

## **EVOLUTION OF MANAGEMENT IN THE INFORMATION TECHNOLOGY DOMAIN TO INCREMENTAL AND TANGIBLE OUTCOME-BASED MODE: ACCELERATED BY THE POSITIVE INFLUENCE OF COVID-19**

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### **Abstract**

Management, as the study of the organization and the organizational phenomenon has been an evolving body of knowledge that has particularly been maturing to inculcate the intricacies of knowledge work and the knowledge worker. The trend has been continuous, but the form and messaging have crystallized more with the advent of the twentieth century. Management in Information Technology has also embraced this evolution as it is necessitated by the demands of the knowledge work. From a linear sequential management model to iterative feedback and feed forward driven management methodology, the journey has been continuous. The study analyzed this trend which clearly showed the evolution but also inherent inertia in adapting to this evolution, thus creating limits to the opportunities that it provides. So, the journey from the waterfall model of software development in the Information Technology domain to a 'V-model' (software development model), where software development is plotted against software testing and then the iterative models evolved to Agile methodology. But in run-time, the mode to implement Agile through Sprint, scrum, etc. became a mini waterfall. The requirement analysis was based on Work Breakdown Structure, which should ideally have been User story and acceptance criterion, the resource loading, and inherent effort estimation and resource utilization were role-based, such as Project Manager, Technical Architect, Team Leader, Developer, Tester, etc., though it should have been Scrum Master and Scrum Members. Bell curve is being used habitually to measure resource performance within the team. Individual sprints were not leading to production release, which is how it was envisioned but there was some staging environment created where the sprints ended and then did a common User Acceptance Testing which is followed by deployment to production much like the waterfall model. To add to this, puritanical Agile practitioners were necessitating all scrum members to be in the same room for an effective stand-up or scrum meeting, which is almost impossible to achieve in the current onsite-offshore model of engagement. This created more fissures than opportunities to align. So, the inherent inertia and the puritanical interpretation of the methodologies resulted in falling back to the same trap and not reaping the benefits of the natural evolution of management in The Information Technology which was taking its organic spread to lead us to improved effectiveness. But with the onset of COVID 19 pandemic, the Information Technology industry had to take immediate steps, which was, the same steps that were being dictated by the organic spread of the management evolution but were being resisted by this inherent inertia combined with the puritanical approach. Here, the study has analyzed the steps and implications dictated by COVID 19 pandemic in the Information Technology domain, and how it needs to be conceptualized to ensure it is utilized as an enabler for the next phase of The Information Technology management growth, particularly in terms of knowledge work and the knowledge worker..

**Key words:** Management, Knowledge Work, The knowledge worker, Linear Sequential Methodology, Waterfall Model, Agile Methodology, The Information Technology, COVID 19

### **Introduction**

Management principles and practices are the pillars for the growth and sustenance of new business enterprises. Management, as the study of the organization and organizational phenomenon, helps an organization sustain and evolve. The traditional management principles are derived largely from how the big-business industry operates, though of late the focus is increasingly on knowledge and service-based institutions for new-age entrepreneurs. The Information Technology-based enterprises (The Information Technology Services and The Information

Technology enabled Services) are the new-age business enterprise that is both knowledge-based as well as a service institute.

In a knowledge-based enterprise, every stakeholder practices management. It is defined by the individual roles and responsibilities. The role of the manager has a set of management principles and practices that they are responsible for and every other role has its own defined set of management principles and practices to perform. Every stakeholder in a knowledge-based enterprise must understand, apply, and enrich suitable management practices, as the role demands.

**Traditional Management Principles and Practices v/s New-age enterprise**

<b>Attributes</b>	<b>Traditional organization</b>	<b>New-age enterprise</b>
Tasks	Tasks	Quality driven Deliverables
Responsibilities	The Manager	The knowledge worker
Practices	Top-level Management	New-age enterprise

Table 1: Traditional Management Principles and Practices v/s New-age enterprise

In the book ‘*Principles of Management*’, by Peter Drucker, the author has enumerated ‘*Management by Objective*’ which sets up a methodical approach towards driving management principles and practices in a business enterprise. In the book ‘*Management Tasks, Responsibilities, Practices*’, by Peter Drucker, the author has investigated and opined about the variables in management function and has also talked about the knowledge worker and services institutions. The current entrepreneurs (new-age business enterprise) with the Information Technology based organization, including The Information Technology Services (ITS) as well as the Information Technology enabled Services (ITeS) fits entirely in the characteristic of both a service organization as well as a knowledge-based organization.

This study would analyze a set of factors that follow the organic spread leading to the evolution of management in the Information Technology domain, such as, the ability of the Information Technology to enable new-age business, the concept of stakeholders with regards to Knowledge work, and the knowledge worker where the stakeholders are weighted equal (equal in proportion to their weight, where weight is dependent on the responsibilities assigned and carried out by each role) and everyone needs to manage their knowledge work while managing the organization hierarchy as well. This also considers the need for innovation and entrepreneurship riding these innovations in the established as well as the emerging markets. The study also observes the conceptual models being built and evolve around it from linear sequential models to iterative models for software projects in the Information Technology domain. Also, this study has considered the personnel development with these changes and the opportunities to maximize their utilization. The study thus indicates that the ingredients leading to next set of evolution in Management for the Information Technology domain were knocking at the doors of organizations, but it was being resisted by the inherent inertia of the organization decision makers and project managers, as well as the puritanical from the existing management methodology. It is the onset of COVID 19 pandemic, and the challenges it brought in terms of distributed manpower, timeline and budget crunch, an uncertain future, etc., and the opportunities, such as a leading demand for digitalization, the Information Technology becoming an essential service and the realization of its role and the demand to evolve quickly to yield the success has allowed the evolution to run its course leading to adaptability among the Information Technology organizations & practitioners.

**Literature Review**

Historically there has been a detailed discussion on the qualitative and quantitative measures with regards to the IT values (Chan, 2000). The approach is two-pronged, on one hand, they are trying to understand how the qualitative study v/s the quantitative study of IT values is leading to interpretational gaps and at the same time, when IT values are studied for an individual (or the knowledge worker) against when it is studied for an organization (or a knowledge organization or enterprise). The measures of IT values would vary across these and subsequently it will impact the outcome. These findings are about the widening gap in how the parameters to study IT values are categorized and how it is impacting the output, thus making it inconsistent. The data under study has been derived from articles from 'Communications of the ACM', 'Information Systems Research', 'Journal of Management Information Systems', and 'MIS Quarterly' for the period between 1993 to 1998. For the understanding and analysis of this study around Incremental and Tangible Management by Outcome (IT MBO), IT values are an important construct to derive from and the study is also taking reference of the journal, such as 'Journal of Management Information System', and 'MIS Quarterly' from the year 2000 to 2019. This study agrees with these assertions that the difference of determinants and logically the outcome is varied and at times can be conflicting when the articles related to IT values or those that can be ascribed to IT values were analyzed. Even though the study has identified that it can be because of the reliance on secondary data and prioritization of organization-level analysis. In a knowledge-based enterprise, each knowledge worker breeds enterprise and thus is an interconnected entity and their study should evolve to bring in the analysis that encompasses this overall aspect. This would create the required uniformity. This is the aspect of the study, where IT value is studied as an inclusive component of overall IT evolution from a knowledge perspective that will cater to this problem statement. This study is aligned to include this as an important determinant.

There have been studies regarding the role of information management as well as Information Technology as an enabler for a business purpose (Kesner & Russell, 2007). This fits in perfectly with our research for Incremental and Tangible 'Management By Outcome' (IT MBO), the study is also considering the business operations where the business enterprise is a knowledge-based enterprise. In this paper (Kesner & Russell, 2007), the study implements the 'case-study' approach to build in the information base and analyze it upon the same. It combines the FastFit Case study (a sports retail chain) and Winter Gear Distributors (a key fastFit supplier) to understand and analyze the phenomenon of business control, management information systems, and implementing IT in aligning the same. It caters to an end to end process of Business Process Reengineering with Information (Customer, Inventory, Communication, and Control), Supply Chain Management to create an end to end business flows. It also includes Information Technology to align this end to end operations. Information Technology, as well as Information Technology-enabled Services are an integral component to run a business enterprise. It is equally true of a conventional business as well as to a new-age business enterprise. The emphasis in this paper is also on how to adapt to MIS (Management Information System- IT-enabled) for a beginner by proving the applicability for each phase in the operations of a business enterprise as well as the ease of operability that makes it appealing and effective. This is true universally that business enterprises must adapt to IT to maintain and improve optimization and make use of advances in technology such as Business Intelligence, improved Customer Experience, and data analytics. This study takes it further ahead on when you are using IT for your business enterprise, how has this been traditionally impacting you and with the realization of IT being a knowledge-driven function, how can this be inferred to ensure ever-improved applicability of the same.

Effective communication is a mandatory attribute for the success of any knowledge-based enterprise. The output of a knowledge-based new-age enterprise is dependent on effective communication as it must cater to both intended as well as implied customer expectations. This is a shared objective of IT MBO, as well as in various research papers in the past (Mastrogiacomo et al., 2014). This is an action-based approach where the study has created a conceptual model called 'Coopilot', which was then used for four years for Information System projects and the output is measured. The paper claims that the output is in line with the expectation that an improved communication can aid in the confidence of IS Project Manager in successfully running the project. This is the point of interest for this paper. It has considered the theory of joint activity developed by a psycholinguist, Herbert Clark. The paper claims that the output falls in line with how Clark's theory can add to the IS field and the importance of conversation as a theoretical construct. It talks about improved confidence and motivation. While there has been continued focus on communication as an enabler, for example, Agile

methodology also emphasizes communication, cooperation, and collaboration. But the usage of one model to effectively cater to the vast world of Information Technology is too farfetched. This study can contribute to the creation of a methodology construct, such as Agile, which can have a specific modular approach like 'KANBAN' or 'Scaled Agile' to handle each unique situation in Information Technology. Similarly, the communication needs to be accounted for a varied set of Information Technology, the Information Technology systems, the Information Technology Services, the Information Technology Enterprises, the Information Technology enables Services, among others. The construct must also consider both the knowledge workers as well as the new-age enterprises for effective coverage and output.

The study also analyzed papers that suggest a model where the study has identified one of the factors behind the failure of the Information System development project where the requirements are dynamic and are prone to failure to be the inability to harmonize values (Narayanaswamy et al., 2013). Through this value harmonization, between the project manager and team members, the paper observed that the control loss is minimized. The study introduced control loss as an intermediate outcome variable of the congruence model, that was utilized to test the process of harmonization. The congruence was defined to reflect a level of agreement and degree of shared understanding. It builds on the communication aspect, identifying and discussing the disagreements with constructive solution approaches and its contribution to improving the ISD project. But it also focuses on relations between project managers and team members. While it is a set standard in a team structure of project managers and team members, it also has the concept of Scrum where the working function of a Scrum Master, Product Owner, and Scrum team members are very different where the intricacies of values, aligned with work responsibilities and shared vision are unique. Suitably, the study needs to consider this and think of how the harmonization should be initiated. Also, the study is talking about the knowledge-worker driven enterprise and of all sizes and varied work functions. The study is repeatedly projecting the limitation of a model-based projecting approach as it is too entrenched in the area and the study is talking about a wider expanse where a methodology merges with analysis and which is open to interpretation and customization as per the unique needs.

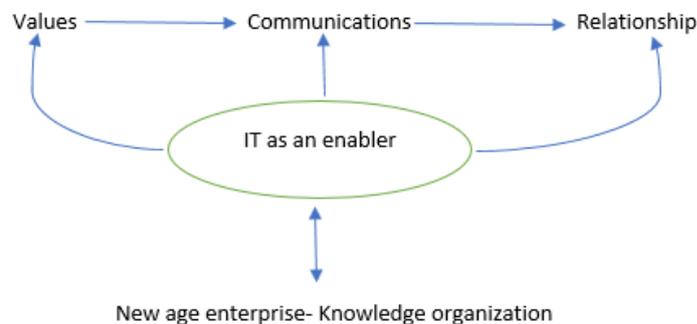


Figure 1: Attributes distribution for new-age enterprise

This study is also interested in describing the knowledge-based new-age enterprise to build upon the labor-manager stakeholder arrangement to a weighted-equal stakeholder set in a knowledge-based new-age enterprise, where weight is the individual roles and responsibilities assigned to each stakeholder (Gibson, 2000). The paper builds from the stakeholder theory and considers the stakeholder theory from a business ethics perspective. It further builds upon our exploration of values. Values allow for congruence or divergence, leading to either more cohesive work output or a spillover impacting the outcome, losing control as the expectation is already volatile, for it must consider the implicit. The moral basis needs to be looked at first from a positive discrimination perspective for the traditional roles are being and must be diluted and weighted-equal should not just be in theory, but it should be practiced. The moral compass should not become an intervention that maintains the status quo. Our analysis in this study would build upon this argument.

The study considers several works of "Peter Drucker" to discuss the concepts of Value, Ethics, Influencers, and Stakeholders (Schwartz, 2002). The study here talks about Peter Drucker's antipathy to traditional ethics (through a socio-economic phenomenon) and further propagation of Management, to a greater end, but not an end. This was a new reality, and the study opines that it was based on Weimar Experience. As per the study, Peter Drucker's Weimar ideology was built on the premise that business corporation was recognized as an individual entity and the owners, even paid executives, must not be held accountable to outside shareholders or even non-managing entity. When our study is talking about Incremental and Tangible Management by Outcome, it accepts that management for new-age knowledge-based enterprise is the means to a greater end, but this 'means' must also consider the need to foster the individual entrepreneurship of every knowledge worker. The responsibility of the management function would go beyond the business enterprise and business owners to knowledge-based new-age enterprise and the knowledge worker where Information Technology would be the enabler and the leveler.

The study also explores the link between inter-organizational relationships and innovation (Palumbo & Manna, 2018) by making use of secondary data from the Italian Institute of Statistic and multinomial logit models to understand and analyze the inter-organizational relationships and its impact in fostering innovation in the organization. This is a novel implementation of logit models to study inter-organizational traits to observe innovation and encapsulates the transformation. The paper suggests a positive effect by studying different stakeholders under the same umbrella, such as suppliers, vendors, etc. It also throws an interesting observation that inter-organization brings positive change, but geography is not a constraint. This is also in line with the Information Technology set-up where almost invariably it is seen that the stakeholders are geographically separated, as also the IT applications aiding the overall observation. This study allows for and aids in the overall argument building that the knowledge worker and new-age enterprise need constant innovation and to create an environment that positively catalyzes innovation must be aligned through understanding the inter-organizational relationships, for the new-age enterprise the role definition is also evolving. This study would also consider primary data as against earlier works which were dependent on secondary data. Primary data would allow the analysis of real-time practice to draw the pattern.

This study has analyzed papers on entrepreneurship and innovation management in emerging economies (Singh & Gaur, 2018), which was a special issue of 17 papers that are focused on Entrepreneurship and Innovation in emerging markets. The study has rightly identified the lack of enough material, except for Latin America and Europe. Also, that entrepreneurship and innovation go hand in hand and have both economic as well as social ramifications. In an emerging market, the trend for this and their co-option is not always smooth, but it invariably has to co-opt. The study has, through the set of papers, utilized literature reviews as well as case studies to understand and put forward the gap in the literature as well as suggest ideas to build upon. The markets of China, as well as Brazil, India, and the Middle East have been included to understand the micro-level labor market, the need for innovation, mapping individual entrepreneurship, and how it impacts the wider society. In this respect, it also considers the need for an innovative ecosystem, skill, policymaking, and new venture sustainability. This is where it is a great fit for the interest area of the study. It delves into areas that are directly related when the study is talking about entrepreneurship and how knowledge-based enterprise and the knowledge workers in the new-age (especially with IT) could build on and capitalize on the same. The gap among these papers is that it is very wide-based. The focus of this study is limited to Information Technology and Information Technology enabled services. The study would include a set of respondents directly involved in the work to respond which will build the base for the analysis.

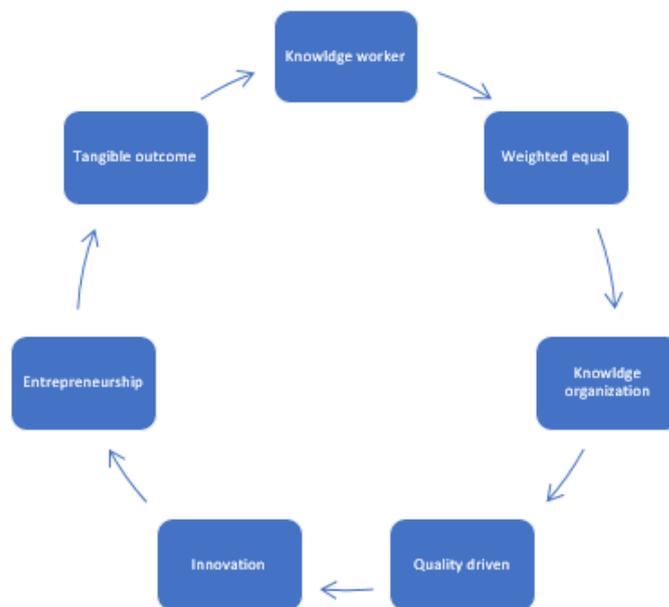


Figure 2: Sequential flow of factors contributing to Management by Outcome

The study also explores Total Quality Management (Zakuan et al., 2010) which has used structured equation modeling to understand how the various tenets that constitute TQM would bear an impact on an organization when evaluated for Satisfaction level and Business results for an enterprise. It starts by analyzing literature on TQM and its implications and for different markets of developed and developing in nature. It also talks about different domains. The TQM attributes which positively and negatively affect the outcome such as employee satisfaction, teamwork, productivity have been identified and through a set of constructs analyzed. This is in line with what this study is discussing as Quality-driven IT Application Lifecycle Management, which is a core component of our study. New-age enterprise or knowledge enterprise must have IT at its core (in our study) and the most critical aspect in an IT delivery is Quality. Quality driven development (also Test-Driven Development) go a long way in bridging the expected and actual client expectations as not all client requirement in an IT delivery is explicit or tangible. It must, therefore, account for the implicit requirements. Here, the discussed items have been 'Quality & Innovation', 'Supplier & Organization', 'Quality Performance & Organization Performance', which has been fed into creating a conceptual model using structured equation modeling to come out with two parameters of 'Satisfaction level & Business result'. It enables the study to take ahead these discussions as part of wider 'Incremental and Tangible Management by Outcome'. Here, Quality is an item of discussion and it enables this discussion. The study is, as IT MBO, focused on the practice of how the knowledge workers are doing it today and analyze and comment on the same, without any conceptual model to test. This paper is broad-based as the focus is on how to evolve, in terms of management practices.

PRINCE2 (Project In Controlled Environment) is a very effective and widespread project management technique, especially for the Information Technology domain in the European market. There has been previous work (Lianying et al., 2012) to create a new project management maturity model (P2CMM) based on the 'attribute synthetic assessment principle' and PRINCE2 process. The P2CMM model that this paper builds works on the quantitative evaluation index system and employs a web-based questionnaire survey (referred to as cobweb method) to provide the result. It delves into the principles of PRINCE2 to work up the model and it's

(P2CMM) approach, process, and evaluation system. It has a very remarkable similarity to our work as it intends to arrive at a tangible outcome for project management. And it also tries to build upon the existing PRINCE2 project management principle, after analyzing CMMi and PRINCE2. But that is where the similarity ends, and the gaps begin. It doesn't justify the reason to define the tangibles, why are the tangibles required, and is there any special need for these tangibles for the IT domain. The study is saying tangibles are required to be considered along with intangibles, as in the IT domain, customer requirements are both stated and implied and it must cater to both to manage projects successfully. Also, it considers both PRINCE2 and Agile, for the controlled requirement as well as frequently changing requirements, so it covers the IT domain in a broader sense. More and more IT projects are now having frequently changing requirements; thus, the study needs to cater to the agile project management process as well. Finally, as part of the future research work it would consider testing the model with actual project execution once it has created a model based on the initial survey. So, it would allow for run-time observation and evaluation after creating the model through the survey.

It must draw upon the need of IT projects (software projects) among other projects to rely on project management methodologies and the project managers to be well versed on the same to ensure improved project outcomes (Matosa & Lopes, 2013). This paper picks two of the most widespread project management framework PRINCE2 (Project In Controlled Environment) and PMBOK (Project Management Body of Knowledge) and through a case study sets up the uniqueness and interprets on how it is the choice of the manager handling the project to implement either, but implement one to derive the optimum project output. The paper intends to focus on building management knowledge and using one of these two to achieve the same. PRINCE2 and PMBOK have been rightly identified here as the two most widely implemented methodologies for software project management (IT projects). It considers the certifications around PMBOK and PFRINCE2 which are globally recognized and sets the knowledge foundation to understand and implement these methodologies. It creates a comparative pallet for the PMBOK 5 group process of 'initiating, planning, executing, controlling and closing' with PRINCE2's 8 steps of 'Starting up, directing, initiating, planning, controlling a stage, managing product delivery, directing and closing'. It has also identified the variable in both categories. Through a selection of case studies, it shows how implementing one of these two is about the choice of the manager. It also creates a resemblance in the two for each other. It also describes the subtle variation in driving a project through these two methodologies. It talks about the ideal scenario of certified people on both these. But it is not the practical norm. This serves as a very good reference for our work. This work is driven by the primary scholar who is a certified PRINCE2 Practitioner and Agile Scrum Master, and thus has the necessary globally recognized knowledge base to start work based on these two methodologies. For this work, the study is not considering PMBOK. It is only PRINCE2 (for fixed requirement) and Agile (for frequently changing requirement), caters to the two most widespread project cases in the IT domain. Also, this work takes it further ahead, by analyzing how it is being implemented for existing projects through interactions with project managers/ project owners and then works on a conceptual model to further optimize the project delivery.

In this analysis of project development methodologies, the study especially includes Agile Scrum to compare productivity (measured in terms of Java line of codes) of the organization under observation (Sutherland et al., 2007). It emphasizes the variance that the project management methodology takes from PMBOK or even what is otherwise known as ideal agile in run time project management language in the Information Technology domain. There is a very good congruence in this basic set-up of this paper and this work. The author of this study has an Agile Scrum Master certification and experience in handling run-time IT projects and it can be fully comprehended as part of the study of this paper, that indicates and then substantiates through organizational data to prove that Agile need to evolve to consider frequently changing requirements to ensure optimum productivity. This is also what this work is aimed at, how to ensure that the productivity is maximized by optimizing the existing project management methodology in IT and allow it to evolve into a model that ensures the new-age challenges in this domain are catered to. But these studies have significant differences in terms of defining productivity. For example, a company generating 1 million lines of codes per month against another which generates 1.5 million or 2 million lines of codes. In today's time of automatic code generation, this comparison can be severely flawed. Also, what was the deliverable that came out of those lines of codes? Was each of those lines of codes leading to any feature development, a user story getting completed, or setting up the architecture and performing the unit test? There are many other considerations. In this work, the focus is

on the tangible outcome, the demonstrable delivery for the client considering both tangibles and intangibles. The study is not measuring variance from a traditional agile or PMBOK or PRINCE2, but the study is aimed at the evolution of these methodologies, to cater to the new age needs of Information Technology management as those of the knowledge industry and the knowledge worker.

In understanding agile project management methods using Scrum (Cervone, 2011) agile methodology is understood using scrum through a digital project library project. The agile methodology is a guideline and is fluid in its applicability if the focus remains on frequently changing requirements and the output for the business and end-user. Scrum allows us to set up the right team, create small and iterative goals through Sprint cycles, and allows improved control. This paper helps build the knowledge base around agile project management methodology, and particularly around Scrum. This paper also delves into this iterative process of continuous review and short design time to ensure that the output delivery is aligned and cut down on any frills or overhead or cost center or non-billables in IT parlance. The findings of this paper are a common reality of iterative (if not ideal agile) project management methodology in IT. Our work is aligned with the need to cut down non-billables, for every project role to directly contribute to the demonstrable delivery and is a natural progression/ evolution/ enrichment in this iterative outcome driven IT project management. This study would strive to understand the agile, scrum, sprint, and its multiple variations implemented across organizations and IT project customized for their individual needs, but it also wants to consider the unique traits of this evolution towards incremental and tangible outcome-based IT project management. The study wishes to understand and analyze this implication across people, processes, and products for a more holistic application of this evolution.

In understanding Agile Project Management (Fernandez & Fernandez, 2008) it also considers the evolution of management in IT to be focused around project management as the key parameter and there-in moving a hierarchical system of management to more collaborative one. It talks about the knowledge workers to refer to the stakeholders of this collaborative project management which is in line with this work. It caters to the need for agilism to cater to frequently changing requirements in IT viz. a viz. the traditional approach. The focus in the traditional approach was on defining what is needed and then delivering that with an acceptable amount of variation. But the nature of IT delivery is such that 'what is needed' can only be defined in terms of system performance, appearance and functioning. 'What is needed' in IT or the requirements doesn't get covered by mentioning it in colloquial language, it needs to be created to be defined, and thus agilism in creating takes precedence and allows for a better definition and implementation. Agile project methodology allows for this to be in a more improved manner as compared with traditional management methodology. It also aims to cater to the distributed geography and constantly adjusting to the frequent change and the emerging challenges and opportunities. It describes the agile project management for knowledge work and the knowledge worker and is a very substantive template to increase the introduction and adoption of agile project management methodology. From there on the IT industry has not just accepted but also improvised to create their customized interpretation of this as it is deemed suitable for their individual need. But the study also observes that more than agile it is the iterative need and the push and pull of services delivery within IT that has created these many flavors of implementation. Through this work, the study intends to take into account why these variations, and how agile, sprint, scrum, and these variations fit into an evolutionary pattern or the need to take into account the outcome of the IT project from the time the requirements are to be defined, designed and executed across a distributed geography with distributed stakeholders and emerging challenges and opportunities particularly for knowledge work and the knowledge worker.

Further in agile project management in run time over traditional management for a project in the Information Technology domain, it must consider factors such as changing requirements, adaptability, and managing controls when compared to the traditional linear development methods (Augustine et al., 2005). It rightly identifies the limitation of such linear sequential methods which is hard to come by in real-world project management. The uncertainties of the real-world project not merely in requirements that evolve for several reasons but also in timelines, budgets, resources, and other factors that contribute to the overall success or failure of any project. It considers the underlying tendency of software requirements to evolve in an iterative mode (feedback-driven). And it also rightly identifies that there have been many variations of agile methodologies, such as Scrum, Crystal, eXtreme Programming, FDD, etc. but projects invariably still fall on the

traditional linear sequential mode. It talks about Complex Adaptive Systems (CAS) for agile methodology. It talks about the Guiding Vision, Organic Teams, Simple rules, and Free and Open Access to information, Light touch management style, and adaptive leadership. Through these steps it employs the Complex Adaptive Systems through an APM case study. It concludes that the right implementation of CAS as an agile project management methodology may lead to improved schedule, budget, customer satisfaction, and business value. All of these are factors that this study is verifying throughout as part of this work and it suggests that the evolution of IT management methodology would enable these. But the study also considers the need for these fluid constructs to be defined better so it can resonate with an IT the knowledge worker who can then apply these without any external presence but organically within for the knowledge work. This working would consider attributes coming out of this evolution to set up these and employ to achieve the output and measure the same in an incremental and tangible output mode through demonstrable delivery. The study considers the analysis of the different management approaches in the context of management and leadership (Yukl, 1989). In the current scenario of management being an evolutionary role (primary for lower and middle-level management and in cases upper-middle and top-level management), it must be made mandatory to understand and analyze the role of leadership in this context. Every achievement of management is the sum of the manager(s) and the surrounding conditions (“forces” & “facts”). No manager can operate in silos. No management exists in isolation. A successful manager in one enterprise becomes a bitter disappointment in another enterprise or settles for moderate success in another. A successful manager in one project may falter in another project execution, while again excel in other ones. The Manager, or any other entity, does not function in silos. Forces, facts, other environmental variables, enable, disable, and catalyze the management function, which brings success or failure for the enterprise. The vision, dedication & integrity of managers are a function of various sets of internal and external variables. After all, a manager is also an employee and is affected by any employment variable, such as training, work-life balance, pay-out, etc. For new venture growth the study analyzes discussions considering individual entrepreneurship for new-age business (Gilbert et al., 2006). This study must also focus on the intra-organization relationships as well as inter organizations, impact on society, multi-cultural aspects while keeping the human caliber at the core of it, always. The big business monopoly has its course, but Information Technology allows for and enables entrepreneurship, and an average knowledge worker must look beyond providing services to the big organization and must aim to become a service provider. The study must also consider that it is discussing here management, not economics, and must make a clear differentiation, and must do away with developed, under-developed, or poor, as these have limitations in understanding, analyzing, and appreciating the wider management practices in different nations. When measuring the personnel performance through the bell curve, there are limitations of the bell curve and how it can evolve for all-round personnel development (Madhere, 1995). It includes a set of intangibles that guided individuals working for a varied set of enterprises (where the enterprise is defined as any work of labor with action and reaction, input and output, of product, service or any other verifiable outcome), which can be termed as ‘management practices’. It also creates a question about the concept of ‘developed countries. Do ‘developed countries’ also imply ‘developed societies’? And is a society developed, where the general population is destined to become an employee of big business, rather than to cultivate their entrepreneurial streak? In a knowledge industry, the development would mean, developed intellectual who could contribute to prioritizing individual rights over any group. The study must also critically examine the use of ‘developed’ in a clear distinction between management and economics.

## **Constructs**

Through a systematic literature review, this study identifies below set of constructs to which would form the base to gather and evaluate the responses which would form the base of any future conceptual model-

People- It is very clear from the literature that in a knowledge work (where The Information Technology is knowledge work in a new-age knowledge enterprise) it is the skill that makes each stakeholder a weighted-equal. The factors affecting the knowledge work are skills which in IT must be ever-evolving but also

motivation, need for innovation, values, culture, and work-life balance. This suggests that people are at the center of any construct formation when it comes to Management in The Information Technology domain. The study also caters to this important aspect through analyzing the natural ability of the knowledge worker to be more responsible in delivery especially during a crisis. It also considers the consideration of tangible and intangible and how a weighted-equal stakeholder ensures a demonstratable deliverable, with the first-time-right approach.

Process- The Information Technology domain is always dictated by a very specific project management methodology, that has continuously evolved from a predominantly hit & trial mode to a linear sequential methodology to a more of iterative feedback-driven mode. This process evolution is naturally built in the process of software project management and in the time of crisis, the evolution accelerates and there is more natural acceptance of such evolution. This is another of a very critical construct under study here and would be analyzed further for adaptability, evolution, and focus on delivery.

Product- One of the main constructs of management in Information Technology is the selection and adoption of products. The analysis suggests it to be true for different software systems, such as a Management Information system to an IT-based or IT enabled gadgets. The products are necessitated as per the project requirement, schedule and timeline and must evolve organically. In a crisis, the choice of product and their acceptability would naturally increase as a tool of effective implementation, as is suggested by the available literature.

Business Value- Business value is the primary factor that a knowledge-based organization builds. The study discussed how a new-age knowledge-based enterprise is not merely an economical function but also a social function. The study also takes into consideration the knowledge-based industry to incubate individual entrepreneurship, which originates primarily from a desire to serve or create a business value-based proposition. It is one of the primary constructs that drives a new-age knowledge-based enterprise. The study is aligned with the need and demands of business value in building the management base & its organic spread.

Customer Satisfaction- In the Information Technology-based new-age knowledge enterprise, the customer requirements are a mix of tangibles and intangibles, along with the stated & implied requirements. Through the detailed literature review the study notes that customer satisfaction in The Information Technology domain is possible primarily with a demonstratable delivery in the first-time right approach, and all other constructs, primarily people, process & product, aligned with the business value is to achieve the customer satisfaction. Also, the study considers the fact that in a time of crisis it becomes a major determinant both from the client and end-user as well as the service provider, as the sum of these three components creates the set of what is known as external and internal customers.

These five factors are contributing to the organic spread of evolution and come out as the main attributes of this management evolution, but to study the acceleration caused by the COVID 19 pandemic, the factors under study are People, Process, and Customer Satisfaction. Product and Business Value have been factors that are isolated from the immediate impact of COVID 19 pandemic, as they are long term evolutionary attributes that are more intrinsic and non-transitory. While People, Process, and Customer Satisfaction have been affected by COVID 19 as it has been affected through mass migration of people, change in the official landscape, and the motivation of work staff, also impacting the project management methodology. In these uncertainties the customer requirements have also been affected with a shorter time, an uncertain future, and rapidly rising demands of digitalization, the need to analyze this takes a priority. This study would take into consideration People, Process, and Customer Satisfaction as the constructs under study.

### **Survey Questionnaire**

The survey questions have been derived from the literature review spanning a period of 20 years from 1990 to 2019, some of which are mentioned above as well as the run time experience in management in the Information Technology domain as well as certifications as PRINCE2 practitioner and Agile Scrum Master.

The questions were provided to the respondents in the form of a survey and responses captured on a 5-point Likert scale to keep the objective of the response for further processing and conceptualization.

#### Section 1: Process

1. Do you believe any of the project management methodology, including Agile can be adapted to suite to the need of the time and customer requirement to deliver the most optimum output?
2. Do you believe that project management methodology is only meant to evolve to cater to the needs of the customer and the challenges to delivery?
3. Do you believe customer satisfaction can be achieved by taking into consideration the technical delivery as well considering how the project is planned, communicated & reported?

#### Section 2: Customer Satisfaction

4. Do you accept that the crunch in timelines and budget with rising demand to delivery leads to organic evolution of innovative project management methodology, as if it was always there?
5. Do you accept that there is inherent inertia in management (including entrepreneurial management) during business as usual that impacts the practical implementation or realization of innovative management methodology?
6. Do you accept that the business value in Information Technology is a sum of schedule, cost and delivery in tangible form over the need to conformity to any methodology?

#### Section 3: People

7. Do you realize that each stakeholder in a project set-up naturally takes up more responsibility to achieve overall project success, particularly in a crisis?
8. Do you realize that the Information Technology as a knowledge work allows each stakeholder, or, the knowledge worker, to work as a weighted-equal to achieve overall project success?
9. Do you realize that effective delivery of value to customer is by combining the tangible and intangible, through the stated and implied customer needs?
10. Do you foresee this evolution of stakeholders, value and customer need to be the new normal for the Information Technology project management?

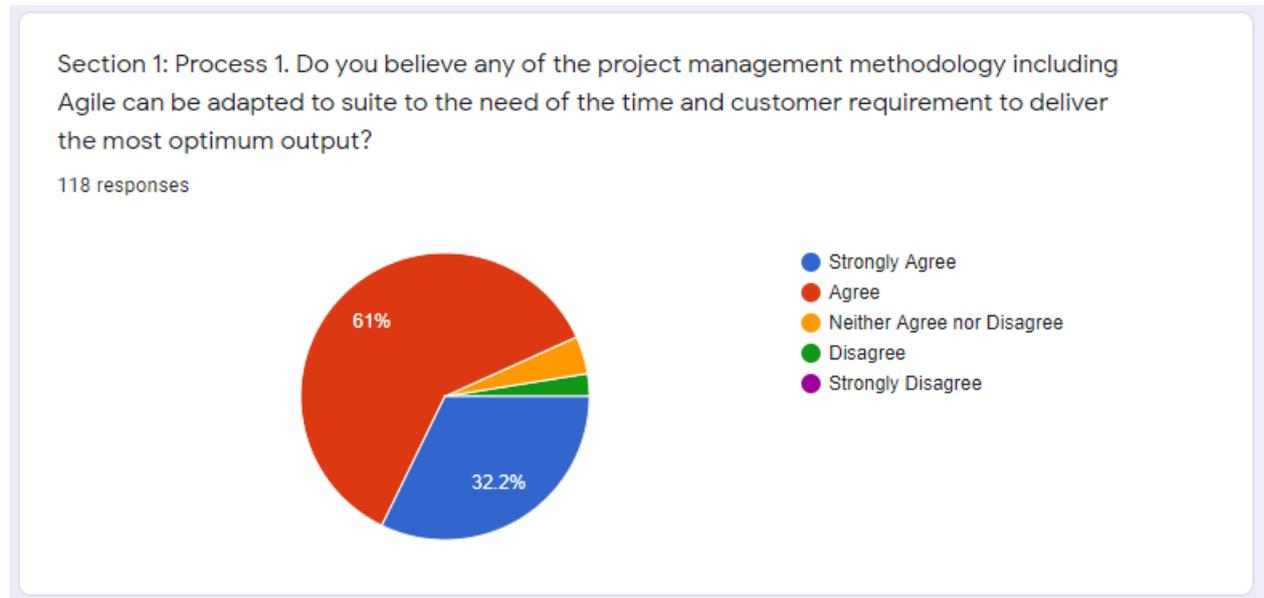
### **Findings**

There was a detailed survey conducted in the month of May 2020, where the above questionnaire was put out to a varied set of respondents involved in the Information Technology project management. It included stakeholders in lower-level management, such as technical architect, technical lead, solution architect, as well as mid-level management, such as project manager, delivery manager, to high-level management such as Chief Delivery Officer, Director, etc. It also encompassed wider geographical limits with respondents from multiple locations in India, such as, Pune, Mumbai, Bangalore, and Delhi as well as from Europe, the US, and South-east Asia. The survey questionnaire was put to 500 respondents of which 118 valid responses were received. Of these, a geographical span of 10 to 15 respondents each from south-east Asia (Malaysia & Singapore), US, Europe (UK, Hungary, Netherlands), and remaining are from India. The domain wise spread is of around 30 to 35 respondents are from the Information Technology enabled Services, while remaining are from core Information Technology Services. The study places due care in terms of quality of response over quantity, as to who are the respondents, how do they contribute to management in IT, and accordingly have gathered the response set. The respondents are from Information Technology, the Information Technology Services and the Information Technology enabled Services as the domain.

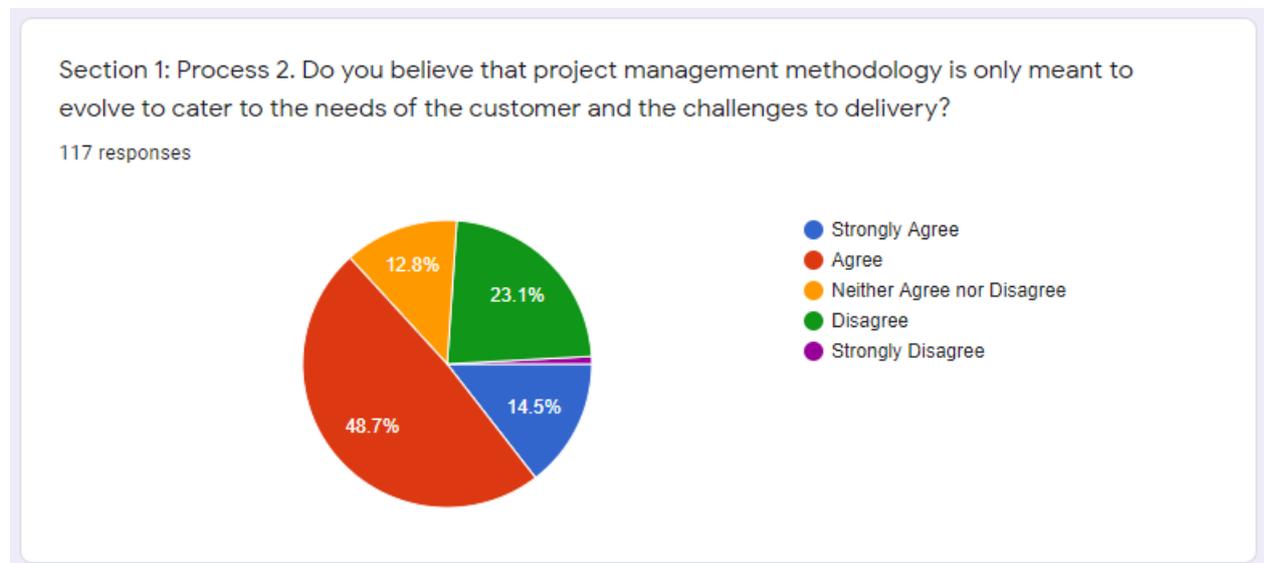
This allowed the study to receive a comprehensive response set for analysis. This survey was conducted in the aftermath of the COVID 19 pandemic initial wave destabilizing normal IT day to day operation, to the new normal because of COVID 19. It allowed the respondents to relate the questions to wider management trends in IT, as well as to reflect and analyze how COVID 19 accelerated this organic spread or natural evolution.

Total number of respondents- 118

The overall response summary-



Agree-	72 responses
Strongly Agree-	38 responses
Neither Agree nor Disagree-	5 responses
Disagree-	3 responses



Agree-	57 responses
Strongly Agree-	17 responses
Neither Agree nor Disagree-	15 responses
Disagree-	27 responses

Strongly Disagree- 1 response  
 No response- 1



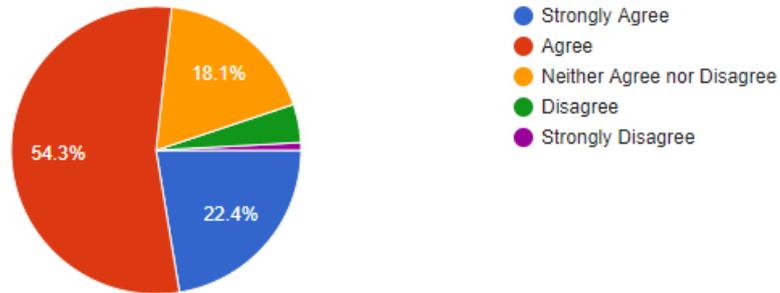
Agree- 43 responses  
 Strongly Agree- 60 responses  
 Neither Agree nor Disagree- 8 responses  
 Disagree- 6 responses  
 No response- 1

In the first section of three questions, the study covers the ‘Process’ aspect, refer to the section ‘Constructs’ above in this document. Here, the focus was to understand the as-is process which was under the organic spread of natural evolution, considering also from the perspective of PRINCE2 and Agile project management methodology for fixed and frequently changing requirements. The response suggests that there is a wider consensus in terms of acceptance to the evolution and the fact that with the COVID 19 crisis, this has accelerated the adoption of such evolution to be the new normal. The response also suggests that it is believed to be aiding the overall management effort to recognize and deliver. There are some disagreements in the process which can be attributed to the inherent inertia, as per the findings of our literature review (Augustine et al, 2005) . The study needs to take into consideration the fact that there needs to be a model that can be applied to realize this acceleration, and only a pandemic spread will not be enough to force the maximum spread of the evolution of management in Information Technology domain.

Section 2: Customer Satisfaction 4. Do you accept that the crunch in timelines and budget with rising demand to delivery leads to organic evolution of innovative project management methodology, as if it was always there?



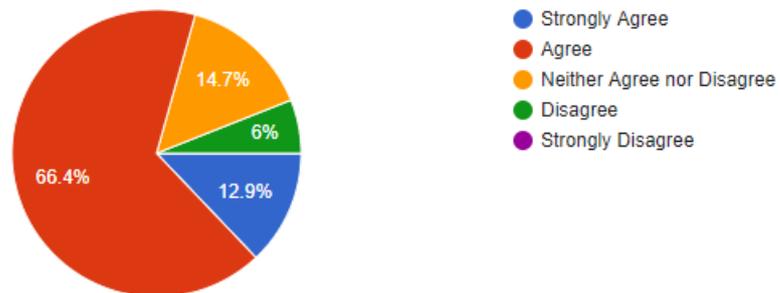
116 responses



Agree-	63 responses
Strongly Agree-	26 responses
Neither Agree nor Disagree-	21 responses
Disagree-	5 responses
Strongly Disagree-	1 response
No response-	2

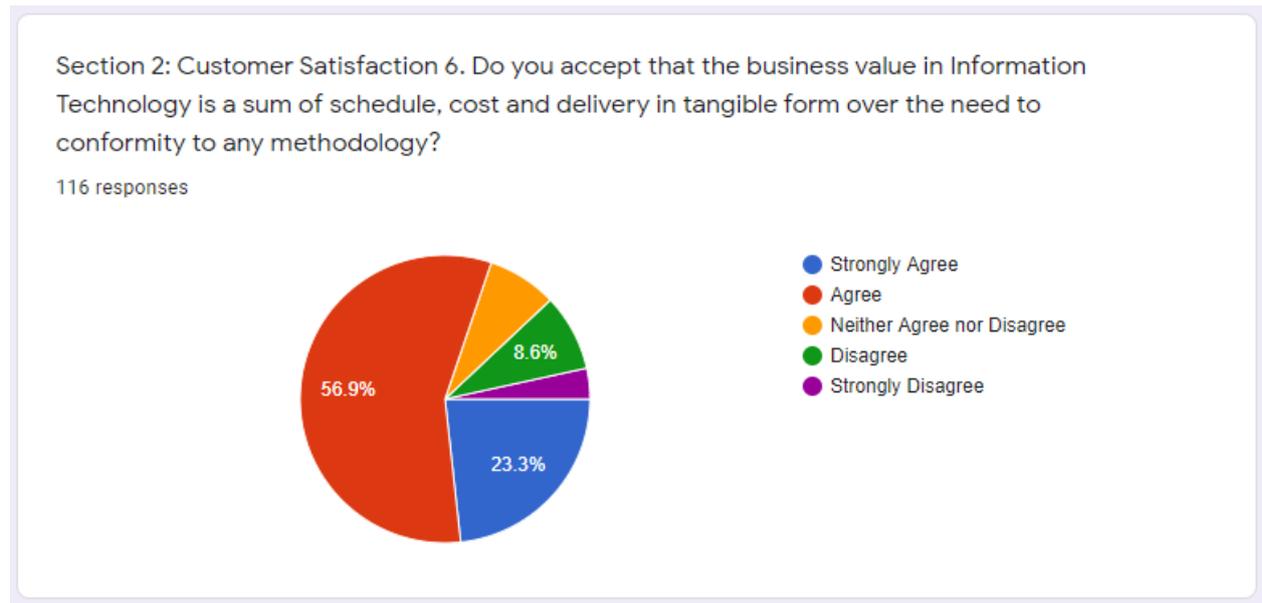
Section 2: Customer Satisfaction 5. Do you accept that there is inherent inertia in management (including entrepreneurial management) during business as usual that impacts the practical implementation or realization of innovative management methodology?

116 responses



Agree-	77 responses
Strongly Agree-	15 responses
Neither Agree nor Disagree-	17 responses
Disagree-	7 responses

No response- 2

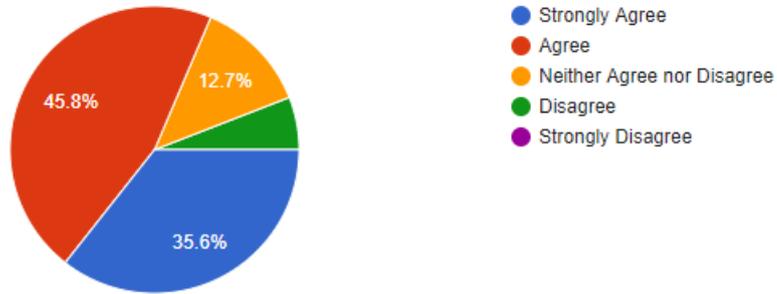


Agree-	66 responses
Strongly Agree-	27 responses
Neither Agree nor Disagree-	9 responses
Disagree-	10 responses
Strongly Disagree-	4 responses
No response-	2

In section 2, Question number 4 to 6, the study covers the construct of 'Customer satisfaction'. Customer satisfaction in Information Technology is a complex phenomenon, as the nature of requirement in IT is both stated and implied and the translation of an idea to an end product is a mix of tangibles and intangibles. This becomes even more complex with rising end customer experience demands and the technology change. Thus, it is a very complex and critical parameter. The response also suggests how it has been interpreted and analyzed by the respondents. Primarily, it focusses on timelines and budgets which are tackled first before moving on to inherent inertia and entrepreneurial management. The response suggests that customer satisfaction needs more elaborate conceptualization to be defined in an incremental and tangible mode.

Section 3: People 7. Do you realize that each stakeholder in a project set-up naturally takes up more responsibility to achieve overall project success, particularly in a crisis?

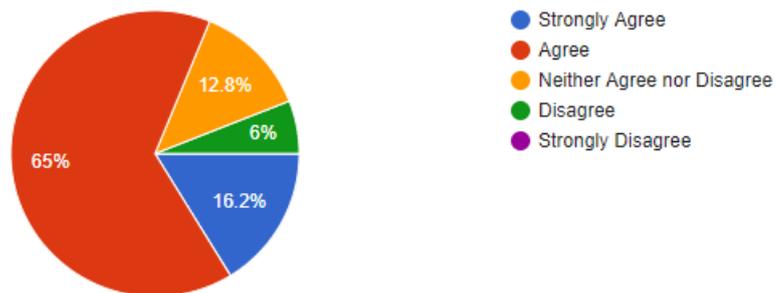
118 responses



Agree-	54 responses
Strongly Agree-	42 responses
Neither Agree nor Disagree-	15 responses
Disagree-	7 responses

Section 3: People 8. Do you realize that Information Technology as a knowledge work allows each stakeholder, or, knowledge worker, to work as a weighted equal to achieve overall project success?

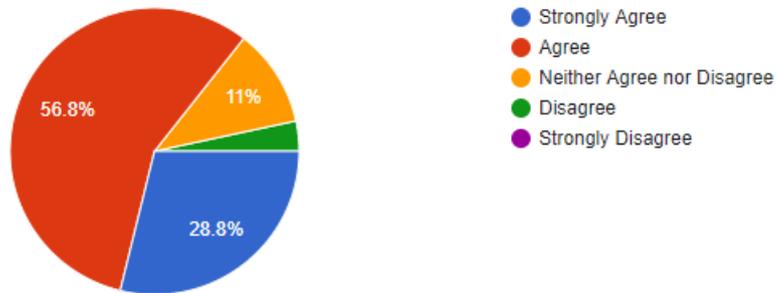
117 responses



Agree-	76 responses
Strongly Agree-	19 responses
Neither Agree nor Disagree-	15 responses
Disagree-	7 responses
No response-	1

Section 3: People 9. Do you realize that effective delivery of value to customer is by combining the tangible and intangible, through the stated and implied customer needs?

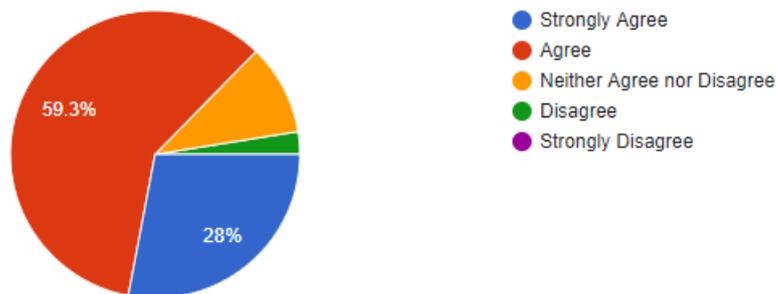
118 responses



- Agree- 67 responses
- Strongly Agree- 34 responses
- Neither Agree nor Disagree- 13 responses
- Disagree- 4 responses

Section 3: People 10. Do you foresee this evolution of stakeholders, value and customer need to be the new normal for information technology project management?

118 responses



- Agree- 70 responses
- Strongly Agree- 33 responses
- Neither Agree nor Disagree- 12 responses
- Disagree- 3 responses

As the final part of this survey, it covers the ‘People’ construct. As the paper explains, people here are the knowledge worker who is a weighted-equal among each stakeholder in a new-age knowledge-based enterprise, primarily for the Information Technology domain. The questions cut across aspects of responsibility for the knowledge worker among each stakeholder to delivering value for business and their end clients. There is a

multi-pronged approach to handle this, one of which this survey has picked up which is about the realization of responsibility and contribution towards creating value. This has been captured as part of this survey. The study indicates that there is a realization of this aspect but how it is being implemented and what shape it would take needs to be delved into.

**Conclusion**

The primary aim of this study was to understand and analyze the natural evolution of management in the Information Technology domain as knowledge work, new-age knowledge enterprise through a set of literature and then utilize the constructs from the literature review to further pose this questions on how the organic spread of this natural evolution is accelerated in the aftermath of COVID 19 pandemic. The questions in the survey handled the most impacted constructs of ‘Process’, ‘Customer satisfaction’, and ‘People’ that were directly affected as a result of the COVID 19 pandemic. The respondent set was from a wider geographical boundary as well as from the overall management hierarchy in IT. As a domain, it considered IT, ITS, and ITeS, which is, Information Technology (core companies), the Information Technology Services, and the Information Technology enabled Services. The quality of respondents (and their response) was prioritized over the quantity to ensure the outcome is aligned with the overall principle of the study and towards fulfilling its objective.

After analyzing the survey response, it indicates that the pandemic has accelerated the evolution, as it was necessary with growing demands for digitalization creating huge opportunities for IT projects but severe restrictions on ‘business as usual’, forcing the need to evolve. But the IT sector was able to evolve with minimal to no disruption, as there was always this evolution knocking on the doors, but the inherent inertia was blocking it and bringing the management back to business as usual in the normal course of action. The study response suggests that there is still some latency on this count and there are constructs that need to be further studied. But as per this study, it is suggested that the evolution of management in IT would keep it in fine safe to handle the jolt of such disruption and create more opportunities to move it towards an incremental and tangible mode.

**Future work**

The study shows that the constructs under study are identified and handled by each stakeholder but there is a necessity to create a conceptual model with all available constructs, to ensure an aligned implementation of incremental and tangible management by outcome mode, keeping these five constructs as the main attribute and laying it across the project management life cycle.

	People	Process	Product	Business Value	Customer Satisfaction
Project set up					
Project initiation					
Project run					
Project control					
Project reporting					
Project closure					

Table 2: Structure of the proposed conceptual model

Further study would frame this conceptual model and put it to test to ascertain the effectiveness and build on the learning of the same.

**List of tables**

Table 1: Traditional Management Principles and Practices v/s New-age enterprise

Figure 1: Attributes distribution for new-age enterprise

Figure 2: Sequential flow of factors contributing to Management by Outcome

Table 2: Structure of the proposed conceptual model

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