FRAMEWORK FOR AGILE TRANSFORMATION IN LARGE SCALE: EVALUATION OF EFFECTIVENESS

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Abstract

Agile transformation refers to the process of adopting and implementing agile principles and practices within an organization, typically beyond the boundaries of individual teams or projects. It involves a comprehensive and strategic approach to shift the organization's mindset, culture, and operational processes towards agility. Agile transformation goes beyond the application of specific methodologies or frameworks like Scrum or Kanban. It involves a holistic change that impacts various aspects of the organization, including leadership, structure, processes, and practices. The primary goals of agile transformation are to enhance organizational agility, improve collaboration and communication, increase flexibility and responsiveness to customer needs, and foster a culture of continuous improvement and learning. Agile transformation at a large scale can be complex and challenging. Implementing agile at a large scale requires careful planning, coordination, and a systematic approach. Agile transformation opens the door to easily adapting organisations' objectives to the market trend based on openness, creativity, and cooperation in comparison to other business models. The main intention of this research is to practically estimate the productivity of the proposed framework for agile transformation on a large scale by comparing it with existing approaches. The study selected post mortem analysis because it significantly utilised the consequences of the proposed framework in its analysis and helped examine whether the proposed model is suitable and whether an agile transformation can be achieved on a large scale. The study relies on 265 samples, with an emphasis on only the IT sector, and individuals who shared their perceptions, for analysis. For statistical analysis the paper uses SPSS ver 26 and relies on t-test. The finding indicates that the proposed model estimated that the framework resolved all the challenges like change resistance, lack of investment, difficulties while implementing agile methods, coordination challenges in multi-team environments, and others. Some of the success parameters are leadership quality, cooperation, and coordination, and others indicate that the proposed model has a capability for implementing agile transformation on a large scale that ultimately influences the effectiveness of the company.

Keywords: Agile Transformation, Large Scale

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Introduction

Agile transformation is a complicated organisational phenomenon for large scale transformation. It was initially proposed and applied within individual teams with the intention to develop software for small size projects. Steadily, the transformation is beginning to be introduced at the organisation level, which is responsible for influence over multidisciplinary activities like team programs and organisation portfolios as well as domains like HR finance and sales (Stettina, C. J. et al., 2021; Barroca, L et al., 2019). The organisation employs an agile approach to maximise consumer value and product or service quality. Agile transformation also delivers better alignment with consumer demands, effective involvement of business and other stakeholders, transparent planning and implementation procedures, and a convenient manner of understanding the perception based on proposed software and who has the capability to resolve the challenges and upcoming issues from the company's perspective (Olteanu, C. G., 2018; Sarangee, K et al., 2022).

Brosseau, D et al., (2019) mentioned, several organisations are emphasising the implementation of agile transformations to make their businesses more agile and responsive; however, the actual impact of those transformations is not recognized or appropriately understood. In the last three decades, an agile approach has intensified the success rate in the software industry and enhanced the skill, motivation, and productivity of teams (Russo, D., 2021). The development of an agile approach is based on the fundamentals of the emerging world, where technology spontaneously changes the market's perspective. In that condition, agile transformation opens the door to easily adapting organisations' objectives to the market trend based on openness, creativity, and cooperation in comparison to other business models (Gandomani, T. J et al., 2014). Further, these methods assure less documentation, higher-quality services, intensified consumer-oriented services and their satisfaction, a rapid return on investment through convenient and frequent delivery, greater transparency to consumers, and so on (Alsari, A et al., 2020). In short, agile transformation is well recognized as the procedure of replacing traditional software development methods with a versatile and conventional agile development approach.

Several academic studies have been carried out in agile transformation, agile software development, and related domains. These studies enhance the understanding of agile and related technology in different aspects of the transformation of traditional procedures to agile by putting emphasis on the diverse dimensions of transformation imposed on large-scale projects (Moe, N. B., &Mikalsen, M., 2020). This research is the post-evaluation. However, the main intention of this research is to practically estimate the productivity of the proposed framework for agile transformation on a large scale by comparing it with existing approaches.

Literature Review

The intention of the research (Stettina, C. J. et al., 2021) is to identify the influence of agile transformation on organisational performance. The study selected an empirical analysis approach to collect data from agile coaches and transformation leaders. In all, 265 samples are collected across industries. The finding indicates the benefit of agile transformation and explores the impacting components of agile transformation and being responsible for productivity, workplace wellness, employee satisfaction, and employee coordination. The result indicates that transformation has been associated with organisational benefit and sustainability. Russo, D. (2021) the prominent reasons for implementing agile in the workplace, such as economic feasibility, frequent deployment, rational alignment, and others. For empirical

investigation, 265 IT employees were surveyed in a post-mortem study and developed the PLS-SEM model that tested the success factors for formulating agile models and determined prominent components like economic feasibility, a goal-oriented approach, and timely accomplishment for any agile success transformation framework.

Olteanu, C. G. (2018) indicates that essential requirements for the company to introduce agile transformation include training and workshops, the involvement of agile experts, support, and effectiveness, and learning about organisational culture. The challenges encountered during implementing an agile transformation are that continuous learning as a part of the organisation's learning culture is the largest agile issue that needs to be resolved by the company to adapt the transformation. Gandomani, T. J. et al (2014) opted for large scale research to determine diverse aspects of an agile transformation. The finding indicates that before implementing transformation in organisational level companies need to introduce reforms requisite before moving to agile such as need of change, evaluation, training, facilitators and other concepts.

Methodology

The study selected postmortem analysis because it is significantly utilised in analysis of the consequences of the proposed framework and assisted to examine whether proposed model is suitable, and an agile transformation can be achieved on large scale. Postmortem analysis brings unexpected benefits in practice as it helps to improve and optimise the outcomes based on new improvement possibilities in the development process. The main objective of postmortem analysis in a survey is to compare the pre and post analysis of data. Postmortem analysis can be accomplished in a distinct way: one type is the observation approach, conduct and redefine the consequences. To compress the research object this study uses an observation approach of postmortem analysis that relies on empirical analysis of data.

The study relies on 265 samples as emphasis on only the IT sector, individuals who have already shared their perception which is considered as pre analysis. The same people are selected for post analysis. To identify their insight regarding the proposed framework, the study used a questionnaire which is prepared with Likert Scale 5-point set. For statistical analysis the research uses SPSS (ver 26) tool and implements t-test to evaluate the significance of the model. Moreover, to check the reliability of the questionnaire Cronbach alpha test is used. While preparing the questionnaire the focus is on exploring the challenges that are mentioned in the thesis and the obstacles encountered by implementing agile transformation in large scale projects.

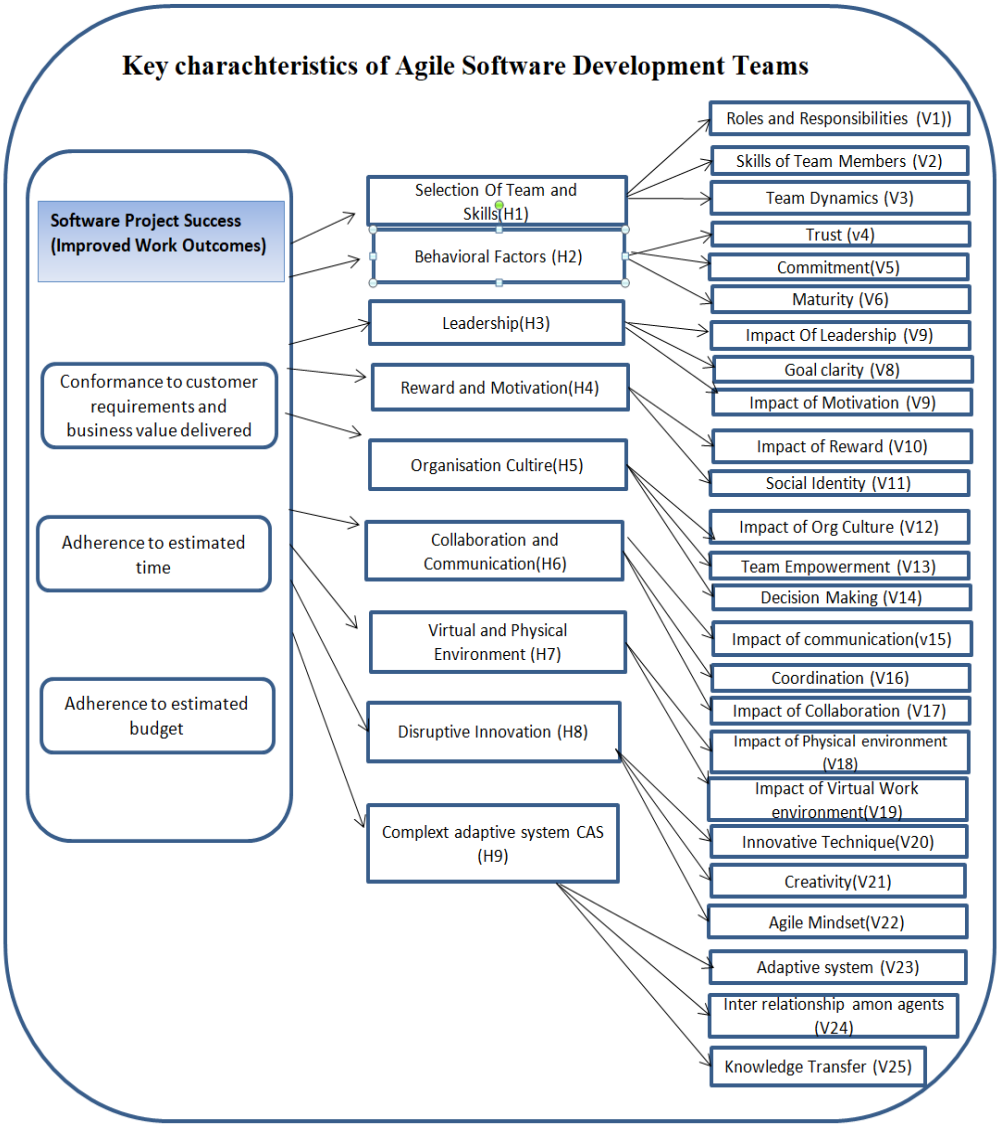
The proposed model was developed by researching the challenges and success factors faced by industry. In-depth interviews are conducted with employees in the IT industry to gain a deep understanding of their perspectives, experiences, and insights regarding agile transformations. These interviews allow for open-ended discussions, enabling the researchers to capture rich and nuanced data that can reveal the complexities and challenges of agile transformations from the employees' point of view.Surveys are also used to collect data from a larger sample of employees. The surveys include Likert scale questions with seven points, which allow employees to rate their perceptions and opinions on different aspects related to agile transformations. This quantitative data can provide insights into the prevalence and distribution of certain factors or practices within the IT industry.

To ensure generalizability, the manuscript also seeks insights from agile coaches in organizations. These insights can provide additional perspectives and enrich the findings of the study, contributing to a more comprehensive understanding of the research objective. The qualitative approach chosen for this study is empirical in nature, as it involves collecting raw data from employees and agile

coaches to understand their perspectives and experiences. Random sampling is used to collect data, ensuring that the sample is representative of the wider population within the IT industry. By utilizing qualitative methods such as in-depth interviews, surveys, and insights from agile coaches, the manuscript aims to gain a thorough understanding of the dynamics of agile transformations, identify obstacles and success factors, and uncover best practices used by the industry. The chosen approach and methods contribute to a robust investigation of the research objective and enhance the rigor and validity of the findings.

Moreover, there are three aspects assessed by nine elements that are determined using the Likert scale of seven points. The qualitative approach that is empirical in nature is chosen to smoothly investigate the research based on random sampling to collect the raw data. For collecting raw data, regarding the main qualities and components of agile software development teams, the study collects samples from employees who are working in software projects for Indian IT firms and MNCs related to Indian grounds. To check the reliability and validity of the questionnaire the KMO test is used. To assess the research question and the hypothesis the SPSS statistical tool is used and approaches like partial least squares (PLS-SEM) are explored to effectively find the hypothesis based on their requirement. To test the hypotheses, 265 samples (software engineers and other sector employees) who had previously worked on a large-scale Agile project were recruited. The parameters that are chosen in the research can be classified as dependent and independent variables. Under the independent variables are Selection of Team and Skills (IV1), Behavioral Factors (Maturity, Commitment) (IV2), Leadership (IV3), Impact of the Organizational Culture (IV5), Collaboration and Communication (IV6), Disruptive Innovation (IV8) and Complex Adaptive System (CAS) (IV9) while the dependent variable is (DV) – Improved Work Outcomes.

The findings exhibit that, out of all these independent variables two variables are not significant and did not impact on overall work performance. These components are Reward and Motivation (IV4) Virtual and Physical Work Environment (IV7) do not have a substantial impact on the Improved Work Outcomes as compared to the other independent variables. These elements act as a vital participation in formulating a framework that is effectively used to improve performance while organisation implementing Agile Transformation



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Based on the research done in analysing the critical factors that impact large scale transformation proposed model was created after empirical investigations. To check the effectiveness of proposed model it wasfurther evaluated through post mortem analysis by collecting data and statistical analysis is completed in the below section of this study.

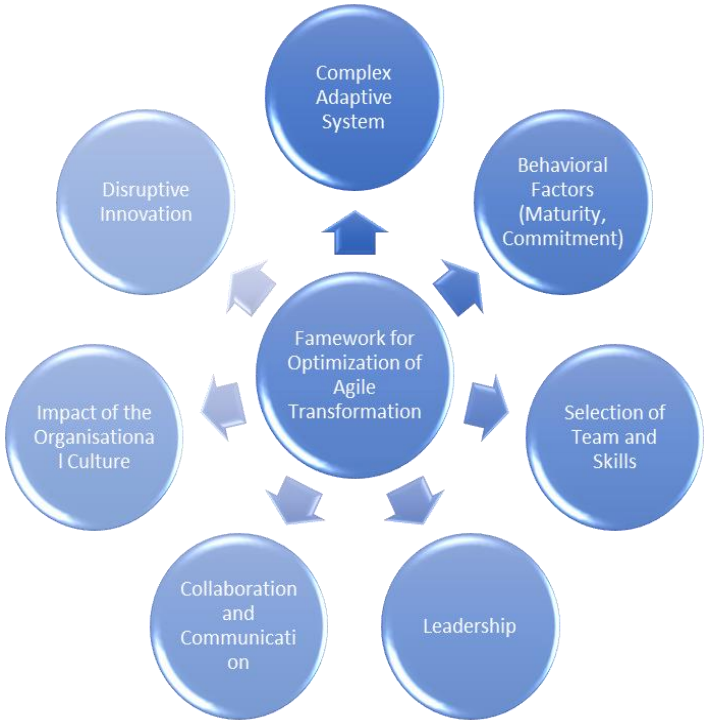

Fig. 1: Proposed Model.

Data Analysis

The analysis section can be classified into two parts one is the statistical part and another one is the comparison part. In the statistical part the study shares demographic profile and their reliability. In the comparison segment the study compared the present obtained data to assess the significance of the agile transformation framework.

The post mortem analysis assists to obtain information based on the perception of the employees who also provide their insight with distinct other parameters covered like the investments, type of agile framework, transformation strategy and others. Some questionnaires are illustrated in pictorial form.

The percentage of participants and their designation is illustrated in Fig.2. Large number of participants come from the TL/ SM category which holds 35%, followed by 17% of the respondents who belong to SSE types and 15% of the individuals working as a designation of PM.

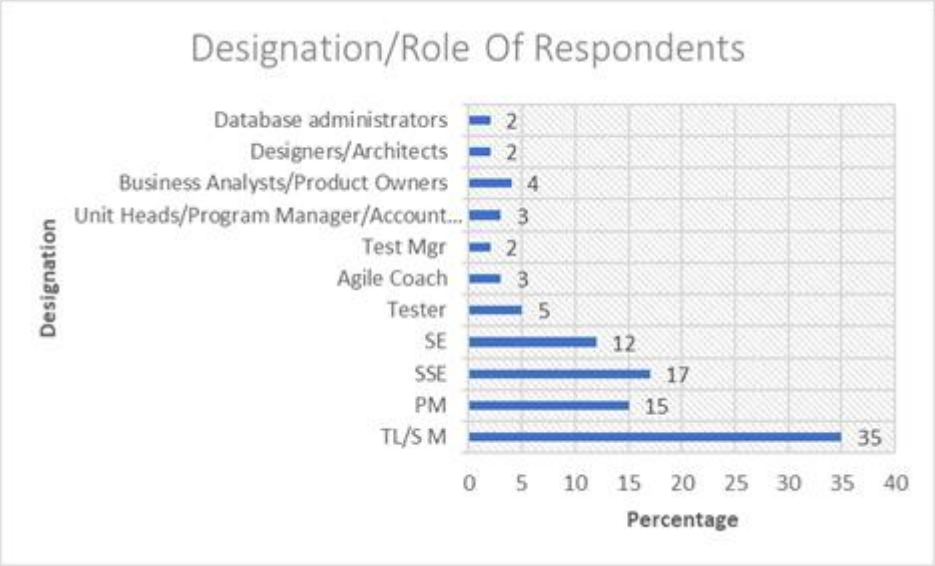

Fig.2: Designation

The projects' duration has been recorded in terms of the number of months. The timeframes for the software projects ranged from three to 96 months. This was illustrated in Fig.3. The data indicates that around 25% of the project comes under 21 to 40 months of duration followed by 24% of the project belonging to the 1-20 month time span. Only 12 % of the project belongs to 81 to 100 month duration.

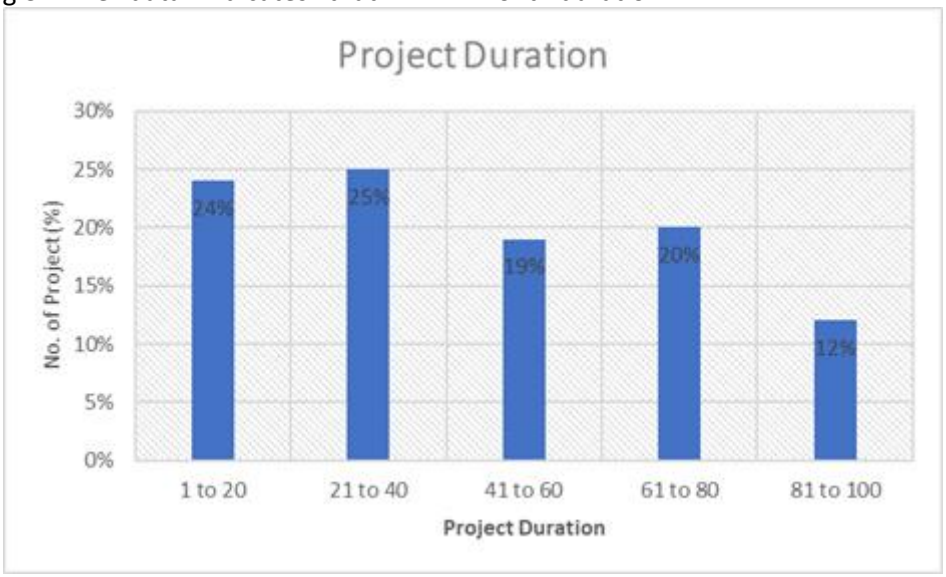

Fig.3: Project Duration

The projects' types and percentages are displayed in Fig. 4. covering distinct types of projects as 44% of the working project belong to the maintenance segment followed by 26% of the project are from customization or enhancement while the remaining are from s/w development, R&D and others.

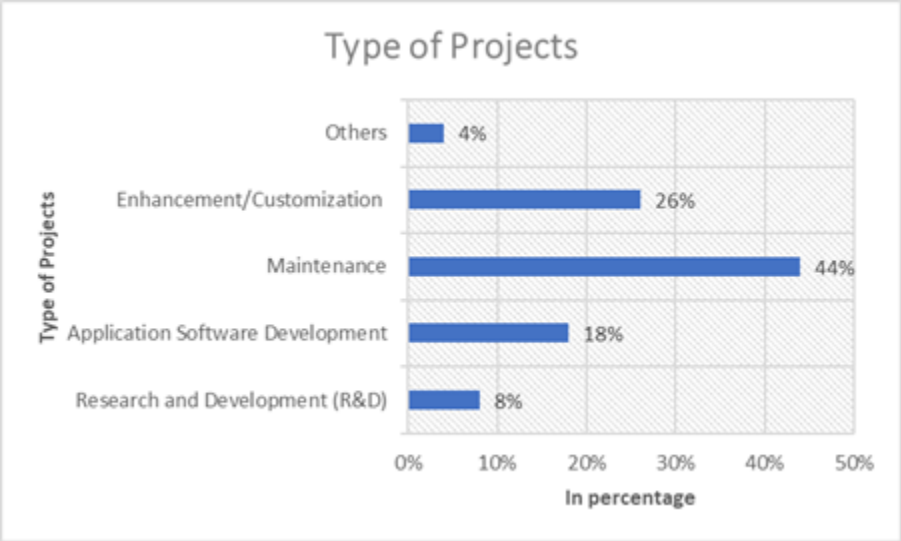

Fig 4: Type of Project

The key roles played by participants are shown with various transformations. In Fig.5, the description is shown indicating 26% of the individuals are working as Agile program coaches, while 22% of the participants are team coaches and a similar percentage of respondents are holding transformation manager positions.

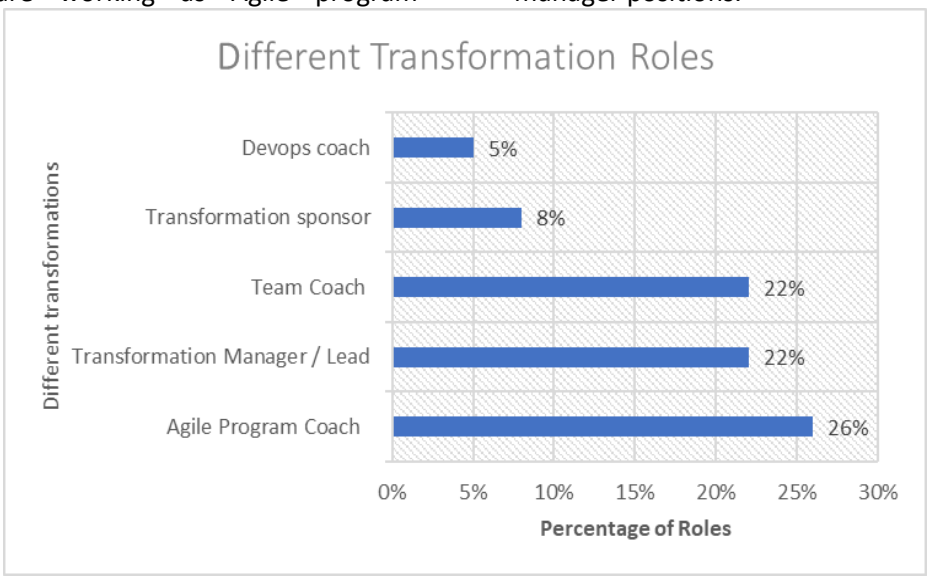

Fig.5: Different Transformation

Other questionnaires that are part of the analysis are the challenges and success factors that were discussed in the following section. Some of the challenging parameters, such as change resistance, lack of investment, are explored to determine whether the proposed model has the capability to resolve these challenges as illustrated in the fig (6 to 12). Alongside, some of the success parameters are leadership quality, cooperation, and coordination, while others seek to determine whether the proposed model has a capability to deal with the success parameters. To determine whether participants encounter any challenge related to adaptability while using the proposed framework, the finding indicates that 71% of the participants showed their disagreement while 21% were in neutral perception and 8% of the participants agreed towards challenges.

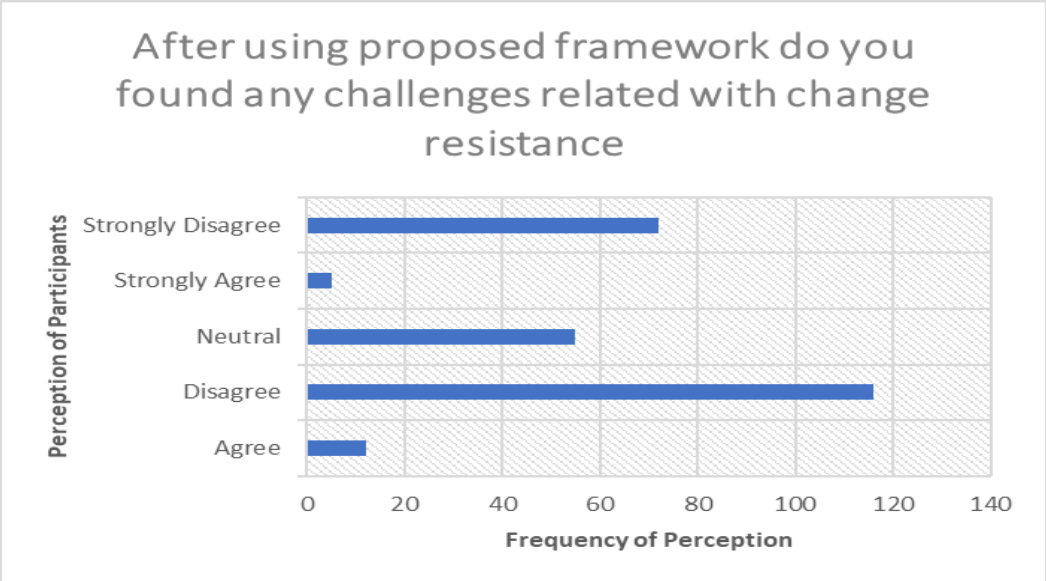

Fig 6: Challenge with Change resistance

To determine whether participants are facing a lack of investment challenge while utilising the proposed model in the workplace while exercising large scale agile transformation. The finding indicates that 71% of the participants mention that they do not find any issue related with lack of investment while 7% of the participants found challenges however 23% of the participants showed neutral perception.

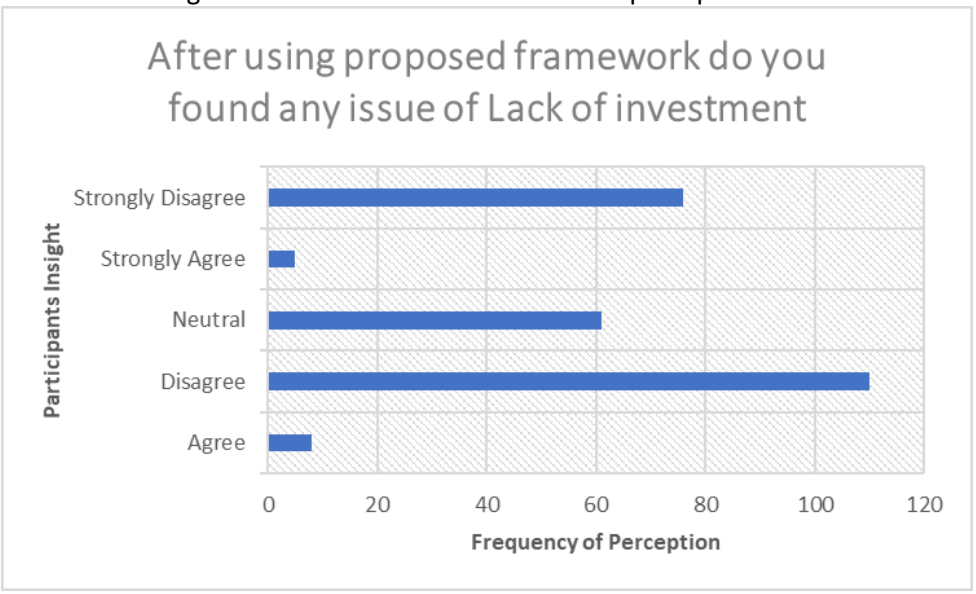

Fig 7: Lack of Investment Challenge

One of the most prominent questionnaires is whether employees found any challenges while implementing agile once they were using the proposed model in the above place. The findings indicate that 74% of the participants indicate that they do not find any challenges while 20% showed neutral perception and remaining found difficulties while implementing agile in the workplace.

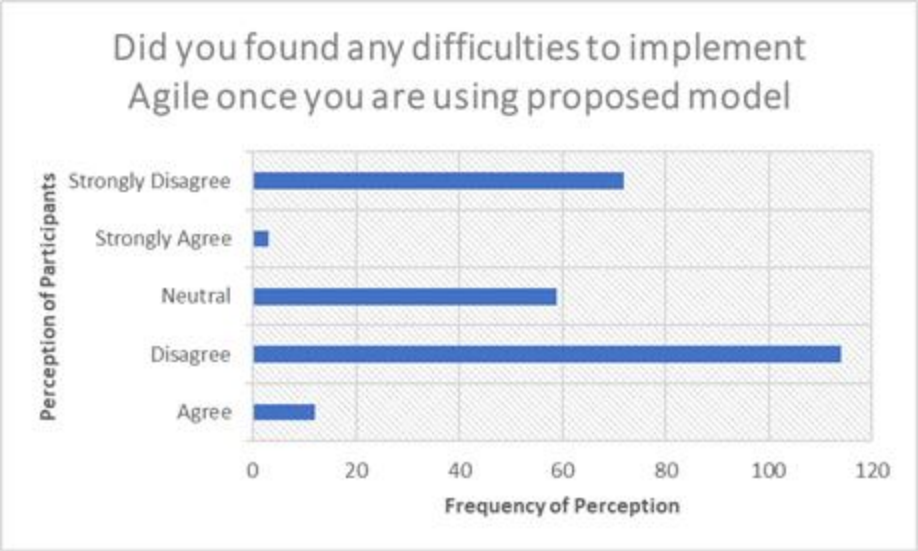

Fig. 8: Challenge to Agile implementation

The findings indicate that the employees have effective coordination while dealing with a multi-team environment as 75% of the participants do not find any challenge and 20% show their neutral perception. Meanwhile, the remaining 5% of the participants show that they encounter certain challenges while working in a multi team environment after implementing the proposed framework.

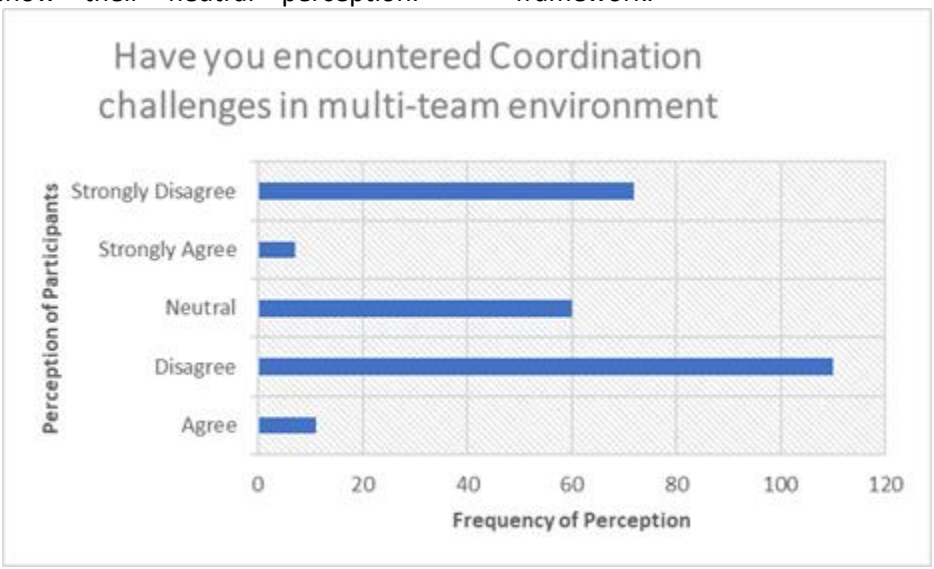

Fig. 9: Challenge with Coordination

Another question is also related with the challenges which emphasise whether employees found any difficulty when they are using different approaches in a multi-team environment. The findings indicate that 72% of the participants disagree with the notion and 6% of the participants show that they found certain kinds of difficulties while implementing a different approach.

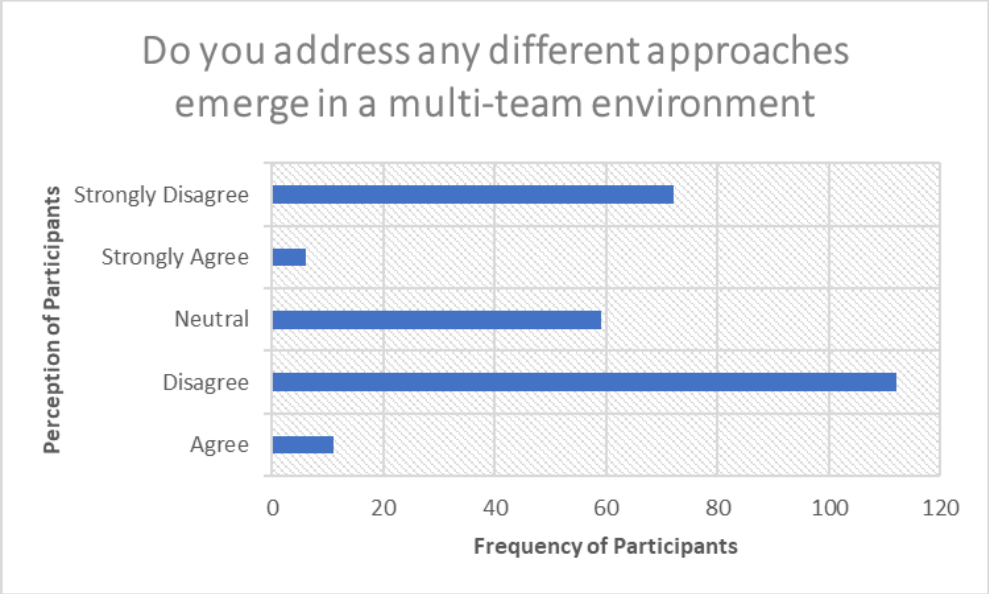

Fig. 10: Difficulties with different approaches.

In order to determine whether participants are facing a hierarchical management challenge while utilising the proposed model in the workplace while exercising large scale agile transformation. The finding indicates that 71% of the participants mention that they do not find any issues, while 7% of the participants found challenges, however, 23% of the participants showed neutral perception.

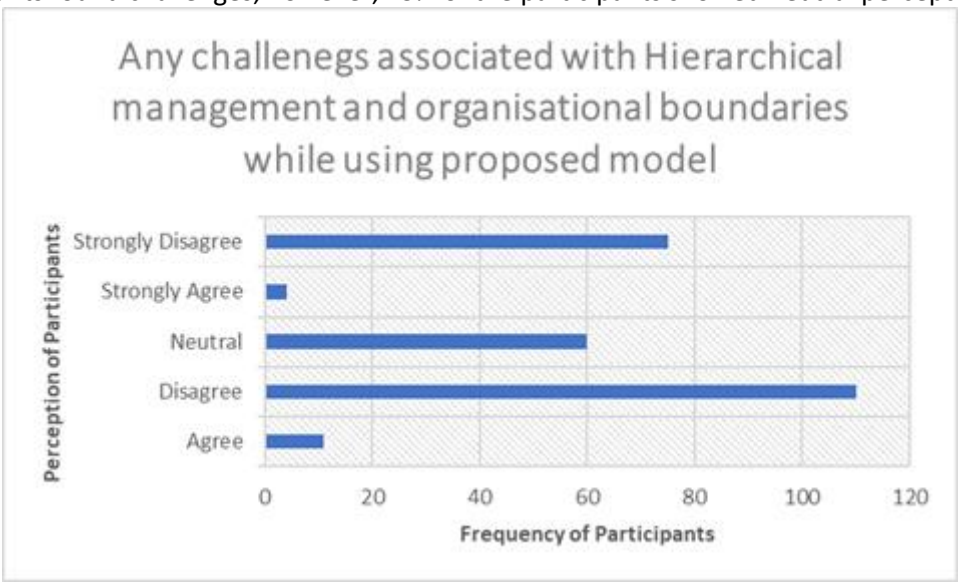

Fig. 11: Hierarchical Management

In order to determine whether participants encounter any requirement challenge while utilising the proposed model in the workplace while exercising large scale agile transformation. The finding indicates that 74% of the participants mention that they do not find any issue related with lack of investment while 7% of the participants found challenges however 19% of the participants showed neutral perception.

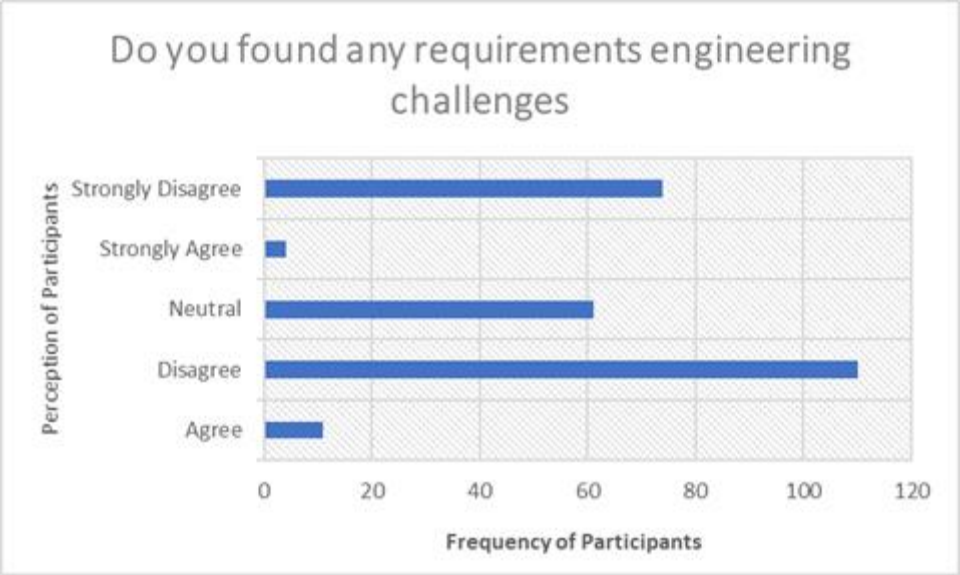

Fig. 12: Requirement engineering challenge

These figures indicate that all the challenges are effectively resolved by the proposed method as most of the participants(more than 75%) favoured that they do not find any of the challenges when they use the proposed agile framework, while 20% showed neutral perception toward distinct challenges and related components.

Next segment is revealing the success factor that usually plays a very crucial role in agile transformation on a large scale. The characteristics of agile transformation can be categorised as management support, leadership quality, coordination, open communication and others.

One of the questions was related to whether after implementing the proposed model employees found management support to adapt transformation procedures. The finding indicates that 78% of the participants showed an agreed notion that they found support while 7% of the participants mentioned that they did not find management support and 16% showed their neutral perception.

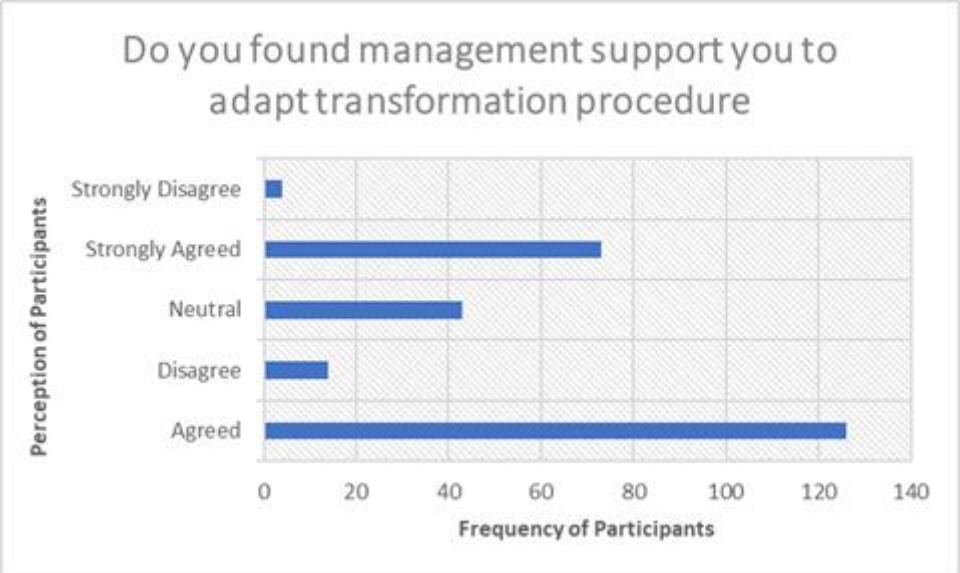

Fig. 13: Management Supports

One of the questions was related to whether after implementing the proposed model employees found effective coordination and leadership quality in their workplace. The

findings indicate that 78% of the participants believe that their organisation has appropriate coordination and leadership quality, while 7% of the participants mentioned that they did not find coordination and leadership support and 16% showed their neutral perception.



Fig. 14: Coordination and Leadership

The findings indicate that 77% of the participants believe that their organisation has appropriate communication covering formal, informal etc, while 7% of the participants disagreed and 16% showed their neutral perception.

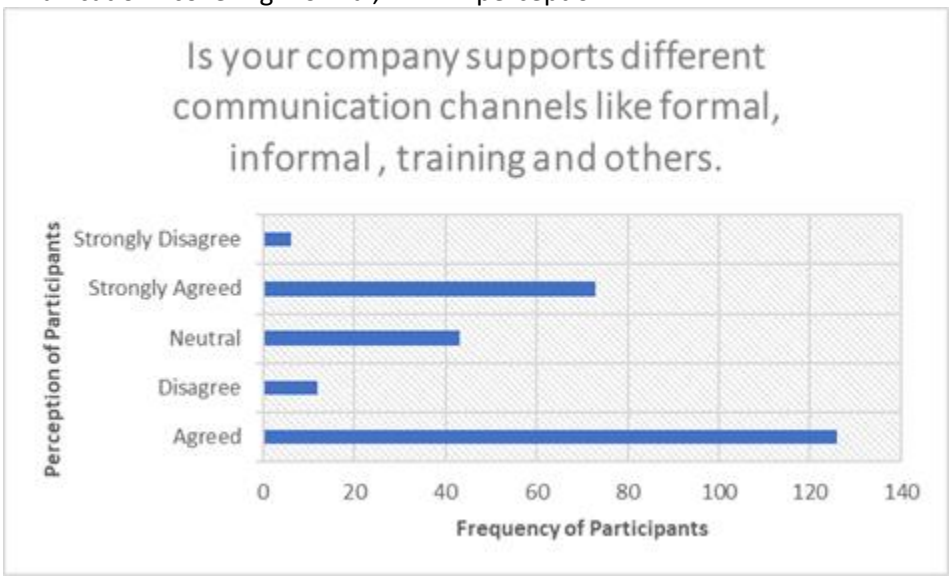

Fig. 15: Communication supports

The question related to whether companies provide effective training and upgrade skills before introducing agile in the firm. The findings indicate that 78% of the participants believe that their organisation has an appropriate training and upskilling environment, while 7% of the participants disagreed and 16% showed their neutral perception.

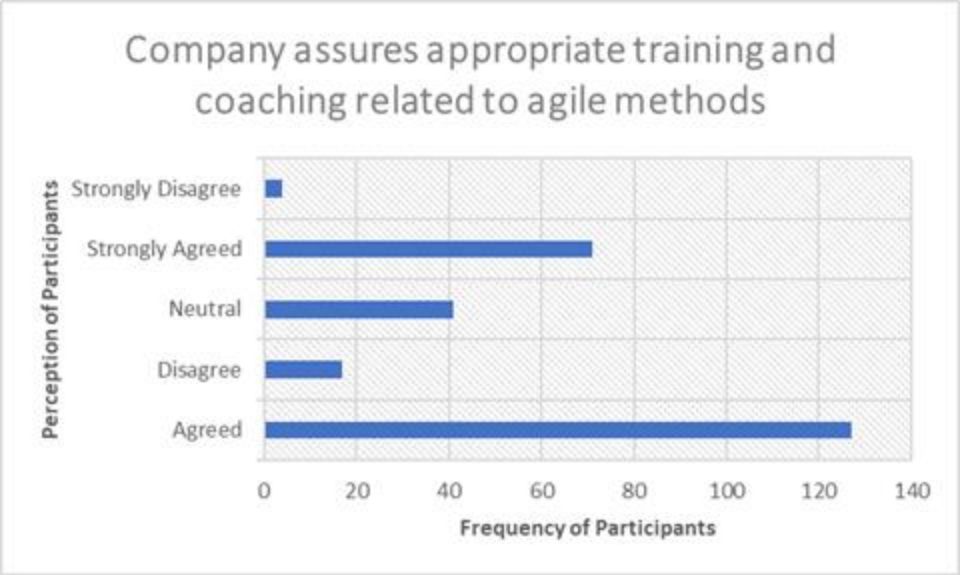

Fig. 16: Training and Coaching

The above-mentioned figures (13 to 16) show the success components that any agile framework must possess, and the finding indicates that the proposed model acquired all the prominent success factors as 80% of the participants believe that their agile transformation framework possesses all the qualities.

Statistical Analysis

The consistency of the survey is determined which is referred to as reliability. The reliability is greater when the quantity of items is significantly greater. The most appropriate measure to determine reliability is the Cronbach alpha (CA), also referred to as the pilot test. The range of the CA value is 0 to 1, with a figure over 0.7 being regarded as reliable.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.831	14

T-test

The raw data will be input into this built-in function, which will compute the t value. Following that, a p-value will be determined and compared to the critical number. By doing this, it can determine rapidly whether two groups differ analytically. Using the measure of the difference between group means over the cumulative std error including both groups, the t test determines the actual distinction among two group means. The fraction of the disparity in group means over the aggregate std errors of both groups is utilised in the t test to identify the real distinction between two group means.

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
DV	265	5.02	1.99	0.112
IV1	265	3.04	1.324	0.081

IV2	265	3.39	1.325	0.081

Table 1: Sample statistics.

The value of t, df and mean differences is illustrated in the table below. The value of p=0.00 indicates that the model is significant and clearly discriminates among both the groups. The sig. Value should be lower than (p<0.05) demonstrating that the model is significant and effective.

One-Sample Test						
	T	DF	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
DV	44.965	317	0.00	5.019	4.8	5.24
IV1	37.406	264	0.00	3.042	2.88	3.2
IV2	41.693	264	0.00	3.392	3.23	3.55

Table 2: T-test table.

Comparison of Agile Models

The comparison of other agile framework and proposed model are discussed in the table 3 below-

Parameters	Other Agile Framework	Proposed Agile Framework
Investment/Costing	High to moderate	Comparative low
Team Size	5-10	Any number (divide in interaction)
Maturity Level	Team level [advanced level (29%)] Program level [novice level (32%)] Portfolio level [beginner level (38%)]	Team level [advanced level (69%)] Program level [novice level (82%)] Portfolio level [world level (38%)]
Satisfaction Level	Slight Satisfied (20.9%) Moderate Satisfied (38.6%) Extremely satisfied (18.6%) Slightly dissatisfied (8.21%) Neither satisfied nor dissatisfied (7.46%) Moderately dissatisfied (3.73%) Extremely dissatisfied (2.99%)	Slight Satisfied (23%) Moderate Satisfied (40%) Extremely satisfied (28%) Slightly dissatisfied (3%) Neither satisfied nor dissatisfied (4%) Moderately dissatisfied (1%) Extremely dissatisfied (1%)
Transformation Strategy	Bottom-up strategy (42.54%) Department-by-Department strategy (29.10%) Big bang strategy (11.94) New department strategy (7.46%)	Mixed Approach (78%) Rest believe that this approach is based on balancing strategy b/w top-down and bottom-up.
Strategy used for the agile transformation	Scaled Agile Framework®(SAFe®) (42.11%) Scrum of Scrums (19.55%) Internally created methods (14.29%)	Proposed model is used by everyone (100%)

Type of Project	Same	Same
Project Completion Status	0 to 20 (8.8%) 21 to 40 (14.1%) 41 to 60 (17.5%) 61 to 80 (29%) 81 to 100 (30.6%)	0 to 20 (4%) 21 to 40 (6%) 41 to 60 (15%) 61 to 80 (35%) 81 to 100 (40%)

Table 3: Comparison between agile models and proposed framework.

All the challenges that are mentioned after rigorous literature survey and primary source data analysis, are effectively resolved by the proposed model. The components of the model who participate to eliminate the challenges are discussed in the below table 4.

	Change resistance	Lack of investment	Agile difficult to implement	Coordination challenges in multi-team environment	Different approaches emerge in a multi-team environment	Hierarchical management and organisational boundaries	Requirements engineering challenges
Selection of Team and Skills	✓	✓	✓	✓			✓
Behavioural Factors (Maturity, Commitment)		✓		✓			✓
Leadership	✓		✓	✓		✓	
Impact of the Organisational Culture	✓	✓		✓	✓	✓	
Collaboration and Communication	✓			✓	✓	✓	
Disruptive Innovation		✓	✓		✓		
Complex Adaptive			✓		✓		✓

System (CAS)							

Table 4: Components of the model who participate to eliminate the challenges.

Results

The outcome of the post mortem analysis and the finding of the research reveals that the proposed model has all the characteristics and capability to effectively implement the agile transformation on a large scale. The proposed model estimated that the framework resolved all the challenges indicated during implementing agile in the workplace like change resistance, lack of investment, difficulties while implementing agile methods, Coordination challenges in multi-team environments and others.

As the model demonstrates all the dynamic qualities as it resolves the challenges associated with large scale agile transformation that can be categorised into distinct success factors such as management support provided flexibility to rearrange the schedule to conveniently access space to adapt for transformation procedure. Providing adequate training corrected the situation and even created strong agile supporters in management. Transforming the way of working of a large group required coordination and leadership quality. Team autonomy to make the team self-organise and empower them based on training, skilling, and upskilling.

The comparison of the proposed model and other agile frameworks is also illustrated in the table in analysis section which indicates that 91% of the participants are satisfied with their proposed model, while 78% of the participants believe that they use a mixed approach as a transformation strategy.

Conclusion

Ultimately, it may be extracted that by examining the proposed framework it was determined that the framework has all the features that are required for any agile framework in an organisation to match the need and goal. The suggested framework enables the synchronisation and alignment of several domains to produce strong mechanisms that ultimately influence the effectiveness of the company and enable it to flourish in the cutthroat market.

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