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An Adapted Technology Acceptance Model (TAM 5) Framework to Enhance User Acceptance and Experience

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Abstract In the rapidly evolving technological landscape, many companies invest in developing solutions that often fail to gain user acceptance. Understanding the reasons behind these failures is crucial, thus various iterations of the Technology Acceptance Model (TAM) have been introduced namely: TAM, TAM 2, TAM 3, and TAM 4 IE. Applying these models has shed light on a significant portion of the factors influencing technology acceptance. Nevertheless, it suggests that numerous other factors remain unexplored and need further consideration. This research proposes the Technology Acceptance Model 5 (TAM 5) as an advanced version with additional dimensions and factors to further investigate, aiming to enhance technology acceptance. TAM 5 includes three primary dimensions: First, applying Hybrid Agile-Waterfall software development approach, merging the strengths of both methodologies, to enhance the development process and user satisfaction; Second, applying Hybrid Work Settings of Working from Home (WFH) and Working from Office (WFO), enhancing team collaboration and problem-solving, thereby facilitating technology acceptance; and finally, consideration of Cultural factors, Social customs and traditions, and Time zone differences (CST), all of which may influence technology acceptance. To assess the effectiveness of TAM 5, a questionnaire designed and validated by experts was administered to respondents in the software industry, including professionals from various roles and experience levels. The results were analyzed using multiple regression, and the weights indicate that applying the Hybrid Agile-Waterfall development approach and the Hybrid Work Settings had a significant positive impact on technology acceptance with β values of 0.333 and 0.344 respectively. Cultural factors and traditions had a significant negative influence on technology acceptance with β value of -0.848, while the impact of time zone differences was found to be insignificant with a negligible β value. In conclusion, TAM 5 reveals key dimensions that impact technology acceptance rates, providing valuable insights for businesses and researchers to better understand and address the challenges related to user acceptance of technology in contemporary society.

Keywords: Technology acceptance model (TAM), User acceptance, Hybrid Agile-Waterfall approach, Work from Home (WFH), Work from Office (WFO).

Introduction

Technology has invaded our daily lives and has become a vein for individuals, organizations and even governments. Hundreds of thousands of applications and solutions emerged during the last few years and forced themselves into our communities and changed our way of life, social behavior, learning scheme, and our personality including how we run businesses, conduct trade, and much more. Among these applications are social media platforms, FinTech, healthcare, Enterprise Resource Planning (ERP), e-government, smart cities,

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Internet of Things (IoT), and Industrial Internet of Things (IIoT) to name a few. This high volume of competition to make the public accept one application or solution over the other is becoming exceptionally important, acting as cross-roads between success and failure, between making a profit or a loss, and between contributing something of value to society versus being ineffective. Therefore, having criteria in place for accepting technology (i.e., software application) shapes the entire process of building applications, design, development, quality assurance, user experience and interface, deployment, and delivery.

Technology Acceptance Model (TAM), introduced by Fred Davis in 1986, is the art of delivering a software product in a way that is accepted and satisfactory to those who will use it, the end-users. It consists of two major beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) which drive people or organizations to accept or reject a software application (Lai, 2017; Legris et al., 2001).

The Standish Group report (1999) estimated that in 1998, the cost of canceled Information Technology (IT) projects was USD 75 billion (Chulkov & Desai, 2005). Another Standish Group study found that only 29 percent of projects succeed. The Royal Society of Engineering and British Computer Society found that 84 percent of projects fail while in the public sector, project failures are a lot more common in comparison to the private sector. The cost of failures is huge and overwhelming. Failures of Information Systems (IS) projects in both the public and private sectors cost around USD 150 billion per annum in the United States and USD 140 billion in the European Union (Gauld, 2007).

In addition to the User Experience (UX), it is very clear that missing a Technology Acceptance Model (TAM), which is the acceptance criteria from the plan of designing and developing the software, plays a significant role in project failure and the rejection of the product as it does not fulfill the end-user requirements. This has been a major issue for software providers and customers alike, resulting in undesirable consequences, such as legal actions, increased spending on products that are unusable, time wasted on development, deployment, and implementation for both providers and customers, and the search for alternatives which again, may end in the same results.

To overcome the challenges surrounding the rejection of software by end users, Technology Acceptance Model 5 (TAM 5) is proposed by this research with additional factors that contribute to enhancing the technology acceptance rates. The following research questions were identified and have been answered through the journey of this research work:

RQ1: How does the hybrid Agile-Waterfall development approach affect technology acceptance?
RQ2: How does the hybrid work setting of Work from Home (WFH) and Work from Office (WFO) affect technology acceptance?
RQ3: How do cultural factors and social customs affect technology acceptance?
RQ4: How does the time zone difference affect technology acceptance?

The remainder of the paper is structured as follows. Section 2 provides a review of the state of the art of related work. The proposed TAM 5 framework is presented in Section 3. Section 4 discusses the main results of the research work. Finally, Section 5 summarizes the work and the main contributions of this paper and opens possible directions for further research.

Related Work

Technology Acceptance Model (TAM)

TAM plays a significant role in the success or failure of a particular software application. To reflect how critical TAM could be, let’s take healthcare devices, such as remote patient monitoring, glucose monitoring, Parkinson’s disease monitoring, and heart rate monitoring to name a few. These are application-operated devices that depend entirely on technology and are essential to provide patient care by health care providers, which makes it even more essential to be accepted by users.

Another example is NASA spaceships which have no room for technology flaws especially when they are on a mission to space with astronauts aboard spaceships with their lives at stake. The Standish Group conducted a study in 1998 and found that 26% of all Management Information Systems (MIS) projects were completed with requirements met, within budget and on time (Legris et al., 2001). This indicates that 74% of MIS projects were either incomplete or partially delivered or cancelled. It also indicates that the acceptance rate is not satisfactory, and the impact of this rejection is high in developers' time and effort and in the cost of developing such applications, given developers are forced to rework the rejected parts resulting in increased spending on wages, third party software licensing, and utilities, etc. Therefore, it is very important to find models and techniques that can enhance technology acceptance. Original TAM structure is shown in Figure 1.

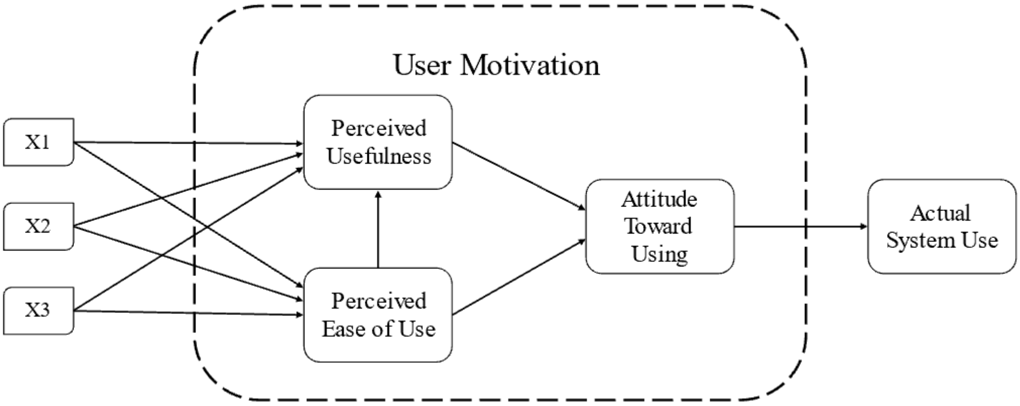

Figure 1. Technology acceptance model (Davis 1986; Adapted from Lai, 2017)

Enhanced TAMs

TAM is the cornerstone for future work to enhance the TAM framework or build on it to come up with better frameworks such as TAM2, TAM3, and TAM 4 IE. TAM2 was proposed by Venkatesh and Davis (2000) where four constructs were considered (1) job relevance, (2) output quality, (3) result demonstrability, and (4) perceived ease of use.

Venkatesh and Bala (2008) developed an integrated model of technology acceptance - TAM3 where they combined the model of the determinants of perceived ease of use and TAM2. TAM3 was developed using the four different determinants of perceived usefulness and perceived ease of use including (1) social influence, (2) system characteristics, (3) the individual differences, and (4) facilitating.

TAM4 IE was the outcome of theoretical and empirical research conducted in previous studies and has the following five aspects: (1) subjective perception, (2) perceived usability, (3) perceived usefulness, (4) future expectations, and (5) facilitating conditions (Prietch and Filgueiras, 2015).

The Proposed Model (TAM 5)

The research proposed model is composed of three dimensions that altogether construct TAM 5 as illustrated in Figure 2. The first dimension is applying a Hybrid Development Approach that combines waterfall and agile development models, merging the strengths of both methodologies, to enhance the development process and user satisfaction, the second dimension is adopting a Hybrid Work Setting that combines work from home and work from office styles, enhancing team collaboration and problem-solving, and the third dimension consists of considering multiple factors; Cultural factors, Social customs and traditions, and Time zone differences, all of which may influence technology acceptance. These dimensions and factors and their influence on technoogy acceptance will be described in detail in the next subsections.

Dimension One: Hybrid Software Development Approach

The first dimension of TAM 5 is applying the hybrid software development methodology which combines waterfall and agile models, where the agile model is the primary structure of the software development cycle and waterfall is applied where applicable within different sprints or iterations. Large projects can be challenging to manage and frequently fall short of stakeholder expectations. Although agile methods have generated sound interest in the business world, little research has been done on how they should be implemented in large environments that involve outsourcing, numerous programs, projects, and methodologies; a situation that is currently viewed as extremely difficult in the business world.

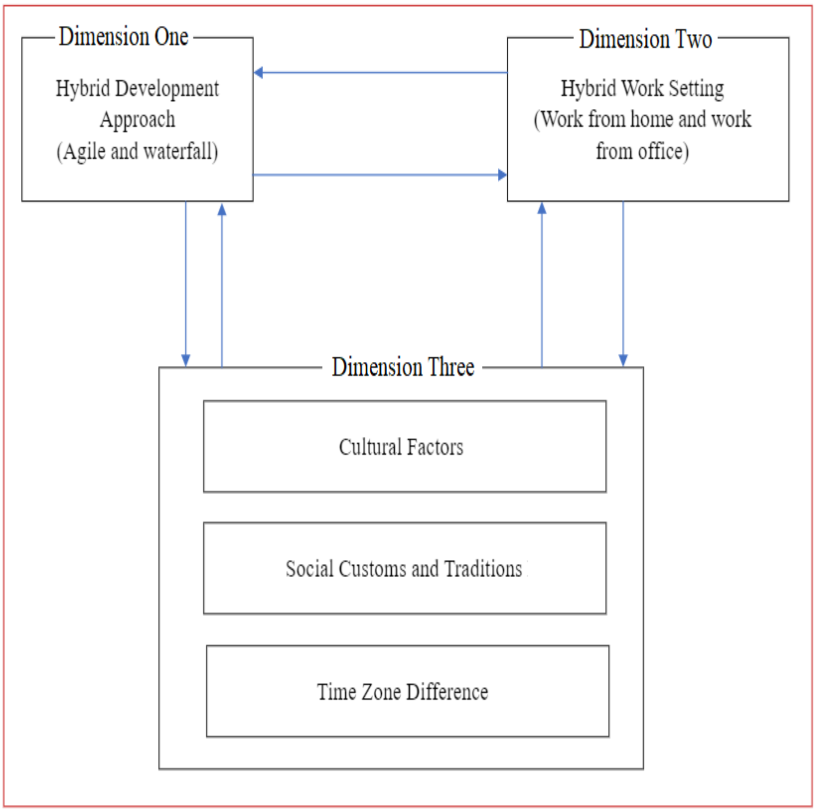

Figure 2. Technology acceptance model 5 (TAM 5)

Since it is generally accepted that no one methodology can be used to serve all projects, both agile and non-agile techniques must be customized and integrated to suit various projects. This highlights the fact that, in order to meet these issues, a software development capacity may blend agile and traditional components to produce a hybrid software development process (Gill et al., 2018).

The composite approach splits the project into several increments; each of which will have a set of the project lifecycle stages. Each increment will combine the best attributes of available software development processes (Waterfall, Iterative, and Agile) together used to develop and manage application software development (Al-Maharmeh & Unhelkar, 2008).

One of the 12 principles of the Agile manifesto is to “enable face-to-face interactions”, but with the widespread use of remote work and adoption of work from home flexibility after the COVID-19 pandemic, face-to-face interactions were not much of a practice as it was pre-COVID. This led to mixing working from home style with working from office which may have an impact on technology acceptance rate as will be discussed in the next section.

Dimension Two: Hybrid Work Setting

The global pandemic of COVID-19 precipitated a widespread adoption of remote work practices. It pushed people worldwide to start working from home and led to teachers and students adopting remote teaching and learning, commonly known as online work and study. Post the pandemic, people, employers, and employees alike, willingly adapted the working from home style, yet working from office has tangible effects on productivity and knowledge exchange among employees. This led several companies to adopt a hybrid work setting of mixing work from home and work from office work styles.

Psychiatrist Edward Hallowell refers to a short meetup at a co-worker's desk as a 'human moment' which is "a face-to-face encounter that allows for empathy, emotional connection, and nonverbal cues to complement what is actually said". With remote communications, the connection is severely weakened, and nonverbal signals are more difficult to pick up on. People are more likely to empathize with each other and are often energized in human moments which support organizational culture and collaboration (Fayard et al., 2021).

Therefore, the second dimension proposed by TAM 5 is applying the hybrid work setting that enforces both work from home and work from office styles, where several weekly hours are mandatory to be worked from office and team members can meet to tackle pressing issues that can be resolved much faster and more efficiently during face-to-face meetings. Concurrently, it allows team members to work remotely, providing them with a degree of flexibility, which is anticipated to positively influence the rate of technology acceptance.

Dimension Three: Cultural Factors, Social Customs, and Time Zone Differences (CST)

Several scholars and researchers introduced new factors they believed had an impact on the original model of TAM. In this research, TAM 5 introduces new factors and investigates their substantial impact on technology acceptance rates.

Cultural Factors

Several cultural factors have a genuine impact on technology acceptance. Some cultural factors that may affect the productivity of teams and therefore decrease the acceptance rate are: (1) having children, elderly or other family members to care for, especially while working from home, which were found to have a negative impact on remote workers' physical and psychological well-being, (2) difference in weekend days, and (3) following different calendars, e.g., Gregorian, Hijri (Islamic), etc., which can potentially disrupt effective communication within a team. These variations in scheduling preferences and cultural practices can introduce complexity and hinder seamless coordination among team members, impacting their ability to collaborate and communicate efficiently, and consequently affects technology acceptance.

Social Customs

Social customs and traditions also have an impact on technology acceptance rate. Some factors are religious occasions like the month of Ramadan, Eid Al Fitr, and Eid Al Adha in Muslim majority countries, and Christmas holiday in other countries. Having different days off and holidays among diverse team members would also affect teams productivity and the overall technology acceptance rate. For example, in Ramadan, the working hours are reduced by 25%, six hours instead of eight hours per day for the private sector and may be more than that for the public sector, followed by three days holiday which reduces the productivity of employees and may have a negative impact on technology acceptance.

Time Zone Differences

A critical factor that needs attention for virtual teams scattered around the world is the different time zones and the difficulties associated with it, such as, delay in communication, the mental stress at the end of a working day in one zone which is a fresh start of the working day in another zone. Companies are asking their employees to change their working hours to start in the afternoon, which would be the morning of their teammates in another time zone, to have more interactions, meetings, etc. This inconvenient change is neither sustainable nor comfortable for many employees, especially for families who have caregiving responsibilities, so adopting a mixture of work from home and work from office may enhance the productivity of the developers and teams and consequently increasing technology acceptance.

Results and Discussion

One of the most common methods of collecting data in research is questionnaires. However, it is a challenge to validate that the collected data is reliable and reflects realistic results. In this research, in order to assess the effectiveness of TAM 5 model, data was collected and acquired in the form of a questionnaire that was developed and validated by experts to address the proposed factors and are subject to arbitration. The questionnaire was administered to respondents in the software industry, including professionals from various roles and experience levels, and a total of 115 participants took part in the survey.

A complete quantitative data analysis was carried out to answer and assess the research hypothesis and research questions. Statistical Package for the Social Science (SPSS) was used to analyze the data and the questionnaire responses. SPSS is a powerful statistical software platform that provides efficient statistical data analysis. The collected responses of 115 were examined by SPSS prior to the data analysis and it was determined that they were fit for the analysis.

Analyzing the Items of the Development Approach

According to Table (1) below, about half of the organizations adopt Agile framework (Scrum, Kanban, Extreme Programming (XP), Lean) development approach with percent (47.8%), also (46.1%) of the organizations in the study sample adopt Hybrid (Agile & Waterfall) development approach, while only (4.3%) of the organizations adopt Waterfall development approach. Finally, (1.7%) of the organizations adopt other development approach.

Table 1. Means, SD, and percentages-development approach

Statement Number	Items	M	SD	Percent
1	Agile framework (Scrum, Kanban, XP, Lean)	2.02	1.009	47.8
2	Waterfall			4.3
3	Hybrid (Agile & Waterfall)			46.1
4	Other			1.7

Table (2) below demonstrates values of means, standard deviation, and MI for the Development Approach. The second statement "Adopting the Agile development approach increases the technology acceptance rate (i.e., enhances user acceptance)" ranked first among the items being rated by the study sample, as it has the highest mean (4.16), expressing a high level of agreement, while the third statement "Adopting the Waterfall development approach increases the technology acceptance rate (i.e., enhances user acceptance)" ranked the lowest among the items being rated by the study sample, as it has the least mean (2.79), also expressing a moderate level of agreement. The overall assessment degree of the Development Approach dimension is rated by a mean of 3.704. This value expresses a high level of agreement among the study sample.

Table 2. Means, SD, and MI for development approach (arranged in a descending order)

Statement Number	Items	M	SD	MI	Level	Rank
2	Adopting the Agile development approach increases the technology acceptance rate (i.e., enhances user acceptance)	4.16	0.67	83.2%	High	1
4	The productivity of development teams would increase and lead to the enhancement of the technology acceptance rate (i.e., enhances user acceptance)	4.10	0.754	82.0%	High	2
1	Adopting the Hybrid (Agile & Waterfall) development approach increases the technology acceptance rate (i.e., enhances user acceptance)	3.77	0.872	75.4%	High	3
3	Adopting the Waterfall development approach increases the technology acceptance rate (i.e., enhances user acceptance)	2.79	0.996	55.8%	Moderate	4
	Overall Mean	3.704	0.491	74.1%	High	

Means description (1 – 1.8 v. low, 1.81 – 2.6 low, 2.61 – 3.40 Moderate, 3.41 – 4.20 high, and 4.21 – 5 v. high)

Analyzing the Items of Work Settings

According to Table 2 below, about half of the organizations' work setting was Hybrid (WFO and WFH), i.e., mixture of hours between working from the office and working from home with percent (49.6%), also (40.9%) of the organizations' adopted Work from Office (WFO) work style, i.e., working specific number of hours in office forced by work policy, while (9.6%) of the organizations' work style was Work from Home (WFH), i.e., working only from home.

Table 2. Means, SD, and percentages-work settings

Statement Number	Items	M	SD	Percent
1	Work from Office (WFO), i.e., working specific number of hours in office forced by work policy.	2.09	0.951	40.9
2	Work from Home (WFH), i.e., working only from home, such as during COVID-19 lockdown.			9.6
3	Hybrid (WFO and WFH), i.e., mixture of hours between working from office and working from home.			49.6
4	Other			0

Table 3 below demonstrates the values of means, standard deviation, and MI for the Work Settings. The third statement "Implementing a Hybrid (WFO and WFH) policy by my organization would increase my work productivity" ranked first among the items being rated by the study sample, as it has the highest mean (4.17), expressing a high level of agreement, while the fifth statement "Implementing a Work from Home policy by my organization would enhance the overall technology acceptance rate (i.e., enhances user acceptance)" ranked the lowest among the items being rated by the study sample, as it has the least mean (3.3), expressing a moderate level of agreement. The overall assessment degree of the Work Style dimension is rated by a mean of 3.615. This value expresses a high level of agreement among the study sample.

Table 3. Means, SD, and MI for work settings (arranged in a descending order)

Statement Number	Items	M	SD	MI	Level	Rank
3	Implementing a Hybrid (WFO and WFH) policy by my organization would increase my work productivity	4.17	0.764	83.4%	High	1
6	Implementing a Hybrid (WFO and FH) policy by my organization would enhance the overall technology acceptance rate (i.e., enhances user acceptance)	3.87	0.884	77.4%	High	2
4	Implementing a Work from Office policy by my organization would enhance the overall technology acceptance rate (i.e., enhances user acceptance)	3.54	0.901	70.8%	High	3
1	Employing a Work from Office policy by my organization would increase my work productivity	3.43	1.036	68.6%	High	4
2	Implementing a Work from Home policy by my organization would increase my work productivity	3.37	1.021	67.4%	Moderate	5
5	Implementing a Work from Home policy by my organization would enhance the overall technology acceptance rate (i.e., enhances user acceptance)	3.3	0.936	66%	Moderate	6
	Overall Mean	3.615	0.467	72.3%	High	

Means description (1 – 1.8 v. low, 1.81 – 2.6 low, 2.61 – 3.40 Moderate, 3.41 – 4.20 high, and 4.21 – 5 v. high)

Analyzing the Items of Cultural Factors

Table 4 below demonstrates the values of means, standard deviation, and MI for the Cultural Factors. The first statement "Having children, elderly or other family members to care for while working from home would decrease my productivity" ranked first among the items being rated by the study sample, as it has the highest mean (3.55), expressing a high level of agreement, while the fourth statement "Working with diverse team members that have different holiday occasions such as Ramadan, Eid holidays, and Christmas with different days off would decrease the overall technology acceptance rate (i.e., reduces user acceptance)" ranked the lowest among the items being rated by the study sample, as it has the least mean (3.01), expressing a moderate level of agreement. The overall assessment degree of the Cultural Factors dimension is rated by a mean of 3.2. This value expresses a moderate level of agreement among the study sample.

Table 4. Means, SD, and MI for cultural factors (arranged in a descending order)

Statement Number	Items	M	SD	MI	Level	Rank
1	Having children, elderly or other family members to care for while working from home would decrease my productivity	3.55	1.028	71%	High	1
2	Having children, elderly or other family members to care for while working from home would decrease the overall technology acceptance rate (i.e., reduces user acceptance)	3.21	0.96	64.2%	Moderate	2
3	Working with diverse team members that have different holiday occasions such as Ramadan, Eid holidays, and Christmas with different days off would decrease team productivity	3.03	1.123	60.6%	Moderate	3
4	Working with diverse team members that have different holiday occasions such as Ramadan, Eid holidays, and Christmas with different days off would decrease the overall technology acceptance rate (i.e., reduces user acceptance)	3.01	1.004	60.2%	Moderate	4
	Overall Mean	3.2	0.762	64%	Moderate	

Means description (1 – 1.8 v. low, 1.81 – 2.6 low, 2.61 – 3.40 Moderate, 3.41 – 4.20 high, and 4.21 – 5 v. high)

Analyzing the Items of Time Zone Difference

According to Table 5 below, most of the respondents worked with virtual teams in different time zones in their organizations with percentage (75.7%). Table 6 below demonstrates the values of means, standard deviation, and MI for the Time Zone Difference factor.

Table 5. Means, SD, and percentages-time zone differences

Statement Number	Items	M	SD	Percent
1	No	1.76	0.431	24.3
2	Yes			75.7

Table 6. Means, SD, and MI for time zone (arranged in a descending order)

Statement Number	Items	M	SD	MI	Level	Rank
1	Working with virtual teams in different time zones would be a challenge facing development team members	3.83	0.819	76.6%	High	1
3	Being flexible to collaborate with other team members in different time zones other than my own would increase the overall technology acceptance rate (i.e., enhances user acceptance)	3.57	0.849	71.4%	High	2
2	Being flexible to collaborate with other team members in different time zones other than my own would increase my productivity	3.5	0.931	70%	High	3
	Overall Mean	3.63	0.624	72.7%	High	

Means description (1 – 1.8 v. low, 1.81 – 2.6 low, 2.61 – 3.40 Moderate, 3.41 – 4.20 high, and 4.21 – 5 v. high)

The first statement “Working with virtual teams in different time zones would be a challenge facing development team members” ranked first among the items being rated by the study sample, as it has the highest mean (3.83), expressing a high level of agreement, while the second statement "Being flexible to collaborate with other team members in different time zones other than my own would increase my productivity" ranked the lowest among the items being rated by the study sample, as it has the least mean (3.5), expressing a high level of agreement. The overall assessment degree of the Time Zone dimension is rated by a mean of 3.63. This value expresses a high level of agreement among the study sample.

Model of Measurement

The model of measurement with its 4 variables (i.e., independent factors) measured by 17 measurement items was assessed using Confirmatory Factor Analysis (CFA), which is a quantitative technique used to analyze the efficacy of measurement models where the number of factors and their direct relationship are specified (Price, 2023). CFA is available on Analysis of a Moment Structures – statistical software (AMOS) as depicted in Figure (3). According to Chen (2007) the model showed a satisfactory model fit concerning major model fit indices. Model fit statistics for the primary measurement model are shown in Table 7 below.

Table 7. Final measurement model fit

X^2	X^2/DF	SRMR	CFI	TLI	GFI	IFI	RMSEA
95.522	1.151	0.079	0.976	0.96	0.913	0.979	0.036

Table 7 shows that the value of Standardized Root Mean Squared Residual (SRMR) is less than 0.08, indicating an excellent model fit (Hu & Bentler, 1999). The Comparative Fit Index (CFI) value is greater than 0.95 indicating an excellent fit for the model (Kline, 2005). The Tucker Lewis Index (TLI) value is greater than 0.90, indicating an excellent fit as well (Sharma et al., 2005). The Goodness of Fit Index (GFI) and Incremental Fit Index (IFI) values are greater than 0.90, also indicating an excellent fit for the model (Hu & Bentler, 1999). Also, the Root Mean Square Error of Approximation (RMSEA) is less than 0.1, which indicates an excellent fit for the model (Brown, 2015). As indexes suggest a sufficient fit of the model to the current data, the hypothesized model is fitted.

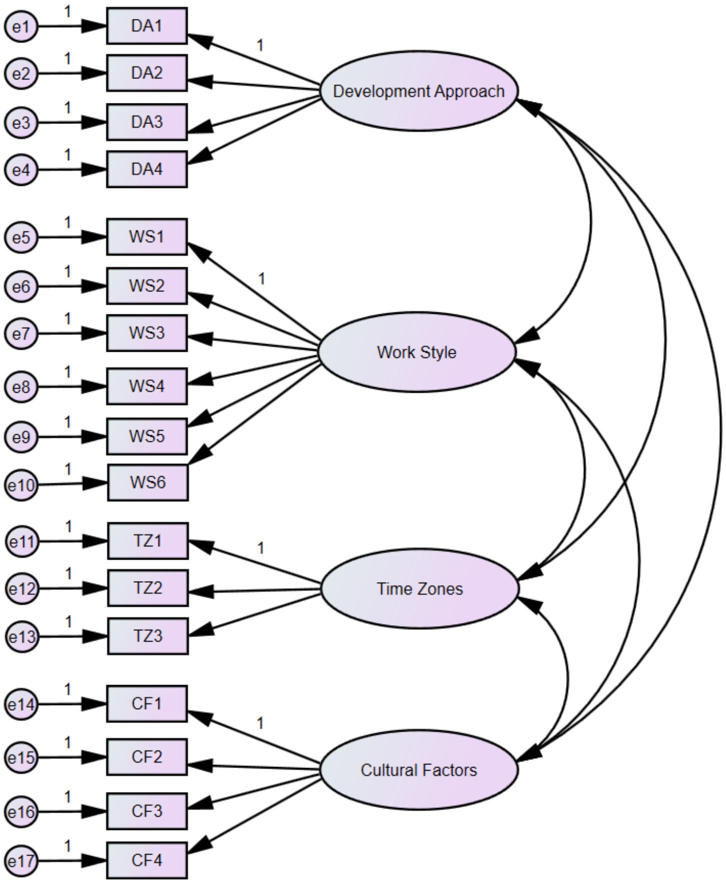

Figure 3. Confirmatory factor analysis (CFA) model

Testing the Research Questions

To test the research questions, the variance-based Structural Equation Model (SEM), is used because of its ability to model relationships between multiple dependent and independent variables at the same time which is required in this research (Henseler, 2017).

Testing RQ_1: How does the hybrid Agile-Waterfall development approach affect technology acceptance?

The result of the SEM is presented in Table (8) below shows the following: Hybrid Agile-Waterfall development approach can explain 24.5% of the variation in technology acceptance, the R^2 value equals 0.245, which indicates the ability of the independent variable to explain changes in the dependent variable. According to the regression weights, Hybrid Agile-Waterfall development approach has a significant positive effect on technology acceptance, since the critical ratio value is greater than 2 and the p-value (0.001) is less than 0.01, the path is significant (Byrne, 2013). The effect size of Hybrid Agile-Waterfall development approach on technology acceptance is 0.333.

Table 8. Structural Equation Modelling Regression Weights-Development Approach

			Estimate	S.E.	C.R.	P	Effect	R^2
TA	⟵	Hybrid (Agile-Waterfall)	.819	.258	3.179	.001	0.333	0.245

S.E. = Standard errors of the regression weights, C.R. = Critical Ratio, P = p-value (*<0.05, **<0.01, ***<0.001)

Testing RQ2: How does the hybrid work style of work from home (WFH) and work from office (WFO) affect technology acceptance?

The result of the SEM is presented in Table (9) below. Hybrid work settings of work from home (WFH) and work from office (WFO) can explain 11.8% of the variation in technology acceptance, the R^2 value equals 0.118, which indicates the ability of the independent variable to explain changes in the dependent variable. According to the regression weights, Hybrid work settings of work from home (WFH) and work from office (WFO) has a significant positive effect on technology acceptance, since the critical ratio value is greater than 2 and the p-value (0.001) is less than 0.01, the path is significant (Byrne, 2013). The effect size of Hybrid work settings of work from home (WFH) and work from office (WFO) on technology acceptance is 0.344.

Table 9. Structural Equation Modelling Regression Weights-Work Settings

			Estimate	S.E.	C.R.	P	Effect	R^2
TA	⟵	Hybrid work settings	.923	.437	2.114	.035	0.344	0.118

S.E. = Standard errors of the regression weights, C.R. = Critical Ratio, P = p-value (*<0.05, **<0.01, ***<0.001)

Testing RQ3: How do cultural factors and social customs affect technology acceptance?

In this research, we assumed that cultural factors such as having children or elderly family members to care for have a negative impact on technology acceptance rate and the results proved this assumption. The result of the SEM is presented in table (10) below. Cultural factors can explain 71.9% of the variation in technology acceptance, the R^2 value equals 0.719, which indicates the ability of the independent variable to explain changes in the dependent variable. According to the regression weights, Cultural factors have a significant negative effect on technology acceptance, since the critical ratio value is less than -2 and the p-value (0.001) is less than 0.01, the path is significant (Byrne, 2013). The effect size of cultural factors and social customs on technology acceptance is -0.848.

Table 10. Structural Equation Modelling Regression Weights-CST

			Estimate	S.E.	C.R.	P	Effect	R^2
TA	⟵	CF	-3.725	1.499	-2.485	.013	-0.848	0.719

S.E. = Standard errors of the regression weights, C.R. = Critical Ratio, P = p-value (*<0.05, **<0.01, ***<0.001)

Testing RQ4: How does the time zone difference affect technology acceptance?

The result of the SEM is presented in Table (11) below. Time zone difference can explain 1.7% of the variation in technology acceptance, the R^2 value equals 0.017, which indicates the ability of the independent variable to explain changes in the dependent variable. According to the regression weights, the time zone difference has an insignificant effect on technology acceptance, since the critical ratio value is less than 2 and the p-value (0.211) is greater than 0.05, the path is insignificant (Byrne, 2013).

Table 11. Structural Equation Modelling Regression Weights-Time Zone Differences

			Estimate	S.E.	C.R.	P	Effect	R^2
TA	←	TZ	6.606	5.286	1.250	.211	-	0.017

S.E. = Standard errors of the regression weights, C.R. = Critical Ratio, P = p-value (*<0.05, **<0.01, ***<0.001)

Conclusion and Future Directions

The Technology Acceptance Model explored various factors that proved to have a significant impact on increasing technology acceptance and adoption, however it still needs improvement and enhancement to bring aboard more factors that contribute to the technology acceptance to achieve better results in both user acceptance and experience. The constant change in technology and human social behavior makes this an on-going process as it needs to be revised as new technologies emerge and human needs change and evolve.

This research has proposed TAM 5 model which consists of applying a hybrid development approach consisting of agile and waterfall models, adopting a hybrid work setting combining work from home and work from office styles, and the following additional factors: cultural factors, social customs and traditions, and time zone difference. This research aimed at investigating the impact of applying TAM 5 factors on technology acceptance.

It was concluded that applying the Hybrid Development Approach and the Hybrid Work Settings have a significant positive effect on technology acceptance rate. On the other hand, Cultural Factors and Social Customs and Traditions were found to have a significant negative impact on technology acceptance rate, while the Time Zone Difference Factor has an insignificant effect on technology acceptance rate. In conclusion, TAM 5 has revealed key dimensions that impact technology acceptance rates, providing valuable insights for businesses and researchers to better understand and address the challenges related to user acceptance of technology in contemporary society.

The technology acceptance rate is influenced by an indefinite and evolving array of factors, given the constant emergence of new technologies. This suggests that ongoing research can reveal additional and novel factors in the future, including those that may influence unemployment rates and the economy, since the introduction of new technology is closely linked to employment, as it creates fresh job prospects. Finally, this proposed research will be further evaluated by conducting a case study to apply TAM 5 factors on a software development company to evaluate these factors impact on technology acceptance rate.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the authors.

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