage in some form of collaboration, in which members of the team share project-related information via electronic means while working remotely

from a variety of locations. These locations can be relatively close to one another (for example, different office buildings at the company's headquarters), or they can be spread out over the entire planet (Burton et al., 2019). Nonetheless, it is remarkable how little emphasis, in both practice and literature, has been paid to the problems associated with leadership in increasingly collaborative project teams. Existing research suggests, however, that the greater the degree of project collaboration (due to the geographical separation of project members), the less likely it is that teams will be able to ensure the necessary level of task coordination across geographical locations, time zones, and (not in the least) cultural backgrounds (Anwar, 2016

). According to the findings of certain studies, one out of every two geographically dispersed teams does not succeed in achieving their goals because of an inability to effectively manage their distributed workforce (Read et al., 2019). This, in turn, testifies to the increased leadership challenges that are being thrown against expanding project teams. Even experienced project leaders find it incredibly difficult to secure the essential integration of the unique efforts of project participants. An official from a multinational software company told us that they had reduced the number of distant sites they work with to "strictly no more than one remote site." Previously, these projects frequently involved four or five remote sites. Executives all over the world, on the other hand, are ready to draw on specialist information that is located in a variety of places across the world in order to facilitate knowledge sharing for the purpose of improving innovation, performance, and long-term competitive advantage. As a result, businesses are seeking new strategies to successfully lead a growing number of teams before going back to more collaboratively located project teams. Addressing the leadership challenge of collaboration is the missing piece to the puzzle that is the execution of this approach (Faeq, 2022). In particular, the geographical separation of project followers reduces the direct influence that project leaders have on the activities of those followers. In contrast to the members of face-to-face teams, members of remote teams frequently do not feel the same level of obligation to comply with their leaders' commands as those members of face-to-face teams do. Project leaders in face-to-face teams have the ability to exert direct influence on their team members. On the one hand, this is because there is a deficiency in the "felt presence" of the leaders (Lei et al., 2021). On the other hand, commitments to other projects within the company (for project members who are employed by the company) or even commitments to other jobs (for project members who are freelancers) may prevent leadership adherence. This is especially true for employees of the company who are working on multiple projects at once (Hameed and Anwar, 2018). Some project leaders attempt to overcome these leadership challenges by relying on computer-mediated communication (Cortellazzo et al., 2019), applying fancy software solutions to tackle leadership in teams. However, this approach is not always successful (Anwar, 2017). Despite the benefits of advanced communication technology, project managers need to be aware that it is not sufficient to merely compensate for a loss of physical presence by making use of technology that is mediated by a computer. Instead, those in charge of projects would be better off coming to terms with the fact that they cannot present the same substance and style of leadership in virtual teams as they do in traditional ones (Faeq et al., 2020). It is therefore necessary to have more than a technological answer in order to become a successful leader of teams; rather, project leaders need to reconsider their core notion of what it means to be a leader. Despite the fact that project team leaders are frequently fully aware of the significant difficulties associated with leading across vast geographical, cultural, and time-zone distances, they frequently hold the belief that accumulating decision-making authority is the only way to achieve success. However, these leaders quickly discover that their efforts to direct members of the team are fruitless, which leads to a growing sense of frustration on their part. These leaders are aware that they only have a limited effect on the members of their project, but they want to make up for this lack of influence by making even more strenuous efforts to exercise leadership influence; as a result, they believe that "more of the same" is the best course of action. However, rather than frantically trying to solve their lack of leadership effectiveness on their own, successful project leaders should acknowledge the limited effectiveness of their (traditional) leadership and look for alternative and new ways of leading. This is an important step for successful project leaders to take because it allows them to avoid making desperate attempts to solve their lack of leadership effectiveness on their own. Along these lines, recent research has shifted away from the concept of "hero leadership," which focuses entirely on the leader of the team, and has pointed instead to the members of the team as an alternative source of leadership behavior. Members of a project team are typically knowledgeable specialists in the fields in which they are working (Pamidimukkala and Kermanshachi, 2021). As a consequence of this, members of the project team typically have several years of experience and, thus, have the confidence to assume responsibility for the successful completion of the joint work. The participants in a project typically have a positive attitude toward alternative

leadership techniques since these approaches give them the opportunity to share leadership responsibilities. Project members who are experts in their respective fields and whose task-specific knowledge typically exceeds that of the project leader are frequently interested in exerting (partial) leadership influence and actively contributing to the shaping of the project. This is because teams are frequently formed to address tasks that are both complex and dynamic in nature. Formal leaders who take advantage of the communal leadership potential inherent in the project, rather than relying solely on themselves as the source of leadership for their teams, are more likely to produce stronger teams. These leaders make it possible for their project teams to outperform face-to-face teams by benefiting from the unique qualities of their team members. Therefore, it is in the best interest of both the members of the project team and the leaders of the project to share leadership responsibilities within teams. The significance of leadership for the overall effectiveness of teams is thus highlighted by research (Anwar and Shukur, 2015). The term "leadership" refers to the dynamic and interactive processes of exerting influence among all members of a team in order to maximize the effectiveness of the team (Hoegl & Muethel, 2007). That is, each member of the team, not just the team leader, is responsible for thinking about not only their own areas of responsibility but also the entirety of the project and how they actively relate to the other members of the team. Leadership is defined as the identification of action needs by members of a team and the subsequent initiation of action flows with the purpose of revising and adapting work tactics in order to accomplish a team goal (Galli, 2018). Leadership has been demonstrated to boost the performance of dispersed teams (Anwar and Shukur, 2015), and as such, it is a viable strategy to overcome the drawbacks of dispersed collaboration (Faeq et al., 2021). But for there to be leadership, there must be project leaders who know the leadership potential of their team members and are willing and able to share their leadership responsibilities with their team members (San Cristóbal et al., 2018).

II. LITERATURE REVIEW

Leadership in Project Management

When it comes to software projects, having a capable project manager at the helm is one of the most crucial success factors for delivering high-quality work. A significant factor in determining whether or not a project will be successful is the capacity of the individuals who will be responsible for managing unusual circumstances and unanticipated challenges (Pinto and Slevin, 1988 Duryan et al., 2020). In spite of the availability of various software tools, successful project management is still dependent on a style of leadership that is oriented on the desired outcomes rather than the problems being faced (Anwar and Qadir, 2017). The onerous work of a project manager is to create clear goals, complete the project on time and under budget, decide when to stick to the original plan and when to be flexible, and keep the team passionate about the project even when it is feeling pressured. This not only necessitates the enhancement of the project leader's technical and managerial skills, but it also calls for the project leader to continue their own leadership growth (Faeq et al., 2021). According to Anwar and Shukur (2015) definition of team leadership, team leadership is not a person but rather the process of meeting the needs of a team in order to improve that team's efficiency. In its capacity as a process, it also contributes to the members of the team increasing their competencies (Sanyal and Hisam, 2018). According to Abdullah et al. (2017), there is no one unique leadership style that is effective in all circumstances; nevertheless, there are many different sources of leadership within a team (Lee, 2021). Shared leadership is a sort of distributed leadership that is produced as a process inside a team, in contrast to vertical leadership, which originates from an appointed or official head of the scrum team (Anwar and Abd Zebari, 2015). Both types of leadership exist within scrum teams (Contreras et al., 2020). According to Anwar (2017), in order for leaders to take positive action, they need to demonstrate transformational leadership behaviors. These behaviors should guide followers toward constructive effort and provide an integrated understanding of the goals that need to be accomplished. More successful projects are the result of project managers that use a transformational leadership strategy, which involves inspiring and motivating followers and giving them the authority to adopt and pursue demanding goals and a mission (Faeq et al., 2022). The leader of the project team is actively involved in communication with a variety of networks (Oh et al., 2019). In this area, the project manager demonstrates transactional leadership in order to realize performance levels. He must act as an ambassador and represent the team to others, while at the same time protecting the team from interference, explaining the next steps, and motivating the external stakeholders to pursue objectives cooperatively with the project team. All of these tasks must be completed in order to realize performance levels (Faeq et al., 2022). The manager is faced with a variety of demands, many of which are in direct opposition to one another. This gives rise to the situational approach, which focuses on the relationship between a particular condition and effective leadership (Yilmaz et al., 2020). Anwar

(2017) conducted an analysis of Faeq et al. (2022) situational leadership model in order to determine the particular actions that agile project managers are required to take when leading a team based on the readiness of the team. Anwar (2016) discovered that how leaders construct teams and the quality of their hands-on coaching both affect the success of teams in the form of self-management on the part of the team, the quality of member relationships, and member happiness. It is possible for members of a geographically distributed team to experience a sense of disconnection from both the organization and the team's mission (Zaman et al., 2019). So, it's important for the leader of such a team to do things like keep an eye on the group and make sure everyone knows what's expected of them.

ICT Team Management

According to Anwar and Surarchith (2015), self-organizing teams are made up of "individuals that are capable of managing their own work assignments." This means that members of the team are able to allocate tasks to one another and reschedule those tasks based on the needs of the group as well as the skills that are needed. Everyone on the team has a say in the decisions that are made collectively. Faeq (2022) presented four principles of self-organization, and they are as follows: necessary diversity; redundancy of functions; minimal critical specification; and double loop learning. After that, Sadq et al. (2020) proposed that self-organizing teams should have these five characteristics in order to be successful: autonomy, team orientation, shared leadership, redundancy, and learning. In their investigation, they came to the conclusion that the most significant obstacle to self-organization was the classification of tasks according to levels of expertise. Tabassi et al. (2019) expanded on this by adding an additional critical component called "Communication and Collaboration." Faeq et al. (2020) proposed that, in addition to autonomy, self-organizing teams demonstrate self-transcendence as well as cross-fertilization. The group's members routinely and persistently organize themselves in order to fulfill ever-evolving criteria. In a perfect world, a self-organizing team will have agreed upon aims and targets. It accomplishes this by fostering an environment of mutual trust and respect for one another. Self-organization and self-management are synonymous terms that have been used in the context of agile software development. Agile teams, such as scrum teams, are examples of self-organizing teams (Marnewick and Marnewick, 2019). In this setting, the members of the team are responsible for managing their own workloads, allocating tasks to one another according to needs and strengths, and taking part in decision-making as a group (Sadq et al., 2021). As the position of the project manager decreases, developers get more autonomy to make decisions and demonstrate commitment (Anwar and Ghafoor, 2017). Agile software development is characterized by its heavy emphasis on collaboration and the high degree of interdependence among tasks (Ali et al., 2020). It suggests little control that is explicitly exercised over the members of the team; otherwise, the teams will become submissive to commands rather than proactive in their approach to issue-solving (Faeq, 2022). Direct contact with partners and iterative procedures are both helpful in controlling competing interests and assisting teams in rapidly adapting to surroundings that are uncertain and constantly shifting (Grzesik and Piwowar-Sulej, 2018). Agile software development is built on a foundation of communication and collaboration amongst developers (Anwar, 2017). Faeq et al. (2021) developed a methodology that would quantify the cornerstones of agile cooperation on five different dimensions. These cornerstones are shared leadership, team orientation, redundancy, learning, and autonomy. Each individual in the team takes ownership of the duties that have been delegated to them and is accountable for bringing them to a successful conclusion (Guinan et al., 2019). In a different piece of research, Anwar and Climis (2017) revealed that supporting team orientation may be done by letting the team engage in iteration planning and goal formulation, and by prioritizing issues in a clear and concise manner. The members of the team are then provided the opportunity to select their own activities. Because of this, team members are able to better grasp the work that each other is doing, which encourages redundancy. Instead of waiting for the project manager's directions and plan of action, as is typical in conventional project management, self-organizing teams are expected to learn, experiment, and problem solve through self-participation during times of crisis. This is in contrast to the standard practice of waiting for the project manager's directions and plan of action. In a nutshell, self-organizing teams should ideally be self-managed and should instill supervisory behavior in their members. When members of a team don't know one another and the team is geographically dispersed, self-organization takes on an even greater level of significance. Building trust is vital to establishing coherence among subteams, especially when those subteams are located in different time zones, have different cultures, and work in different locations. There is a good chance that they will have difficulties with the language, the technical alignment, and the management of the project. Therefore, it is essential for members of a remote team to be self-organized, to build trust with one another, and to exhibit particular leadership behaviors that will assist them in overcoming the hurdles and have a

favorable impact on the team's overall performance on the project. In addition, self-organizing teams offer many benefits to organizations, including increased innovation and performance effectiveness. Performance effectiveness can be defined as an increase in productivity, a decrease in response time, an increase in quality and customer satisfaction, and so on (Henkel et al., 2019). This graph depicts the geographical distribution of approximately 40% of the development teams worldwide. This distribution may now be entirely distributed or partially dispersed. Both options are available. "Groups of individuals that work interdependently across place, time, and organization barriers utilizing technology to communicate and collaborate" is the definition of what is known as "geographically distributed teams" (Sadq et al., 2020). It is difficult to maintain continuous communication (Anwar and Louis, 2017), coordination, and collaboration among team members who are separated by geographical, temporal, or cultural distances when the teams are geographically distributed. This is a challenge that is faced when the teams are working on different continents (Othman et al., 2020). In other instances, the distribution of work is another factor that leads to the lack of job relevance. The members of the team's behavior and their ability to work together are both impacted by the absence of a shared context (Faraj et al., 2021). There are many different contributing aspects that determine how effective distributed teams are. Among these include knowledge of task awareness (Walker and Lloyd-Walker, 2018), understanding of cross-task relationships (*KM* et al., 2021), and reliance on information and communication technology (ICT) for team collaboration (Panteli et al., 2018). Achieving task knowledge awareness means having up-to-date information regarding the performance of every member of the team (Faeq, 2022). It makes members more aware of alternative points of view, which sparks creative solutions when adaptation is required or non-routine tasks are addressed (Bhatti et al., 2021), and it facilitates coordination through observations of the work that others are doing at any point in time (Faeq and Ismael, 2022). On the other hand, this is difficult to accomplish with a team that is spread. Physical distances necessitate dealing with numerous time zones, which in turn necessitates rearranging of work schedules to better accommodate the needs of the team, which could otherwise lead to dissatisfaction and confusion (Lukić and Vračar, 2018). When using scrum, the sprint planning takes place at a predetermined time, and all team members are expected to be present for it. In a distributed team environment, cross-understanding, which is the degree to which members of the team have an accurate understanding of each other's mental models (Afzal et al., 2018), may also be impacted. Cross-understanding refers to the degree to which members of the team have an accurate understanding of each other's mental models. Cross-understanding helps teams function better by improving communication, coordination, and the overall quality of information processing among members of the group (Rajhans, 2018). But it has been found (Grass et al., 2020) that the nonverbal cues that are very important for building trust and reducing conflict are not very well transmitted by the virtual communication tools that are now available (Burton et al., 2019).

Transition phase:

- **Compose team**: This leadership duty comprises selecting the appropriate members of the team who have the necessary knowledge, abilities, and experience to effectively carry out the responsibilities that have been delegated. In situations in which the team has already been assembled, one of the functions of the team leader is to evaluate the skills and qualifications of each individual member of the team, to redistribute those skills and qualifications according to the requirements of the situation, and to replace members of the team if necessary. The same logic may be applied to teams who use the scrum method.
- **Define mission**: It is the responsibility of the scrum master to ensure that the members of the development team are aware of the vision, goals, and items on the product backlog.
- **Establish expectations and goals**: The agile master's responsibility is to ensure that the team has a solid grasp of the product owner's objectives and the expectations for the current sprint. It was anticipated of the team that they would produce high-value stories and features on schedule while minimizing the number of defects and items in the backlog.
- **Provide structure and plan**: Finding methods for efficient product backlog management, gaining knowledge of long-term product planning in an empirical setting, and planning scrum deployments inside the business are all parts of the scrum master's responsibility toward product owners.
- **Train and develop team**: Software engineers help the development team make high-quality products and coach them in situations where scrum hasn't been fully accepted and understood by the whole organization.

- **Sense-making**: As a result of the iterative and incremental approach that the agile process takes, scrum masters need to be able to comprehend and put into practice the concept of agility. The Scrum master is expected to be the first person to notice any differences or problems and to tell management about them.
- **Provide feedback**: The scrum master is responsible for fostering a culture of feedback. The feedback provided by the scrum master has the potential to bring about various beneficial behavioral changes, ultimately leading to increased levels of confidence and trust among team members, which ultimately leads to improved team performance.

Action phase

- **Monitor team**: These meetings are led by the scrum master, who is also responsible for determining which items on the initial backlog will be finished during the sprint and for objectively measuring progress toward the ultimate goal of providing incremental sets of product functionality (Rising and Janoff, 2000). The scrum is run by the scrum master, who is also in charge of making sure the team follows the scrum's theory, rules, and practices.
- **Manage team boundaries**: Managing the link between the team and the wider organizational setting is a role that falls under this category of leadership. It is the responsibility of the scrum master to maintain a healthy power dynamic between the product owner, the team, and management. In accordance with this function, the scrum master collaborates with other scrum masters in order to improve the efficiency with which scrum is applied throughout the organization. In addition to this, he is in charge of making decisions on what course of action to take and confirming those judgments with management.
- **Challenge teams**: This leadership position entails posing difficult challenges to teams with relation to their performance as a team. Scrum masters are responsible for bringing about change that ultimately results in an increase in the productivity of the scrum team.
- **Perform team task**: A team leader is a member of the team who takes an active role in completing team tasks, takes personal responsibility for completing those tasks, and helps other team members.
- **Solve problems**: Agile project managers are facilitators who teach employees and stakeholders about scrum and empirical product development and assist them in putting this knowledge into practice. He promotes regular participation from team members in order to facilitate group problem solving.
- **Provide resources**: Not only should the scrum masters facilitate scrum events as requested or needed, but they should also remove impediments to the development team's progress (Anwar, 2016). This can be done by having the scrum masters organize and schedule the right resources, such as hardware, software, licenses, and training.
- **Encourage team self-management**: The development team is guided by the scrum masters, who also act as facilitators in the areas of self-organization and cross-functionality.

III. METHODOLOGY

Research design

When conducting research, it is crucial to first develop a plan for how you'll go about collecting data and analyzing your findings, which is where the thesis design comes in. The research plan lays out the specifics of what data will be collected, how it will be used, and where it will come from. Moreover, it elucidates and specifies the data to be used in research analysis as well as the research methodologies to be employed by the researcher in order to investigate the causality or effect of the variables under study. Furthermore, it is said that the goal of this method is to offer and illustrate what is considered to be a dependable conclusion and study outcome. In addition, it serves as a bridge between the research questions and the actual execution because it is a blueprint for success. The time and means by which information will be acquired are both affected by the study strategy that is being considered. The goal here is to define and analyze a plan for gathering data that may be used to back up the researcher's assumptions and provide insight into the research issue. Descriptive research is one of the key research strategies that researchers will use to examine their findings. The researcher used quantitative research methods as a component of the descriptive research approach in this study. While qualitative research frequently necessitates Boolean analysis, the quantitative approach compromises on determining a phenomenon in a large number of outcomes. Even though there may be a place for qualitative evaluations of how well someone explains something, applicants' answers must be compared

using a quantitative method. The researcher used a quantitative method since it allowed her to complete the investigation with fewer man-hours and fewer materials expended. Also, the researcher used this method because he or she thought it was the best way to measure the relationships between the study's independent variables—three different types of leadership—and the management of construction projects in a sample of companies in Iraq's Kurdish region.

Sample size and sampling method

The researcher sent out questionnaires to seven different construction firms in the cities of Erbil, Duhok, and Sulaymainah. The current study employed a random sample approach to guarantee that all customers would be able to take part in the research. Since a sample is only a selection of people drawn at random from a larger pool, this will reduce the need for extensive surveying and other laborious manual processes, saving valuable time and money for the study. Nonetheless, 417 online surveys from various construction firms were collected by the researcher.

Conceptual Framework

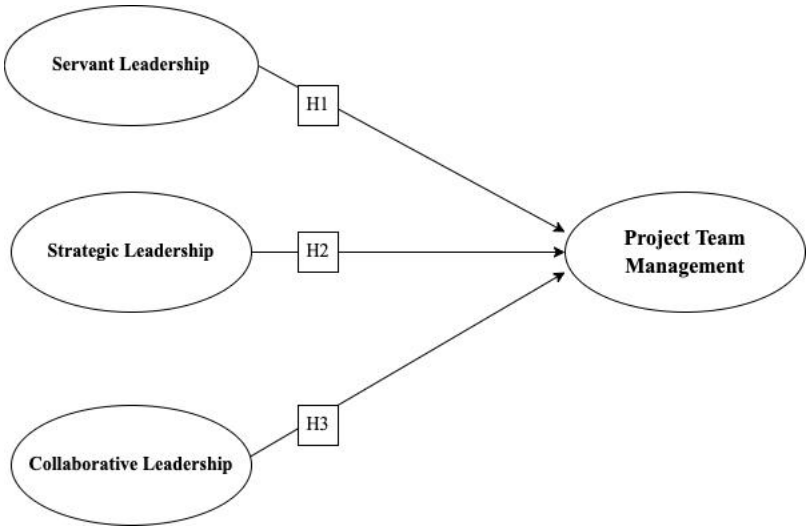

Fig.1: Conceptual Framework

Research Hypotheses

H1: There is a significant and positive relationship between servant leadership and project team management.

H2: There is a significant and positive relationship between Strategic leadership strategy and project team management.

H3: There is a significant and positive relationship between collaborative leadership strategy and project team management.

Data collection

Using a quantitative methodology based on a questionnaire, the author of this study analyzed the connection between three types of leadership and project team management in the construction industry in the Kurdish area of Iraq. Respondents will be given a series of questions on their experiences with and opinions of various construction firms. This is a common way for imperial researchers to get information for a certain kind of study.

Methods of analysis

This study was conducted with a particular emphasis on clients of Kurdish construction firms. When investigating the connection between leadership style and project team management, the researcher opted for a quantitative approach. The study's core data came from surveys the researcher administered to participants. In addition, the researcher contacted clients and obtained information through a questionnaire after gaining permission to do so from the customer database of construction businesses. With three independent variables and project team management as a dependent variable, the research utilized a reliability analysis to determine the validity of the questions employed in the study. Finally, the research model-driven hypotheses were evaluated using regression analysis.

Testing Research Hypotheses

In this section, we examine the results of a survey sent to seven construction firms in the Kurdistan area of Iraq. As was said before in the conceptual framework, the researcher made an effort to evaluate the hypotheses they

had developed. After using reliability analysis and the relationship technique to measure the reliability of the independent variable and the dependent variable, respectively, regression analysis was used to test the proposed study hypotheses.

The relations between independent variables and dependent variable

The following are the findings from an analysis of the correlation between the three distinct types of leadership (servant leadership, strategic leadership, and collaborative leadership) and their respective dependent variables (project team management).

The relationship between servant leadership and project team management.

H1: There is a significant and positive relationship between servant leadership and project team management.

The study used Crosstab to determine the relationships between the variables, and the results showed that 29 customers out of 417 customers rated as low the relation between servant leadership strategy and project team management at selected construction companies in Kurdistan; 161 customers rated as fair the relation between servant leadership strategy and project team management at selected construction companies in Kurdistan; and 227 customers rated as high the relation between servant leadership strategy and project team management at selected construction companies in Kurdistan. Based on the above results, we can say that most clients are worried about how some Kurdistan-based construction companies use servant leadership and manage project teams.

Table 1- Crosstab

Crosstab

Count					
		Project team management			
		Low	Fair	High	Total
Servant leadership Classes	Low	5	22	2	29
	Fair	10	102	49	161
	High	1	41	185	227
Total		16	165	236	417

The Chi-Square Tests table appears to have the Chi-Square statistic in the column labeled Value, exactly to the right of the column labeled "Pearson Chi-Square." The analysis revealed that the chi-square statistic had a value of 138.979, as shown in the results. The p-value may be found in the same row under the heading "Asymptotic Significance (.000). Because the P value is lower than 0.05, the finding is statistically significant. This shows that there is a significant connection between the strategy of servant leadership and the management of project teams at a selection of construction enterprises in Kurdistan.

Table 2-Chi-Square Tests

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	138.979[a]	4	0.000
Likelihood Ratio	146.400	4	0.000
Linear-by-Linear Association	128.711	1	0.000
N of Valid Cases	417		

The relationship between Strategic leadership strategy and project team management.

H2: There is a significant and positive relationship between Strategic leadership strategy and project team management.

The research utilized Crosstab in order to determine the relationships between the variables. The findings showed that 57 customers rated as low the relationship between strategic leadership strategy and project team management at selected construction companies in Kurdistan; 236 customers out of 417 customers rated as fair the relationship between strategic leadership strategy and project team management at selected construction companies in Kurdistan; and 124 customers out of 417 customers rated as high the relationship between strategic leadership strategy and project team management at selected construction companies in Kurdistan. Based on the above results, we can say that most of the customers surveyed at the Kurdistan construction companies gave a "fair" (or "medium") rating for the strategic leadership approach and the project team management.

Table 3-Crosstab

Crosstab					
Count					
		Project team management			Total
		Low	Fair	High	
Strategic leadership Classes	Low	4	42	11	57
	Fair	11	89	136	236
	High	1	34	89	124
Total		16	165	236	417

The Chi-Square Tests table appears to have the Chi-Square statistic in the column labeled Value, exactly to the right of the column labeled "Pearson Chi-Square." Following analysis of the data, we found that the value of the chi-square statistic is 45.589. The p-value may be found in the same row under the heading "Asymptotic Significance (.000). Because the P value is lower than 0.05, the finding is statistically significant. This showed that there is a strong link between strategic leadership strategies and how project teams are managed at a number of construction companies in Kurdistan.

Table 4-Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.589[a]	4	0.000
Likelihood Ratio	48.265	4	0.000
Linear-by-Linear Association	37.467	1	0.000
N of Valid Cases	417		

The relationship between collaborative leadership strategy and project team management.

H3: There is a significant and positive relationship between collaborative leadership strategy and project team management.

The research used Crosstab to determine the relationships between the variables. The findings showed that 53 customers out of 471 customers rated as low the relationship between collaborative leadership and project team management at selected construction companies in Kurdistan; 198 customers out of 417 customers rated as fair the relationship between collaborative leadership and project team management at selected construction companies in Kurdistan; and 166 customers out of 417 customers rated as high the relationship between collaborative leadership and project team management at selected construction companies in Kurdistan. Based on the above results, we can say that most of the customers of the Kurdistan construction companies that were surveyed gave a fair (medium) rating to the collaborative leadership and project team management.

Table 5-Crosstab

Crosstab					
Count					
		Project team management			Total
		Low	Fair	High	
Collaborative leadership Classes	Low	14	27	12	53
	Fair	2	96	100	198
	High	0	42	124	166
Total		16	165	236	417

The Chi-Square Tests table appears to have the Chi-Square statistic in the column labeled Value, exactly to the right of the column labeled "Pearson Chi-Square." As a result of the analysis, we determined that the value of the chi-square statistic is 116.867. The p-value may be found in the same row under the heading "Asymptotic Significance (.000). Because the P value is lower than 0.05, the finding is statistically significant. This demonstrated that there is a substantial connection between the implementation of an collaborative leadership and the management of project teams at a variety of construction enterprises in Kurdistan.

Table 6-Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	116.867[a]	4	0.000
Likelihood Ratio	87.858	4	0.000
Linear-by-Linear Association	71.591	1	0.000
N of Valid Cases	417		

Multiple Regression Analysis

The findings of a multiple regression analysis have been presented in order to evaluate each research hypothesis that was produced in accordance with the research model.

Model Summary

According to the model summary, the value of the adjusted R square is.690, and since this can be seen in the table, it indicates that 70% of the variables have been explained.

Table 7-Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.833[a]	0.695	0.690	2.515
a. Predictors: Collaborative leadership, Strategic leadership, Servant leadership				

ANOVA

According to the results of the ANOVA analysis, which are presented in the table, it was discovered that the value of F was 155.481, and the significant level was equal to.000. Because the P value was lower than.05, this showed that there was a positive correlation between each leader and project team management at selected construction companies in Kurdistan. This conclusion is significant because it indicates that there is a positive association.

Table 8 -ANOVA

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5901.626	6	983.604	155.481	.000[b]
	Residual	2593.741	410	6.326		
	Total	8495.367	416			
a. Dependent Variable: Project team management						
b. Predictors: (Constant), Collaborative leadership, Strategic leadership, Servant leadership						

Coefficients

To evaluate the three study hypotheses that were generated previously, the researcher used multiple regression tests to examine the relationships between the three leadership styles that served as independent variables and the management of the project team that served as the dependent variable. Multiple regression analysis was used to examine the link between leadership styles (collaborative leadership, strategic leadership, and servant leadership) and project team management at the selected construction companies in Kurdistan, and the results are displayed in the table. It was discovered that the value of B was.573 and the value of Beta was .339, both with a significant level of .000. This indicates that the finding is important because the P value is less than.05. According to the findings, the first study hypothesis was validated, which revealed that there is a positive connection between servant leadership strategy and project team management. This hypothesis says that there is a positive association between the two. Regarding the second research hypothesis, which stated that there is a significant and positive relationship between strategic leadership strategy and project team management, it was discovered that the value of B was.637, and the value of Beta was .232, with a significant level of .000. This was in relation to the fact that the first research hypothesis stated that there is a significant and positive relationship between strategic leadership strategy and project team management. The fact that the P value is lower than 0.05 indicates that the finding is statistically significant. The second study hypothesis, which suggested that there is a favorable association between strategic leadership strategy and project team management, was validated. These findings reveal that this hypothesis was supported. It was discovered that the value of B was .238 and the value of Beta was .116, both with a significant level of .000. This indicates that the finding is important because the P value is less than .05. According to the findings, the third study hypothesis was validated, which suggested that there is a favorable connection between collaborative leadership strategy and project team management. The results were shown to be the case.

Table 9-Coefficients

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Collaborative leadership	0.238	0.072	0.116	3.296	0.000
	Strategic leadership	0.637	0.083	0.232	7.651	0.000
	Servant leadership	0.573	0.057	0.339	10.034	0.000
a. Dependent Variable: Project team management						

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IV. CONCLUSION

In conclusion, businesses need to cultivate digital leaders so that these individuals may become the primary proponents of digital skills as well as entrepreneurial process approaches to IT solution creation and development. Because of this, certain leaders may be forced out of their technical comfort zones. Hence, it is essential to acknowledge and encourage the necessary shift in competency levels. It is recommended that companies think about providing chances for their important leaders to participate in professional development so that these individuals may improve their leadership skills in the areas of communication, delegation, and empowerment. When digital leaders get better at taking risks, learning in short cycles, and designing in an entrepreneurial way, the rest of the business is better able to carry out its digital plan. Leaders in the digital space need to turn their attention to locating and removing any hurdles that may be preventing their teams from innovating digitally. Regular check-ins with the project leaders will assist managers to keep updated on the progress being made toward these objectives. Additionally, this will provide a beneficial method for identifying where potential difficulties are emerging as well as what resources may be required. It's possible that providing IT managers with coaches or mentors might be a useful tool in supporting them in the adoption of new leadership behaviors when those behaviors are required. The feedback and assistance that an IT leader receives from a coach or mentor may provide them with comfort that the empowerment they are attempting to build is in the process of being created and that the control they are seeking is also in place. It is equally crucial to the process of digital transformation that attention be paid to IT project leads and other middle management. This layer of the organization is often the one that is under the most strain, and it is easy to disregard them when it comes to the development of their competencies, the coaching they receive, and the assistance they receive. It is essential to proactively identify and target middle managers with the intention of having them act as supporters rather than blockers of new digital development methods. Last but not least, one important piece of the puzzle that is digital transformation is the chance to attend conferences that spark ideas about digital competence and innovation or give access to learning that is both technically advanced and good for professional growth.

V. FUTURE DIRECTIONS FOR PROJECT TEAMS

The use of digital technology is growing more and more pervasive throughout our product line and service offerings. Therefore, information technology (IT) cannot be divorced from other business functions such as strategy, new product development, operations, finance, or marketing. According to the findings of our study, it is abundantly evident that the vast majority of businesses are not prepared for digital transformation since the primary emphasis has not been placed on establishing innovative digital teams. The successful completion of a digital transformation does not require the introduction of new technology. It is about empowering a digital staff that is capable of supporting change while also demanding it. One of the issues that will face businesses in the future is figuring out how to scale up their inventive digital teams. Changing the culture of groups within organizations and teams is challenging and needs acceptance that the process will take a significant amount of time and effort. Because their digital teams now adopt agile-type approaches, for instance, Microsoft's digital transformation is seen as a model for the new industrial revolution. However, it took some time to turn into an agile company since it required a shift in the business's culture as well as the mindsets of all of its employees. Altering the actual physical workplace in order to encourage cooperation both inside and across teams was one of the successful practices that Microsoft implemented in order to grow its digital teams. This includes the utilization of open space, room and wall colors, as well as the structure of the space itself, in order to give the impression that the physical surroundings are nimble. As a result of becoming more fully integrated into the product development lifecycle, agile development teams will play an increasingly important part in the product innovation process. At Cisco, Agile methodology was used by engineering teams, which included specialists in both hardware and software, with the goal of enhancing creativity during the early stages of product development. The members of the engineering teams were given new responsibilities, which included working directly with both fellow engineers (instead of team supervisors) and customers to find solutions to problems. Because of the shift to more autonomous teams and the subsequent promotion of a flatter organizational structure, the end

result was increased levels of customer satisfaction when working in collaboration with Cisco engineering teams, as well as improved net promoter scores and increased employee engagement. Another pattern that has been spotted recently is the incorporation of digital teams into the artificial intelligence (AI) sector. For the purpose of enhancing customer service and real-time interaction, financial institutions are beginning to implement virtual financial assistants. AI solutions frequently call on a variety of specialized skills, such as data science, the development of machine learning, and the protection of data privacy and security in the cloud. In addition to having business domain experts and digital interface designers on their teams, digital teams that are producing AI solutions such as voicebots and chatbots need to have the competencies listed above. AI projects are unlike any other since, after the solution has been implemented, there is frequently further learning that must be done in order to improve the underlying algorithms and data collection. Because of this, AI-based digital teams need to be highly fluid and collaborative not just during the design phase of the solution but also during the implementation phase and after the solution has been put into place. In conclusion, as new digital technologies continue to disrupt, resulting in countless use cases across business, successful companies will be ones that are continually aware of, experimenting with, and learning about the various options that are available to them. In order to move business models ahead, digital teams need to have a strategic perspective in addition to a focus on tactics and execution. The rapid transformation strategy that Ericsson is taking has elevated the company's discussions about forward-looking technologies to a new level. When the firm integrated all of its teams in order to make them really cross-functional, it discovered that the employees working for the company lost sight of the strategic goals and instead concentrated on the operational details. The idea was to establish a more modest technology department that would concentrate solely on the development of flexible and far-reaching technological possibilities.

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Analysis of Emerging Automation Tools in Industry

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Abstract— *The increasing demand of speed and accuracy for software testing in the industry requires advanced testing tools. Efficient software testing can only be done by utilizing necessary and appropriate testing methods and frameworks. High quality development can be achieved by using effective automation testing. This paper compares various software testing tools and will aid professionals and researchers in this field.*

Keywords— ***Software Testing, Test Automation Tools,Software Automated Testing.***

I. INTRODUCTION

Software testing is the process of verifying whether a product or application delivers the expected outcome. It is done to prevent bugs, improve efficiency of the product and reduce costs. The main intent of software testing is to find faults and errors [1], so as to solve them before the end product reaches the customer. Testing can be done manually as well as by using automated tools. Manual testing and automated testing are the two methods of testing. Manual testing is also called as static testing. It is carried out by the tester. Automated testing is also called as dynamic testing [2]. Manual testing and automated testing both are important testing methods but, in most cases, automated testing is considered better than manual testing.

The purpose of this paper is to provide an extensive study on various automation tools available in the market. A number of testing tools are explained in the study along with their pros and cons. The paper is divided as follows: Section 1 is the introduction, Section 2 describes automated testing, Section 3 discusses about Test Automation Tools Categories, Section 4 provides brief descriptions of automation tools along with their advantages and disadvantages, Section 5 presents a comparative analysis of various automation testing tools, Section 6concludes the study.

II. AUTOMATED TESTING

Automated testing is the process of using software to compare the actual outcomes of the product with the expected outcomes. Automated tests are conducted in such a way that they do not require human intervention [4].

Automated testing can be used in many areas instead of manual testing but it cannot replace manual testing completely. Both testing methods work together to give desired results. The benefits of automation testing over manual testing are as follows:

- Higher Testing Efficiency
- Greater Accuracy and Reliability
- Reusability and Repeatability of Test Scripts
- Improved Test Coverage
- Simulation of User Environment
- Boost in Team Morale
- Higher ROI: Saves Time and Costs
- Volume and Simultaneity
- Early Detection of Bugs [3]

Advantages	Disadvantages
It is more efficient and does testing quickly.	Expensive than manual testing.
Increases number of tests as various tools can run simultaneously.	Choosing the right tools takes time and workforce.
Bugs can be found quickly.	Proficiency in languages for scripts is needed.
Results are more accurate than manual testing.	Knowledge of tools is required.

III. TEST AUTOMATION TOOLS CATEGORIES

Software testing automation tools are categorized as follows: Unit Testing Tools, Test Management Tools, Code Coverage Tools, Functional Testing Tools and Performance Testing Tools.

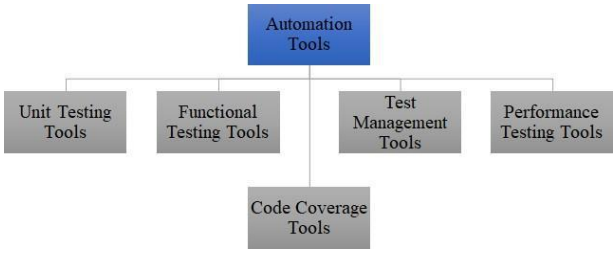

Fig1 : Categories of Test Automation Tools

1. Test Automation Tools

An automation tool is a software itself with the help of which the actual software in focus can be tested, in other words, the automation tool helps and serves as a means in doing software testing [5]. Following is the description of some common testing automation tools available for use:

1. LambdaTest

LambdaTest is an automation testing tool used for desktop and web applications. It can run selenium test automation on desktop, android and iOS mobile browsers in languages like Python, Java, JavaScript, etc. It allows integrated developer tools to help debug issues in live testing, local hosted web testing and geolocation testing.

Advantages	Disadvantages
Variety of frameworks to choose from.	There is no native app testing.
It supports TestCafe, Cypress, Puppeteer, Selenium and Playwright for automated cross browser testing.	It supports only emulators and simulators and not real devices.

Advantages	Disadvantages
Wide range of device and OS supported.	Not able to execute end-to- end and regression testing.
Does not need additional dependencies.	Cannot produce real world conditions to test against.

5. Avo Assure

Avo Assure is a 100% no-code and intelligent test automation tool. It enables technical as well as business users to test across multiple platforms like mobile, web, desktop, mainframes etc.

Advantages	Disadvantages
It is a scriptless automation tool.	Updating an existing mind map is difficult.
Easy to learn and user friendly. Need to learn programming languages is eliminated.	Report size is big which makes it difficult to debug.

2. Katalon Studio

Katalon Studio is used for automation testing for API, desktop, mobile and web. It is an end-to-end automation platform built for continuous testing and bringing solutions for every industry. It is quick to adopt, powerful to scale and has seamless Agile and CI/CD Integration.

Advantages	Disadvantages
No licensing and maintenance fees required.	Poor community support.
Built on Selenium framework but does not need advanced programming skills.	Lack of support of programming languages. Supports only Java/Groovy.

3. Subject7

Subject7 is a cloud-based and truly codeless test automation tool. It is easy to use integrates easily with DevOps/ Agile tooling using native plugins, open API's and in-app integrations.

Advantages	Disadvantages
Features like cloud test execution, multi browser testing, database, connection, REST callsare available.	UI is not that user friendly.
Does not require extensive knowledge of programming languages.	Less online resources available.

6. IBM Rational Functional Tester

The main purpose of this tool is regression testing and automated functional testing. It can perform GUI and data-driven testing. IBM RFT supports a variety of terminal emulator- based and web-based applications.

Advantages	Disadvantages
Quick response and good support. IBM releases frequent updates to fix issues.	Very less support of browsers other than Internet Explorer.
There is no set up fees.	Uses a lot of memory.

7. Test Studio

Test Studio is a test automation solution suited for GUI, performance, load and API testing. It uses languages like C# and VB.NET, a central object repository andcontinuous integration with source control.

Advantages	Disadvantages
It comes with extensive support for data-driven testing.	It is not a free tool and is a bit costly.
Without writing a single line of code, automated tests can be run on devices and emulators.	It needs powerful computers to run all its capabilities.

8. TestComplete

TestComplete is a GUI automation testing tool used to testdesktops, web applications and mobile applications. Made for technical as well as non-technical users. It uses modern languages like Python, JavaScript and VBScript.

Advantages	Disadvantages
Allows to choose a variety of scripting languages.	Additional cost for extra modules and add-ons.
It requires only basic programming skills.	Licensing and maintenance fees are needed.

4. Kobiton

Kobiton's scriptless test automation makes testing easy by creating automated tests from manual tests. It creates scripts which execute on over 350 devices. It supports XCUI, Selenium, Appium etc. for scripting.

IV. COMPARATIVE ANALYSIS OF VARIOUS AUTOMATION TESTING TOOLS

There a lot of Automation Tools available in the market. The selection of the best tool for one's necessity is the difficult task. To reduce the labour of searching for the best tool, below is a detailed comparison of the various automation solutions.

4.1 On basis of price and platform

4.2 On basis of languages, coding skills and tested apps Languages are sometimes necessary in automated testing assome software work using coding. Necessary skills are required by user for the proper working of these tools. The skillset may range from minimum skills to good/advanced level. The following is the comparison according to theseparameters:

Tools	Price (Annually)	Platform
LambdaTest	Free/Paid plansavailable	Windows/Linux/Mac
Test Complete	$3000/$5000	Windows
KatalonStudio	Free/Paid plansavailable	Windows/Mac
Subject7	Given exclusivelyby software provider	Windows
Kobiton	$4000/$9000	Windows/ Linux /Mac
AVO Assure	Given exclusivelyby software provider	Windows/Mac
IBM RFT	Given exclusivelyby software provider	Windows/Linux/Mac
Test Studio	$2500/$3500	Windows

Tools	SupportedLanguages	CodingSkills	TestedApps
LambdaTest	Java/ Python/ Ruby/ PHP/ C#	Good skills needed	Web
TestComplete	VB/ JavaScript/C++/ C#/ Delphi/ Angular/ Rubyon Rails/ PHP	Minimumskills	Web/ Mobile/ Desktop
Katalon Studio	Java/ Groovy	Minimumskills	Web/ Mobile
Subject7	Codeless automation	Minimum/No skills	Web
Kobiton	C#/ Java/ Ruby/NodeJS/ PHP/ Python	Good skills needed	Web
AVO Assure	Codeless automation	Minimum/No skills	Web/ Android/ iPhone/ iPad
IBM RFT	HTML/ Java/Windows/ .NET/ Visual Basic/ Silverlight/ Eclipse/ SAP/Siebel/ Flex/ Ajax/ Dojo/ GEF/ PowerBuilder	Good skills needed	Web/ Desktop
Test Studio	HTML/ AJAX/ Silverlight/ ASP.NET MVC/ JavaScript/ WPF/ Angular/React/ Blazor	Good skills needed	Web

V. CONCLUSION

There are many automation tools in the market. The main purpose of these tools is to reduce time and workload for completing a task. Unfortunately, the features discussed in this study do not alone meet the requirements of the industry. Each tool has its own unique features and can be used effectively if chosen wisely for particular tasks. This study provides detailed explanation of various automation tools so as to ease the selection of automation tool and framework by professionals

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Effect of amended Geosynthetic Clay Liners (GCLs) on chromium contaminated leachate

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Abstract— *Contamination of heavy metals has a detrimental effect on human health. Facilities for the disposal of municipal solid waste are among the possibilities that contaminate groundwater and the environment the most. Leachate is the term for the fluid that results from the anaerobic oxidation of solid waste in landfills. Depending on the type of waste, leachate comprises organic, inorganic, and heavy metals. The primary problem in developing countries is the leachate-related contamination of ground and surface water. Cr (Chromium), one of the heavy metals contained in the leachate, is one of the majority of heavy metals that are carcinogenic in nature. In the leachate sample, the concentration of Cr was determined to be 0.178 mg/l, more than double the allowed limit of 0.1 mg/l. Reducing the Cr concentration in leachate samples after passing through a modified geosynthetic clay liner is the goal of this study (GCL). The modified geosynthetic clay liner was created by mixing various amounts of Peanut Shell Ash (PSA) with encapsulated Sodium Bentonite (Na-B) in commercial GCL (0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, and 50%).*

Keywords— ***Contamination, Geosynthetic clay liner, Leachate, Peanut shell ash.***

I. INTRODUCTION

The explosive growth of municipal solid waste is especially worrying for everyone in the world. The average amount of waste produced daily per person worldwide is 0.74 kg, howeverindividual country waste output rates can range from 0.14 to 4.54 kg (Dixit et al., 2022). Unregulated and non-engineered waste disposal is one of the leading causes of groundwater contamination, air pollution, and land pollution, posing health risks to humans, organisms, and ecosystems (Dixit & Srivastava, 2015). In many nations, a substantial rise is observed in both municipal and industrial solid waste output along with improved standards of existing and sustained industrial and commercial development (Renou et al., 2008).Leachate is a type of contaminated liquid that develops when organic solid waste decomposes, gathers contaminants, and spreads into underground spaces (Renou et al., 2008). Heavy metals including chromium, nickel, copper, zinc, cadmium, lead, etc. are present in the leachate. Groundwater resources are significantly in danger from leachate from landfills. (Maiti et al., 2016). In some cases, identifying the exact nature of groundwater contaminant sources may be impossible (Datta & Singh, 2014). Groundwater is particularly vulnerable in areas with a high population density (Singh & Datta, 2021; Zahra et al., 2021). Unauthorized and uncontrolled pollutant injection into the aquifer is one of the most typical sources of groundwater contamination. (Datta & Singh, 2014).

Heavy metals are metallic chemical elements that have a comparatively high density and are hazardous or harmful even at low concentrations. The process of identifying possible threats to human health connected to environmental exposures is known as health risk assessment. Prolonged exposure to Cr may cause lung, liver, bladder, and kidney cancer. Additionally, it led to respiratory illness and skin damage. (Dixit & Roy, 2016).

The concentration of heavy metals has resulted in a significant increase in environmental danger on a worldwide scale in recent decades. Cr increases the incidence several of malignancies while causing extensive environmental harm and is now shown to be neurotoxic. A

wide range of plants and microorganisms play a significant role in the removal of dangerous metals from polluted settings. The individual eats Cr and its byproducts, particularly chromates. People have been exposed to Cr mostly by ingestion, cutaneous absorption, and inhalation. (Dixit et al., 2016; Sharma & Kumar, 2021)

In waste containment applications, geosynthetic clay liners (GCLs) are effective barrier materials for lining and covering systems (Scalia et al., 2018). Due to their low hydraulic conductivity, which helps to stop contamination from leaching into groundwater, and ease of installation, geosynthetic clay liners (GCLs) are being used frequently in landfill disposal facilities (Yu et al., 2021, De Camillus et al., 2016; Kong et al., 2017; Ozhan, 2018; Sari and Chai, 2013; Xie et al., 2018). The GCLs are created as hydraulic barriers, consisting of two geotextile fabrics and a layer of bentonite (Yu et al., 2021). Numerous research has examined how penetration with leachate from municipal solid waste landfills affects the hydraulic performance of GCLs (Wang et al., 2019).

II. MATERIALS & METHOD

2.1 SITE SELECTION

The study area Kanpur, which is situated on the north by the Ganga River and on the south by the Pandu River, is the 11th most populous city in India (Yamuna). The city is situated between latitudes 25°26′ and 26°58′ north and longitudes 79°31′ and 80°34′ east (Dixit et al., 2022). 33.3 °C and 3.7 °C are the highest and lowest recorded temperatures, respectively. The average relative humidity is 78.13%, there is 820 mm of rain on average per year, and the wind speed is 0.936 km/h (Mishra et al., 2021). A municipal solid waste disposal facility (26o27'12"N, 80o14'19"E) provided the leachate sample.

Fig.1 Leachate generation at the municipal solid waste dump site, Kanpur

2.2 PSA

Peanut shells were collected from small shops and the domestic waste disposal area. The shells that have been collected were cut into small pieces. The PSA was produced through pyrolysis with a controlled oxygen supply. The method is used as recommended by Murad et al., 2022.

2.3 GCL

The procured GCLs are made of needle-punched granular sodium bentonite sandwiched between a woven (carrier) and non-woven (Fig.2a). The woven geotextile with a density of 125 g/m^2 and a non-woven (cover) geotextile with a density of 200 g/m^2 is used in the study. The initial thickness of GCL is 6 mm. The peanut shell ash used in this study is presented in Fig.2b.

Fig.2a Procured GCL sample

Fig.2b PSA sample

2.4 EXPERIMENTAL SETUP USING PSA

Leachate contained heavy elements as Iron, Nickel, Zinc, Chromium, Arsenic, Cadmium, and Lead. The health of humans is seriously damaged by these poisonous metals. From GCL rolled sheet, 8x8 cm GCL specimens were cut. By mixing PSA with Na-B in GCL at room temperature (27°–30°), modified GCL specimens were created. PSA was added in various ratios to Na-B: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45%, and 50%. In order to create the synthetic leachate, distilled water was contaminated with 0.178 mg/l of Cr.

Fig. 2.4 Experimental Setup

III. RESULT AND DISCUSSION

The experimental results highlight that the lowest Chromium (Cr) content was found at 40% PSA in the effluent synthetic leachate from GCL (Geosynthetic Clay Liners) (Peanut Shell Ash). It is obvious that the synthetic leachate's Cr content decreased to 0.0520 mg/l and was the lowest of all the effluents collected from GCL. This demonstrates that the highest PSA absorption against Cr occurs at 40% Na-B addition in GCL.

IV. CONCLUSION

Based on the finding of the study, it can be concluded that peanut shell ash is an organic waste by-product and is available with low or no cost and it can be utilized as a better absorbent for total chromium-contaminated leachate. The application of PSA with GCL improves the reduction capacity of Cr concentration at 40% addition proportion. So, it is recommended that PSA canalso be used in GCL at the locations where leachate is contaminated by a high concentration of Cr. In case of failure, the self-healing property of GCL blended with PSA will reduce the chances of groundwater contamination with Cr.

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Estimation of Air Pollution Tolerance Index of Plants Across theIndustrial Zone in Kanpur City, Uttar Pradesh

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Abstract— *One of the world's most serious issues today is air pollution caused by vehicle emissions, which poses a serious threat to both the environment and the health of living things (plants, humans, animals, microorganisms). The most severely impacted plants are those growing along side roadsides because they are the ones most frequently exposed to various air pollutants and exhibit a range of tolerance and sensitivity. In light of this, the current study's foundation was an evaluation of seasonal variation in the air pollution tolerance index (APTI). One of the most important sources of air pollution is vehicle emissions. The 11th most highly populated city in India is Kanpur. The parameter used to evaluate the sensitivity and tolerance level of plants based on Air Pollution Tolerance Index (APTI). This study aims to calculate the resistance and sensitivity of various plant species to air pollution. In the majority of developing countries, one of the causes of air pollution is vehicular emissions. Planting along the side of the road is a significant method of reducing thepollution that cars emit. The plants' APTI value is calculated using the pH, relative water content (RWC), total chlorophyll (Tch), and ascorbic acid (Asc) content of the leaves. The leaves of plants were collected from industrial zones Northen railway colony.Based on APTI values, In the industrial area, the most tolerant plant Ficus benghalensis (38.40) and Azadirachta indica (31.16), while lowest APTI value plants species Alstonia scholoaris(9.5) and Adina cordifolia (11.6.0) in the industrial zone.*

Keyword— ***Vehicular pollution, Total chlorophyll, Ascorbic acid, Air pollution tolerance index (APTI).***

I. INTRODUCTION

Due to the world's rapid population growth, especially in developing nations, where there are heavy industrial, vehicular particulate, and gaseous pollutants, environmental pollution is a significant concern in urban areas(Kumar et al., 2015a). Communicated the issue has multiplied over the last few decades, endangering both people and the ecosystem severely. Other human activities have exacerbated pollutionand its detrimental effects on people and the environment, including open dumping of industrial and hospital waste and the burning of firewood, which is particularly problematic due to incomplete combustion(Hatamimanesh et al., 2021). Morphological, biochemical, and physiological characteristics(Yadav & Pandey, 2020). Plant selection and biomonitoring are important for developing sustainable landscape plans for industrial and urban civic centers(Walia et al., 2019). Landscaping urban areas with plants offers social, health, environmental and economic benefits, but most recently, urban

landscaping has become important for improving air quality(Shrestha et al., 2021). Correct selection of ornamental plant species and adopting proper landscape design may change the view of the urban landscape and will help in environment amelioration.APTI values range from 1 to 100 and classified aspresented in Table 1.

Table 1. Classification of plants based on APTI values (Sharma et al., 2017)

APTI value	Category of plant
<1	Very sensitive
1–16	Sensitive
17–29	Intermediate
30–100	Tolerant

As bio-indicators of pollution, plants with higher APTI values are more tolerant of air pollution than those with lower APTI values(Mukhopadhyay et al., 2021). The plants can be categorised as very sensitive, sensitive, sensitive, intermediate, and tolerant plants based on their indices (Ahmad et al., 2019; Kaviani et al., 2021). Antioxidant ascorbic acid helps protect plants from oxidative damage caused by aerobic metabolism, photosynthesis, and various contaminants(Zhang et al., 2016). The current study's objective was to determine which plant species in Kanpur, Uttar Pradesh, had the highest air pollution tolerance index (APTI).

II. MATERIAL AND METHOD STUDY AREA

Kanpur, a city of Uttar Pradesh (U.P.) is the study location being considered for the current research. Due to the uncontrolled population growth, industrialization, urbanization, and increase in the number of vehicles on the roadways, environmental issues in the area have been becoming worse. With a population of more than 4 million (Dixit et al., 2022). The current study was carried out at location of northern railway colony,Kanpur.

Fig.1 location of northern railway colony,Kanpur (source: Google Maps)

SAMPLING OF LEAVES

In industrial area during the month of May 2022, fresh leaves from each plant were collected for the study.Table 2 displays the plant species that were selected from sites.

Table 2 Zone (Northern railway colony : industrial area)

Plant name	Common name
Polyalthia longifolia	Ashoka tree
Azadirachta indica	Neem
Ficus religiosa	Peepal tree
Ficus benghalensis	Banyan tree
Solanum pseudocapisum	Jerusalem Cherry
Agle marmelos	Bael
Mangifera indica	Mango
Psidium gulajaval	Guava
Lonicera nigra	Black-berried honeysuckle
Adina cordifolia	Haldina cordifolia
Alstonia scholoaris	blackboard tree
Carcabela thevetia	yellow oleander

APTI

The following mathematical expression was used to combine the ascorbic acid content, leaf extract pH, total chlorophyll content, and relative water content to calculate the APTI of various plant species.(Sharma et al., 2017). APTI of the plants were measured by the eq. (1)

$$APTI = \frac{A(T+P)+R}{10} \quad (1)$$

Where: P : pH of the leaf extract, A :Ascorbic acid concentration (mg/gm), T: total chlorophyll (mg/gm), R : relative water content of leaf (%).

RWC

By weighing the fresh leaves, you can get a fresh weight. The leaves were then submerged in water for an entire night, blotted, dried, and weighed to determine their turgid weight(Zhang et al., 2016). The leaves

were reweighed to determine the dry weight after being dried overnight in an oven at 70 °C. Barr andWeatherly used the following formula to determine and calculate RWC: Eq (2).

$$RWC\ (\%) = \frac{(FW-DW)x100}{TW-DW} \quad (2)$$

Where,

FW = Fresh weight,DW = Dry weight, TW = turgid weight.

Tch

0.5 g of leaf samples were homogenised in 80% acetone and centrifuged to determine the amount of total chlorophyll. Using a spectrophotometer, the supernatant's absorption at 663 and 645 nm was measured. eq3 (a)-(c) proposed by Arnon in 1949; Kaur & Nagpal in 2017 was used to calculate the contents of chlorophyll a, chlorophyll b, and total chlorophyll.

Chlorophyll a (mg/L): 12.7 × A663 − 2.29 × A645 3(a)

Chlorophyll b (mg/L): 22.9 × A645 − 4.68 × A663 3(b)

Total chlorophyll (mg/L): 20.2 × A645 +8.02 × A663 3(c)

pH

5.0 g of fresh leaves were homogenized in 10 ml distilled water. Leaf extract filtered and the pH determined after calibrating pH meter with a buffer solution of pH 4, 7 and 9(Bharti et al., 2018; Veni etal., 2014).

Asc

The 2,6, Dichlorophenol indophenol dye was used in the Titrimetric method of Sadasivam (1987) to evaluate the ascorbic acid level. 500 mg of leaf material were extracted with 4% oxalic acid and titrated with the dye until a pink color appeared(Kumar et al., 2015b).

III. RESULT AND DISCUSSION

The estimated values of APTI with plants biochemical parameters for both the locations are presented in theTable 3.

Table 3. Reprehensive APTI for plants northern railway colony (industrial)

Plant Name	RWC	Ph	Tch	Asc	APTI	Tolerance class
Polyalthialongifolia	66.21	6.84	29.25	6.72	30.87	Tolerant
Azadirachta indica	54.12	6.41	16.5	11.24	31.16	Tolerant
Ficus religiosa	60.52	5.3	9.6	6.94	16.39	Intermediate
Ficus benghalensis	55.61	5.41	16.2	15.2	38.40	Sensitive
Solanum pseudocapisum	55.55	6.79	26.41	6.64	27.59	Intermediate
Agle marmelos	63.41	6.84	21.98	5.94	23.46	Intermediate
Mangifera indica	51.3	6.91	15.2	8.4	23.70	Intermediate
Psidium gulajaval	52.7	6.59	19.5	6.5	22.22	Intermediate
Lonicera nigra	42.72	6.27	37.78	7.49	29.61	Intermediate
Adina cordifolia	51.32	7.8	3.91	5.51	11.60	Sensitive
Alstonia scholoaris	50.44	6.06	3.89	4.5	9.52	Sensitive
Carcabela thevetia	59.18	6.9	3.82	5.93	12.27	Sensitive

As the above table show the variation of APTI value of each plant 9.52 to 38.40.

APTI values of plants in ascending order as *Alstonia scholoaris < Adina cordifolia < Carcabela thevetia < Ficus religiosa < Psidium gulajaval< Agle marmelos <Mangifera indica< Solanum pseudocapisum <Polyalthia longifolia < Azadirachta indica < Ficus benghalensis*

IV. CONCLUSION

In order to better understand and control air quality, the current study provides a framework for selecting the right plant species based on score. The APTI is a helpful tool for selecting plants for the creation of green belts to reduce pollution. Tolerant plant species can lessen the negative effects of long-term exposureto air pollution. The current study makes recommendations for the best suitable plants for the development of a green belt in an industrial zone to the relevant authorities and environmental protection organisations. As per the results, the most tolerant plant *Ficus benghalensis* (38.40) and *Azadirachta indica* (31.16), while and *Polyalthia longifolia (17.84) and Nerium indicum* (16.23) are the best suited plant for industrial area. while lowest APTI value plants species *Alstonia scholoaris*(9.5*)* and *Adina cordifolia* (11.6.0) in the industrial zone.

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Stock investment: Factors influencing stock exchange in banking sector

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Abstract— *Mainly, the purpose of this research is to investigate the factors that influence stock market investment in Kurdistan, specifically in Erbil. Emerging markets can also benefit from these marketplaces in order to improve their economies; however, certain emerging countries may be inexperienced with the procedure at this point in time. If you are a business searching for profitable investment options, the stock exchange is an excellent choice. Because these markets are where monetary transactions take place, investors often take their chances in these markets based on research into projected earnings and risks associated with those investments. Due to the enormous risks involved with high-revenue investments, most investors prefer low-risk, low-revenue enterprises instead of high-revenue ones. The current research was conducted in a quantitative manner, which was then examined. The research was carried out in the Iraqi city of Erbil. Following the distribution of 95 surveys, only 82 questionnaires were received and properly completed by the researcher. An investigation into the elements that influence stock market investing was carried out by the researcher using single regression analysis. Following that, there is a strong relationship between supply and demand, which is represented by the economy factor, which is represented by a third component called competition, and finally the political aspect, which is represented by the lowest value. According to the data, supply and demand appear to have a significant impact on the amount of money invested in Kurdistan's stock exchange.*

Keywords— ***Investment, Banking sector Stock exchange.***

I. INTRODUCTION

Today's competitive international economy places a premium on the agricultural sector, which is one of the most important actors in practically every developed and developing country. The stock market is the most important source of financial resources for the achievement of economic objectives. It contributes to national food security as well as economic prosperity in the country. Investors are looking to the agriculture business as the greatest spot to make investments in order to grow their portfolios and

generate more revenue. However, other factors, such as the exchange rate and the rate of inflation, have a dynamic connection with stock prices in both the long-run and the short-run, indicating that they are causally related to stock prices (Mexmonov, 2020). When it comes to understanding the elements that influence the decisions of investors, stock picking can be a difficult process to complete. The evaluation of a company's financial performance has received a great deal of attention and interest from a wide range of stakeholders, including managers, creditors, financial specialists, present and future investors, and academics and researchers. In comparison to other types of difficulties, financial challenges are more intricate and might provide inconsistent results, not to mention the subjectivity of decision-makers throughout the review process. In financial decision-making, multi-criteria decision-making methodologies have been utilized systematically as a tool to assist in decision-making (Nguyen et al. 2020).

Identifying the elements that impact stock exchange is a vital aspect of stock exchange investment (Defrizal et al. 2021). The strategy to economic development taken by different countries around the world may differ in character (Khan et al. 2018). However, there is tremendous competition around the world for the same goal: to rapidly improve the average income of their people. Investments are regarded the cornerstone of sustainable and well-rounded growth (Khan & Khan, 2018), hence governments should attempt to increase (Mumtaz et al. 2018) and diversify their sources of investment to attain this goal. Individuals can invest their money by assigning a particular quantity of money and "running" it in a variety of corporate sectors in consideration for a profitable quantity of additional revenue. Furthermore, investments are crucial in speeding up the growth process (Andavar et al. 2020); nonetheless, the basic challenge that investments encounter is the method in which they are managed, i.e., a scarcity of continuing to invest (Maqsood et al. 2020). This problem can only be handled by establishing a comprehensive system of monetary organizations and institutions capable of channeling investments in the appropriate direction in order to generate the requisite income (Fakhroni et al. 2018). Stock exchanges, on the other hand, are a terrific venue for enterprises looking for investment possibilities to meet and deal (Bakar & Rosbi, 2019). Emerging countries can exploit these marketplaces to expand their economy as well, although some emerging economies could be uncertain. For corporations looking for profitable investment options, the stock market is a common choice. Investors normally take their risks in these markets based on investigating expected gains and dangers associated with those investment (Sugianto et al. 2019), as these marketplaces are where financial activities are processed (Muhammad & Ali, 2018). Investors often eschew high-revenue investments due to the major dangers connected with them, choosing rather than reduced, low-revenue initiatives (Pokharel, 2018).

In recent years, there has been a significant amount of research on the factors that influence the growth of the financial industry. A number of researchers, including Rangkuti, (2019), and others, have investigated the relationship between financial market development and macroeconomic variables, financial reform, and other country – specific factors, as well as the relationships between the development of the various parts of a financial system. It is obvious from the previous research that financial markets tend to develop in tandem with the expansion of the economy and the advancement of financial reform. The development of the stock market is a manifestation of the development of the wider financial sector. In other words, the growth of the stock market is complementary to the development of the other components of the financial system (Li et al. 2021). FDI is an important source of capital in host countries, and it complements domestic private investment by creating new job opportunities and enhancing technology transfer. A large number of empirical studies on the role of FDI in host countries have found that FDI is a significant source of capital, complements domestic private investment, and boosts overall economic growth in host countries, according to Hamad et al. (2021). Consequently, we detect a tripartite causal relationship: (1) foreign direct investment stimulates economic growth; (2) economic growth encourages stock market development; and (3) the conclusion that foreign direct investment promotes stock market development. In a related research, Errunza (1983) discovered that foreign capital inflows have a long-term influence on the growth of the stock market and boost the involvement of investors. Yartey (2008) contends that foreign investment is related with institutional and regulatory change, proper disclosure and listing requirements, and fair trading practices, all of which contribute to higher trust in local markets as a result of more foreign investment. This broadens the investment base and promotes participation, resulting in a rise in capital inflows (Khan, 2019).

II. LITERATURE REVIEW

The critical role that investments play in achieving economic and social development (Sinurat et al. 2020), particularly because any initial increase in invested capital eventually results in higher in revenue value due to the financial multiplier, and any initial increase in income will also lead to an increase in investment value (Mardani & Sarlak, 2018), is regarded as one of the most important

economic activities (Baseri & Hakaki, 2018). The risks and rewards associated with each investment opportunity (Loebiantoro et al. 2021) are, on the other hand, unique to that investment opportunity. Some individuals believe that making an investment is a sensible move (Vorontsova et al. 2021) Alternatively, some people view investments as "giving up a sum of money for a set period of time in order to receive so much cash flow over time, thereby reimbursing for the lost opportunity of possibilities and the anticipated decline in the value of invested money plus inflation, with the possibility of a new advantage realisable via future demand selection, (Khan, 2020)" while others view investments as "giving up a sum of money for a set period of time in order to receive more cash flow in (Wasara & Ganda, 2019). Based on the foregoing, it is reasonable to assert that the concept of investment differs greatly from the concept of saving, which comprises putting money aside "refraining from making future financial commitments in order to boost future consumption. " Saving is completely risk-free (Khresiat, 2019). "Return on investment (ROI) is described as "the profits generated by the capital owner in exchange (Ahmed et al. 2021) for putting up his business for the benefit (Anwar & Balcioglu, 2016) of others for a specific period of time," or "(Shabbir & Muhammad, 2019) the price paid for absorbing risks or uncertainty factors" (Indrayono, 2019). The more the investor's drive to increase his or her profits, the larger the hazards for the investment. Also important to note is that the longer the time span between the original investment and the return on capital, the bigger the risks (Darvishinia et al. 2019). These concerns originate from the uncertainty of whether or not a profit can be earned from a particular initiative or investment. In the capital market, investors can expect to get one of two types of returns: capital gains and dividends. In the first instance, there is a capital addition, which is a rise in the price of the offer as well as an increase in the profit that the company pays out. In this research, the stock exchange is crucial since it will be used to investigate the variable under examination. As described by (Asgarnezhad, 2018), the level of profit perceived by a financial expert for their personal benefits and investments is referred to as stock exchange. Aside from that, according to (Hiya & Syafi'i, 2021), the stock exchange is defined as the overall growth or loss on an investment over a specific period of time (Pole, & Cavusoglu, 2021). When calculating the change in value of the benefit, it is necessary to reduce the value of any money distributions that occurred throughout the period from the investment's value at the beginning of the period. According to the experts, there are a variety of elements that can influence stock return (Mexmonov, 2020). For example, according to Hameed and Anwar (2018), one of the aspects that may have an impact on stock return is the financial ratio, which has made predicting stock return easier in the past few years (Mumtaz et al. 2018). Other qualities that may have an impact on stock performance include book-to-market ratios, debt-to-equity ratios, and dividend yield, to name a few.

Many financial stock markets have reported that swift globalization, enhanced financial reforms, and rapid development in information and technology have almost eliminated all barriers to financial transaction. (Maqsood et al. 2020) provided evidence that these factors have occurred. This growing interest has motivated a number of writers to do study on the stock markets of these two areas; nevertheless, the research emphasis has risen in recent years, notably following the Asian currency crisis (Fakhroni et al. 2018) and the Daly crisis (Bakar & Rosbi, 2019). There have been fewer studies done that have explored the link between sectors within a stock market. This issue has also been raised. Various subjects have been explored in depth in the context of the interdependencies across stock markets, and a plethora of literature has been produced on the subject. For example, (Sugianto et al. 2019), conducted studies on the issue of short- and long-term interdependences of distinct stock markets. Muhammad & Ali, (2018) published works on leaders and followers on a specific set of stock exchanges. Market volatility transmission mechanisms on the stock markets of different nations have also been investigated by Pokharel, (2018), among others. One of the most significant contributions made by the above-mentioned research was the demonstration of the possibility for diversification across a variety of financial and capital stock markets. Rangkuti, (2019) documented that correlations between indices of foreign stock markets and indices of domestic stock markets are low, which provides opportunities for investors to lower risk without jeopardizing the expected return of the portfolio by increasing the portfolio's investment in international stocks. In recent years, several studies (Li et al. 2021) have empirically demonstrated that the benefits of portfolio diversification diminish or may even disappear completely when markets behave bearishly, owing to the increase in co-movements among global capital markets as a result of the strong interdependence of economies across the globe. These crises have only served to reinforce the concept that gains from portfolio diversity are low or nonexistent during times of crisis or when markets behave in a negative manner. There have been several studies conducted on the continually changing interdependent relationship and volatility transmission of different stock markets. It has been discovered by researchers that any financial crisis may become contagious, and that the efficiency of portfolio diversity diminishes at a time when it is most required. A study found that the infectious crisis

makes investing in stock markets more difficult for diverse investors since fluctuating correlation patterns and uncertainty in the financial climate make it harder to identify the ideal investment strategy. Furthermore, authors asserted that the returns of international diversification are statistically and economically insignificant compared to the returns of domestic diversification (Khan, 2019). This demonstrated that home-biased US investors with portfolios consisting primarily of equity assets and traded on US stock exchanges may exhaust the benefits of cross-border diversification. According to Sinurat et al. (2020), possibilities in industrial inclined returns have surpassed opportunities in countries inclined returns since 1997. Investors are interested in the performance of individual equities, as well as the performance of other market indexes, according to a study conducted by Mardani & Sarlak, (2018). The author, Baseri & Hakaki, (2018), states that previous findings on emerging markets have demonstrated that these markets operate on a complex mechanism and that they are influenced by a variety of factors, which in turn aids researchers and investors in understanding the factors that influence returns and make them volatile in these stock markets. According to Loebiantoro et al. (2021), academics regularly employed stock market indexes to examine the efficiency of the market and the stock performance of emerging financial markets.

Kurdistan-Iraq Stock Exchange

During the 1980s, the Kurdistan Region of Iraq underwent structural reforms to remove distortions in the economy, which were accompanied by other financial reforms, including but not limited to deregulation of interest rates, the removal of credit controls, and the floating of exchange rates. These reforms were overseen by the International Monetary Fund and the World Bank. Kurdistan-stock Iraq's market was inevitable after financial liberalization and the sale of several state-owned enterprises made it impossible to avoid the establishment of a stock market.

Much of economic and financial theory is based on the assumption that individuals make rational investment decisions and take into account all relevant information during the decision-making process (Vorontsova et al. 2021). According to Khan, (2020), asserted that there is evidence to show repeated patterns of irrationality, inconsistency, and incompetence in the way human beings arrive at decisions and choices when confronted with uncertainty. People's reasons for buying and selling stocks – and even why they don't buy stocks at all – are becoming better understood thanks to behavioral finance, a study of the markets that draws on psychology. Also increasing data suggests that institutional investors behave differently from individual investors, maybe as a result of the fact that they are agents operating on behalf of the ultimate investors (Wasara & Ganda, 2019).

The investors can tackle the difficulty of deciding between thousands of prospective stock acquisitions by restricting their search to stocks that have recently captured their interest. Which attention-grabbing equities investors choose to invest in will be determined by their own tastes. Contrarian investors, for example, are more likely to purchase out-of-favor equities, but momentum investors are more likely to chase recent winners. Investors who are rational are more likely to sell their previous loses, so deferring taxes; investors who are behaviorally driven are more likely to sell their prior winnings, thereby deferring the remorse associated with realizing a loss (Khresiat, 2019).

Despite the fact that finance has been studied for thousands of years, behavioral finance, which takes into account human behavior in the financial world, is a relatively young subject of investigation. Fundamental to behavioral finance theories is the study of psychology, with the goal of understanding how emotions and cognitive mistakes impact the behavior of individual investors. Because it has a significant impact on the performance of investors, behavioral finance is becoming an increasingly important aspect of the decision-making process in the current environment. They can be enhanced by identifying the biases and mistakes of judgment to which we are all susceptible when it comes to their performance (Shabbir & Muhammad, 2019).

Investors' actions, according to Indrayono, (2019), can have an impact on financial markets, according to the principles of behavioral finance. Investors may exhibit over- or under-reaction to price changes or news, extrapolation of past trends into the future, a lack of attention to the fundamentals underlying a stock, concentration on popular stocks, and seasonal price cycles, if the perspectives of behavioral finance are correct, it is hypothesized. As a result, these market characteristics have an impact on the decision-making process of investors in the stock market. Market elements that have an influence on investors' decision-making, according to Darvishinia et al. (2019), include price movements, market information, previous patterns of stocks, customer preference, over-reaction to price changes, and the fundamentals of the underlying stocks.

Between these two points in time, there is an important contribution to the issue by conducting their research on the GCC market. His research looked at how the effect of profits and other macroeconomic variables on the stock prices of the Kuwait Stock Exchange fluctuated throughout the course. GDP (gross national product), interest rate, and inflation were the macroeconomic variables that were

evaluated. According to the findings of the study, profits and gross national product (GNP) were favorably associated to stock prices, however inflation and interest rates had a substantial negative influence on stock prices. The explanation for the influence on Kuwaiti stocks is ascribed to the fact that the Kuwait stock market is very susceptible to the feelings of the general public and foreign events. This shows that the people of Kuwait are extremely vigilant and scrutinize external aspects while making investment decisions on which to rely. Profitability was shown to have a considerable influence on stock prices in the United Arab Emirates, followed by money supply and GDP, according to the ordinary least squares regression. Because investors rely on the profits per share to determine the efficiency and trustworthiness of a company, it is advised that enterprises take initiatives to increase their earnings per share. Asgarnezhad, (2018) conducted similar research concentrating on the influence of macro-economic factors on the share price of a corporation. A general review of the prior studies discussed above on the investigation of the most prominent factors affecting share prices reveals that dividends, earnings per share, price earnings ratio, debt policy, GDP, and firm size all play significant roles in influencing the same in a significant manner. According to this, dividend giving companies are more highly appreciated by investors since every investor appreciates a stable dividend policy. Additionally, shares of companies with a greater price-to-earnings ratio imply that such companies will have a promising future in the eyes of the investing public. Another important factor influencing share prices is leverage, which shows that investors place a higher value on companies that use less debt since a higher level of debt reduces the profitability of the stakeholders. Stakeholders also favor companies with high earnings per share since it assures that they will receive a higher return on their investment. Return on Equity is also considered to be crucial since it ensures that shareholders receive the amount of money they invested in return for their investment. Despite the fact that a number of research have been conducted on the subject, the findings suggest that there is a divided perspective as to whether each study has a beneficial or negative influence on the market price. We also can't come to a universal agreement on the variables that influence the market price of stocks since they are the combined consequence of both micro and macro economic issues. The paucity of study on this issue in the Bahraini economy is also revealed by a review of earlier studies conducted in the regions under consideration. Therefore, this paper will fill the gap by conducting a comprehensive study of eight firm specific factors such as earnings per share, dividend yield, dividend per share, book value per share, debt to assets, price earnings ratio, and firm size in order to determine the extent to which they have an impact on the share prices in the Bahrain economic environment (Hiya & Syafi'i, 2021).

Conceptual Framework

The Research model can see at Figure 1

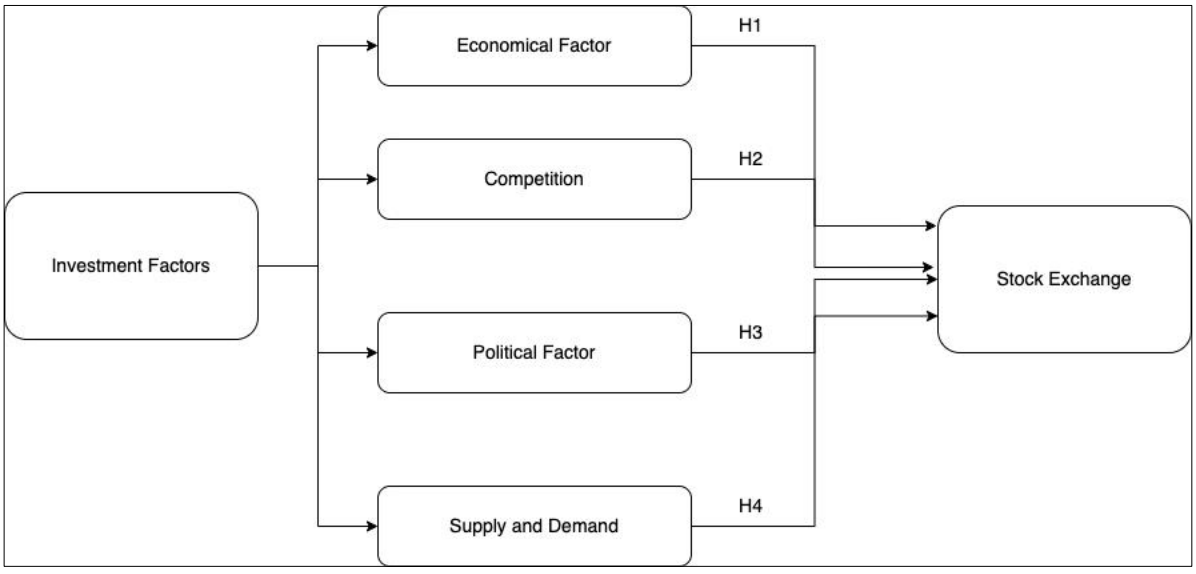

Fig.1-Research Model

Research hypotheses:

H1: Economical as investment factor will have significant and positive influence on stock exchange.

H2: Competition as investment factor will have significant and positive influence on stock exchange.

H3: Political as investment factor will have significant and positive influence on stock exchange.

H4: Supply and demand factors as investment factor will have significant and positive influence on stock exchange.

III. METHODOLOGY

The goal of this study is to investigate the factors that influence stock exchange investment in Kurdistan, and specifically in Erbil, as well as other parts of the world. In order to analyze the current research, a quantitative method was employed. The questionnaire was divided into two sections: the first section had demographic questions about the participants (such as their age and gender), and the second section contained the rest of the questions. This section of the questionnaire had eight questions on the economy element, nine questions about the competition factor, ten questions about the political aspect, eight questions about the supply and demand factor, and twelve questions about the stock exchange. The random sample strategy was applied in this investigation, and it was the most effective. The research was conducted out in the Iraqi city of Erbil. Only 82 surveys were received and properly completed, despite the fact that the researcher had distributed 95 questionnaires. There were multiple choice questions on the questionnaire, thus that was how it was organized. The participants were asked to rate their level of agreement with a five-point Likret scale ranging from strongly disagree to strongly agree.

IV. RESULT AND ANALYSIS

Table 1-Reliability tests

Factors	Number of questions	Cronbach alpha
Economical factor	.795	8
Competition factor	.739	9
Political factor	.744	10
Supply and demand factors	.769	8
Stock exchange	.773	12

Table 1 displays the results of the reliability assessment for four independent components and one dependent factor. According to the reliability tests, the researchers discovered that Cronbach's Alpha for the economy factor =..795 for eight items, which is greater than.6; this suggests that the eight items in the economy factor were reliable for this study. For the competition component, the Cronbach's Alpha was =.739 for nine items, which is greater than.6; this indicates that the nine items in the competition factor were reliable for this study. In this study, the Cronbach's Alpha for the politic factor was.744 for ten items, which is greater than.6. This indicates that the items on the politic factor were trustworthy in this study. The Cronbach's Alpha for the supply and demand factor was.769 for eight items, which is greater than.6; this means that the supply and demand factor's eight items were reliable for this study. Finally, the Cronbach's Alpha for the stock exchange factor was.773 for twelve items, which is greater than.6; this means that the stock exchange factor's twelve items were reliable for this study. The supply and demand factor's eight items were reliable for this study, and the stock exchange.

Table 2-Correlation analysis

		Economy	Competition	Politics	Supply & demand
Stock exchange	Pearson correlation	.722**	.691**	.713**	.761**
		.000	.000	.000	.000
		82	82	82	82

** Correlation is significant at the 0.01 level (2-tailed)

Table 2 depicts the relationship between four independent elements (the economy factor, the competitiveness factor, the political component, and the supply and demand factor) and a dependent factor (the supply and demand factor) (investment in stock exchange). The correlation coefficient R between the economy factor and the stock exchange is.722**, indicating that the two variables are significantly associated. The correlation coefficient R between the competition component and the stock exchange is.691**, indicating that the two variables are significantly associated.

The correlation coefficient between the political component and the stock exchange is.713**, indicating that the two variables are significantly associated. The correlation coefficient R between the supply and demand factor and the stock exchange is.761**, indicating that the two variables are significantly associated. The findings demonstrated that, on the whole, all variables are substantially associated with the dependent component (dependent factor).

Regression Analysis

The current investigation was analyzed using a single regression analysis, which was performed by the researcher. The first study hypothesis was addressed through the use of a single regression, as shown in Table 3, with the economy serving as both an independent variable and a dependent variable (the stock exchange).

Table 3-Coefficients H1

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.331	.139		1.982	.000
Economy	.722	.042	.731	11.334	.000

a. Dependent Variable: stock exchange

A higher-than-expected value of B =.722 in Table 3 indicates that the economic component and stock exchange investment are positively related. This finding supports the researcher's initial hypothesis.

Table 4-Coefficients H2

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.344	.176		2.443	.000
Competition	.701	.061	.709	13.552	.000

a. Dependent Variable: stock exchange

Table 4 displays the conclusion of the second study hypothesis, the researcher discovered that the value B = .701 which is greater than 0.01, similarly the result suggested that there is positive association between competitiveness factor and stock exchange investment.

Table 5-Coefficients H3

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.345	.211		2.332	.000
Politic	.643	.041	.649	11.332	.000

a. Dependent Variable: stock exchange

For the third hypothesis, B =.643 is more than 0.01, therefore the results demonstrate that political factors and stock exchange investments have a positive association, which can be shown in Table 5.

Table 6-Coefficients H4

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.299	.112		2.342	.000
Supply & demand	.734	.056	.739	11.322	.000

a. Dependent Variable: stock exchange

For the fourth hypothesis, B =.734 is larger than 0.01, as shown in Table 6. This finding indicates that the supply and demand component and stock exchange investment have a positive association.

V. CONCLUSION

Factors influencing stock market investment in Kurdistan and Erbil have been examined by this study. Investing money in a way that reduces the risk of losing money is a better strategy. Because risk analysis may help make better decisions, it may be a useful tool. A single regression analysis was done by the researcher to identify the elements that influence stock exchange investing. (Anwar & Abd Zebari, 2015). The study found that supply and demand, economy, competition, and politic were the three factors with the highest values, followed by supply and demand, economy, and competition (Ahmed et al. 2021). Kurdish stock exchange investments appear to be driven by supply and demand, according to the data.

To put it another way, the findings are beneficial to investors since they can be used to build a well-diversified portfolio by picking companies from sectors that are not connected with other sectors and reducing unsystematic risk through diversification. The findings of the study are particularly positive for investors who desire to diversify their portfolios within the United States, particularly for individuals who do not have access to overseas markets, according to the researchers. One of the study's shortcomings is that it overlooks the influence of seven sectors that were determined to be stationary at level 0, even while co-integration was being conducted.

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