

Organizational Support Strategy and Software Process Maturity: CMMI and IT-Offshoring in the UAE

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Abstract

This research highlights the importance of adopting a people-centred strategy in the context of Capability Maturity Model Integrated (CMMI[®]) implementation and proposes a framework for its integration in the UAE. The framework is developed based on an analysis of Perceived Organizational Support (POS) data, examining its impact on the adoption of CMMI[®] and resulting in the creation of a management model known as POS-CMMI[®]. The study demonstrates the translation of CMMI[®]'s value creation into positive outcomes across five organizational aspects: cost, productivity, quality, optimization, and customer experience. The examined flexibility of the nested model manifests itself in a classical organizational solution. By employing a mixed methods approach, combining semi-structured interviews, context analysis, and secondary data from selected cases, the study analyses the influence of POS on the value creation of CMMI[®]. The results indicate that integrating POS-CMMI[®] has the potential to enhance the value created by CMMI[®] itself and suggests that effective CMMI[®] implementation leads to desirable changes in organizational standards, leadership, growth, culture, and employee satisfaction, thereby facilitating the integration of software development processes within organizations. Furthermore, the study identifies the contextual nature of the impact of POS on employees' work outcomes, highlighting how the combination of soft POS and hard CMMI[®] systems can amplify the value additions of CMMI[®]. The findings underscore the criticality of combining POS and CMMI[®] for optimal performance. The proposed integrated model (POS-CMMI) offers IT organizations a novel and unique approach to promote effective CMMI[®] implementation. It is found that the POS construct influences the increase in the level of process maturity, which turns out to be the construct to

increase the effectiveness of organizational performance and potential additional benefits. The practical implications of this study reveal that the POS and CMMI® approach increases the rate at which organizations develop and deliver superior values for their clients in the UAE. It also encourages CMMI® practitioners to explore alternative pathways for enhancing value creation beyond the conventional improvement practices associated with CMMI®.

Keywords

Perceived Organizational Support, Strategy, Capability Maturity Model Integrated, Value Creations, Business Sustainability

1. Introduction

Capability Maturity Model Integrated (CMMI®) is a framework that offers IT organizations a structured approach to assess, measure and improve their organizational process and capabilities. It is used as an effective framework to foster more efficient, cost-effective, and process-driven strategies to offer superior values to clients in IT outsourcing (Bayona-Oré et al., 2019; Majette, 2018; Deloitte United States, 2018). Although the framework initially aimed at streamlining the software development process, presently it is widely utilised beyond the IT-related industries to a greater extent. The utility of the CMMI® enables an organization to recognize its current level of maturity in a specific discipline or area and pilot it towards achieving a higher level of maturity and competitive value creation. CMMI® is a comprehensive process model that includes multiple business disciplines such as project management, software development, IT offshoring, system engineering and contact centre management.

CMMI® is viewed globally as a viable model to produce high-quality IT deliverables; increasingly, the CMMI® has become essential to meet and satisfy clients' rapidly changing needs. Recent studies have indicated that 50% of programming-related work is performed after the implementation stage. Globally, the estimated cost of software maintenance remains 40-80% of the life cycle cost (Ogheneovo, 2014; Dehaghani & Hajrahimi, 2013; Ventionteams, 2024). Many software businesses in the UAE and their offshoring units embrace the CMMI® as a holistic framework for developing high-quality software products (Gorla & Lin, 2010). Organisations strive to achieve delivery maturity by adapting to distinguished maturity practices, as delivery maturity enables the software businesses to build, develop and retain competitive advantages (Goldblat, 2013). However, we constructively argue that sustaining those advantages is only possible when the organisations are prepared to use human involvement through perceived organisational to a sizeable level (Rhoades & Eisenberger, 2002).

Recent literature records widespread difficulties with implementing CMMI®; in meeting budgeted time deadlines, ensuring the quality of existing products and at

the same time developing different software applications (Caniato et al., 2015; Ali et al., 2022; Smite & Gencel, 2009). The effectiveness of implementation is a key issue for CMMI[®]. Integration of the human interface, in terms of the developer's perception of the extent of organisational support, with CMMI[®] is essential to developers' motivation to positive outcomes expressed in their satisfaction as employees and the effective use of CMMI[®] (Gonçalves et al., 2020; Ramírez-Mora et al., 2020; Tsai, 2020). We emphasise the need for integrating POS with CMMI[®]. POS is an active organisational practice, which prioritises human involvement and contributes to firms' CMMI[®] strategy.

Many ITO businesses continue to struggle to remain sustainable globally (Elmuti et al., 2010; Elia et al., 2014; Carmel & Tjia, 2005). This phenomenon stimulates organisational leaders and decision-makers to identify the factors which impact employee-oriented work outcomes. There is a growing significance in understanding employees' work behaviours within ITO organisations. This has shaped much interest in examining workers' perceptions of their organisational support and its impact.

In addition to reviewing the recent literature on CMMI[®] and POS, we draw upon two case studies and empirical data analysis with specific results for UAE.

a) Analysis of POS-based data, mainly quantitative from UAE in 2018, served to reinforce the quantitative POS analysis. The sample included software managers in the UAE, experienced in POS. POS analysis used factor analysis and structural equation modelling as quantitative techniques using AMOS and SPSS (Mohamed Hashim & Robin, 2021).

b) Qualitative evidence from 29 in-depth interviews with software managers in the UAE who have experience implementing and delivering software services using the CMMI[®] framework. The sample included project managers, systems architects, quality assurance managers, and business analysis and software engineers (SaaR, 2019).

Recent studies (Bartol, 2007; Mohamed Hashim & Robin, 2021) argue that human involvement as an internal process—particularly POS—is believed to be impacting the overall deliverables-product or services-delivered to the clients, as employees' work outcomes. Thus, the authors argue that IT companies in the UAE should think of CMMI[®] as part of a broader management system that emphasises soft aspects such as management and support provided to their employees.

This paper aims to develop and test an empirical model by applying the concept of CMMI and POS, which examines the effective value creation of IT companies in the UAE. The following research questions are incorporated to examine the value creation of CMMI[®] and the interaction of POS and CMMI[®].

RQ1: How do organisational support practices impact the value creation of CMMI[®].

RQ2: How the vital integration of POS and CMMI[®] could amplify the value creation process.

The theoretical construct of POS and values of the CMMI[®] framework are

integrated as an instrument to test and determine the increased/amplified value generations. The enhanced/amplified value creation is achieved by stimulating the employees' perception of organisational support. This phenomenon is used in a case study to develop an organisational support profile for UAE-based IT companies. This paper provides practical suggestions about how they might implement this—suggestions based on in-depth research on CMMI® and an offshoot of extensive POS. This paper places emphasis on qualitative managerial relations with and support of their employees and outsourcers.

In addition, it evaluates the applicability of the CMMI® framework across various software services using metadata and its need to integrate human involvement as essential internal process-perceived organisational support. It highlights how the integration of POS-based practices amplifies or stimulates the overall work outcomes of knowledge workers (software or IT deliveries). In other words, how CMMI® as a maturity practice can be effectively applied to software businesses in changing contexts using POS to cope with the IT industry's strategic drifts experience in UAE. It attempts to draw a recommendation for organisational leaders, process leaders and IT subject matter experts for building organisational operation models based on the integration of POS and CMMI®. The inheritance of the POS-CMMI® model, its applicability, and results/interpretations are derived from first-hand quantitative data (first-hand data, POS-confirmatory factor analysis) and its integration with CMMI value creations (existing literature). The authors also adopted a mixed-method approach to the model's applicability based on 29 qualitative interviews to confirm the accumulated impact.

2. Literature Review

The literature review highlights the following characteristics: a) the strategic importance of process maturity, b) its emergence in the information technology offshoring industry, c) the role of the UAE as the IT hub linking the two distinct geographies, d) the cost-quality implications of CMMI®, and e) the value creation of the process model. It also demonstrates the existing, sizeable and impactful gap in the literature.

A review of the literature reveals a shortage of such POS-CMMI® analysis. It could be potentially one of the early studies showing how integrating these two constructs amplify the value creation and delivery through process maturity. Identifying the factors which influence the level of process maturity at an increasing rate could be viewed as one of the theoretical contributions of this research. In a way, it also develops a road map for implementing and improving process improvement knowledge sharing initiatives. CMMI® offers a common but universal process script and set of best practices to assess and contentiously improve organizational capabilities. It is important to capture the key components of CMMI® and its applications to the delivery improvements across business domains. The below-incorporated **Table 1** exhibits the vital components, applications, and potential outcomes of CMMI®.

Table 1. Demonstrates the vital components, application, and outcomes of the CMMI model. Source: [Chrissis et al. \(2007\)](#) and [Hani et al. \(2022\)](#).

Components	Application	Potential Outcomes
Maturity Levels (Levels 1 to 5)	Organizations apply a series of maturity levels that represent different stages of process improvements using logically defined indicators.	Shows the roadmap to organizations, how to achieve the next level of process maturity using repeatable and predictive possessors
Process Areas	Recognize and specify the critical organisational processes that are vital for achieving maturity. A cluster of repeatable and related practices is effectively implemented.	Demonstrates capability to deliver products and services through stable processes.
Best Practices	Develop a repository of best practices using industry-standard, expert knowledge, and experiences.	Continuous Improvement and optimization, this process leads to diminishing cost while achieving the highest quality.
Assessment and Improvement	Examine the current process capabilities against the defined maturity levels. In a way organisations asses, their stream, and weaknesses of the deployed process model. It also captures the current results and aimed improvements.	Recognize the current state of the capability and stability versus what can be practically achieved within the next level of maturity.
Organizational learning	CMMI® fosters a culture of continuous learning via actively promoting training.	Using empirical models becomes evident in decision-making.

CMMI® attempts to enhance process maturity within organizations. Process maturity enables organizations to consistently execute in a predictable, capable, and controlled manner. Research studies have examined the empirical association between the CMMI® maturity level and organizational performance in terms of cost, productivity, quality, optimization, and customer experience, finding a positive correlation. Specifically, a research study by [Majette \(2018\)](#) examined the impact of CMMI® maturity levels on software development projects and found that the organizations with higher CMMI® process maturity levels exhibited improved performance in terms of productivity, cost control, and schedule adherence. Thus, the impact enhances process capabilities. Likewise, another study by [Chaghooshi et al. \(2016\)](#) investigated the impact of CMMI® implementation on organizational performance in Asia and the Middle East indicating a positive association between the CMMI maturity levels and key performance such as project success, customer satisfaction, and employee productivity. The finding also sheds light on that CMMI® implementation caused competitiveness and improved organizational performances.

Several research studies have explored the relationship between CMMI® and quality management, highlighting its impact on organizational performance. An empirical study by [Kukreja and Yadav \(2018\)](#) investigated the effect of CMMI® on quality and organizational performance in the IT services industry, revealed a positive association between CMMI® implementation and quality management practices, leading to improved customer satisfaction, diminished defects, and enhanced organizational performance. Relatedly, a study by [Rai and Malla \(2015\)](#) explored the impact of CMMI® implementation on quality and organizational

performance in the manufacturing sector and found that CMMI® maturity levels had superior quality management practices, resulting in improved product quality, customer satisfaction, and organizational performance. As stated, to perform the practices defined in these models, software engineering approaches are applied. The practices are tightly integrated, overlapped, and sequential. Thus, organisations can develop capabilities and maturities over a period. It is a progressive organizational effectiveness that requires significant investment. The graphical representation included below (Figure 1) illustrates the maturity levels that CMMI® fosters in organizational function and process and how it initializes organizational effectiveness via repeatable processes.

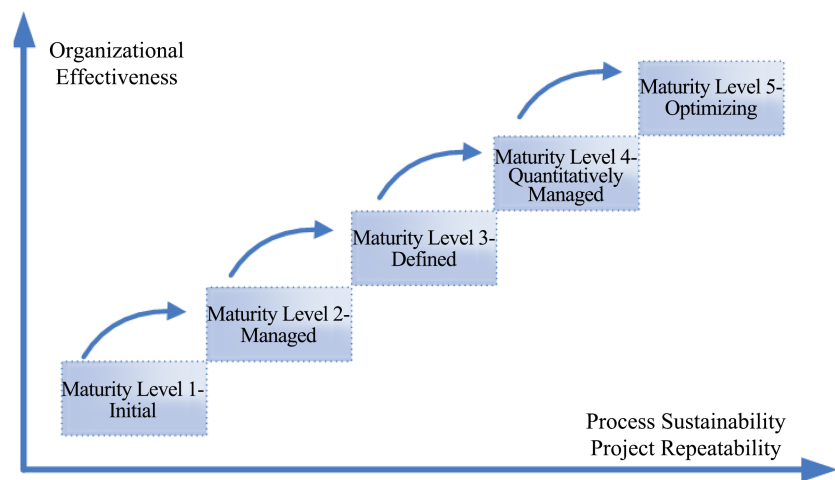


Figure 1. Exhibits how CMMI maturity levels build organizational effectiveness. Source: Evans (2009) and Henriquez et al. (2021).

2.1. Gap in the Literature

This section captures logically the existing gap in the literature and relates it to the context of ITO.

First CMMI® offers a limited focus on integrating human elements to amplify the value creations. i.e., limited capabilities in agile-based developments and operations. The modern days' maturity models are people-centric to create that agility to readily responds to market changes. Second, there are very few cross-domains of empirical research examining the effective implementation of CMMI® and its impact on organizational performances, particularly in the context of ITO in the UAE. Thus, the application of CMMI® requires empirical validations in terms of validating the causal relationships. Third, the value creation of the CMMI® is contextual. How, various maturity levels lead to tangible and intangible benefits such as reduced cost, increased quality and improved customer satisfaction requires research validity. Fourth, CMMI® is a hard system often used in conjunction with other soft systems such as ISO or industry-specific models to project conclusive outcomes. In this to project the conclusive value creations, we proposed the POS model integration with CMMI®. However, there is a lack of

research exploring the alignment, robustness, and compatibility of the POS-CMMI® model, specifically how those complement each other. Fifth, CMMI® is closely associated with industry-specific challenges which are unique to a particular context—UAE. Previous studies of CMMI® focused on software development discipline mostly, but there is a gap in terms of validating its applicability in IT-related service deliveries. Finally, how the continuous improvement, optimization, and evolution of CMMI® in emerging economic situations will lead to improved and implementable models requires rigorous research.

2.2. Information Technology Offshoring (ITO)

This segment covers the strategic importance of ITO, how it is an integral association with the process maturity model and how CMMI® assures sizeable benefits to IT organizations.

ITO is viewed as a breakthrough in the history of global economics (Caniato et al., 2015; Drucker, 2006; Kearney, 2014). The ITO gained economic prominence primarily due to the pursuit of a low-cost structure and the ability to access a global resource pool (many global multinationals began to leverage offshore IT cost advantage locations with accessible labour pools) either through their subsidiary or from third-party suppliers (Mohamed Hashim et al., 2022a, Figure 2). Many ITO businesses are shifting their core and non-core tasks to low-cost nations rather than foreign countries. This is one reason why lower-cost nations are developing nations with emerging economies. In terms of the business process, ITO is described as an act of outsourcing (subcontracting) IT business processes to a company's subsidiary or third parties responsible for running a business process that would be conducted otherwise internally (Marin, 2006). It should be noted that the receivers (ITO organisations) of the outsourced work are also independent legal entities operating on their profit and loss accounts (Davison, 2007; Tlemsani et al., 2024).

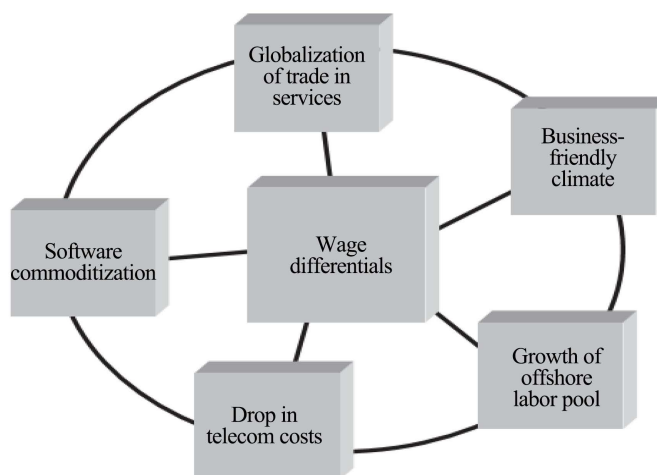


Figure 2. The Economic, Business and Technology Forces of Offshoring. Source: Mohamed Hashim & Robin (2021).

As described by the offshoring scholars, the companies who send (onshore) the work are typically located in the West because of the spending ability, whereas the companies receiving the work (offshore) are located primarily in Asia and the Middle East due to lean production cost structure and skilled labour pool. Hence, offshoring became a viable business model primarily due to companies in the West (onshore) beginning to experience substantial cost savings in their IT works. Previous research that was conducted in offshoring indicates that a large multinational (onshore) spent about 10 - 20 million USD per year and gained cost savings of about 15% to 40%.

2.3. The ITO Hub—United Arab Emirates

This sub-section emphasizes the pivotal role of UAE as the ITO hub integrating two distinct geographics, specifically knowledge workers and their clients in the West. In today's competitive landscape to best manage business challenges organizations need well-defined and mature processes that can modernize operations, optimize resource utilization, and assure predictable outcomes. A highly mature process framework provides several advantages to UAE's outsourcing industry. UAE's outsourcing services market is to reach \$6.8bn in 2023 according to BCG report (*Arab News, 2023*). UAE is viewed as the global hub of ITO in the Middle East due to its proximity to Asia and Europe, operating as a bridge linking the core offshore workforce in Asia and their clients in the West (*Dubai Outsource City, 2023*). Further, the UAE is seen, as the ITO project management hub because the cost of setting up offices in the UAE is less costly than setting up offices in the West. The ITO industry attractiveness in the Middle East and Africa is expected to reach twenty-three billion dollars by 2020 (*du Toit, 2014; Dubai Chamber, 2019*).

The Middle East has become increasingly attractive primarily because of its geographical proximity to Europe and the diversified young talent pool (*Carmel & Tjia, 2005; Stephens, 2009*). The vast talent pool is described as a "demographic cash cow" because the ITO workforce comes from different parts of the world for high work incentives. Further, the Middle East and Africa segments are expected to reach \$7 billion by 2018 (*Statista, 2020*). According to a report by Dubai Outsource Zone in 2016, the UAE has become the second-largest ITO industry in the Middle East and the Africa region. Dubai comprises 90% of outsourcing activity in the UAE. There are significant growth opportunities for ITO within the UAE. As of today, UAE is viewed as the offshoring economic hub (*Arab News, 2023*). It acts as a bridge by linking the core offshore workforce in Asia and their clients in the West (*Carmel & Tjia, 2005; Gyekye & Salminen, 2009*).

The UAE-based operations deliver a competitive cost advantage in the overall cost structure instead of setting up either the ITO companies' head offices or PMOs in the West. The gained cost advantage reflects upon the final price of any business solutions offered to the client. Else, the ITO giants have no options but to set up the PMO layers with higher cost structures in the EU and USA. This is also one of the strategic reasons that there is an increased attractiveness for ITO,

in UAE (Carmel & Tjia, 2005).

The United Arab Emirates does not impose heavy taxation either on individuals or corporates, unlike the West. However, their ICT infrastructure readiness to run ITO business 25 remains very advanced in the Middle East (ME) (Goby, 2014). UAE’s immigration law permits to source a wide range of workers from lower GDP countries, at reliably better perks than their home countries, which is another competitive advantage to ITO organizations (Ali et al., 2021). UAE can view the ITO as a dependable industry next to their primary oil and manufacturing industries to attract GDP revenue. UAE targets to diminish the current economic oil dependency at least by 35% enabling the future generation to utilize more, by developing SMEs (UAE Government, 2016). By establishing clear process maturity objectives, organizations in outsourcing can measure their performance against predefined benchmarks, identify areas for improvement, and implement corrective actions, thereby enhancing customer satisfaction and loyalty.

2.4. CMMI® Cost-Quality Implication

This portion specifically emphasises the integral relationship between the cost-quality implication and how the intervention of POS could improve and optimize the cost-quality benefits to the IT organizations.

We propose that the integration of CMMI® with POS has the potential to shift the cost-quality trade-off substantially (Figure 3). However, evidence shows that sustaining and improving the trade-off over time is not easy; market conditions and customer demands change, technological change is rapid, and implementation and motivational issues arise on the supply side.

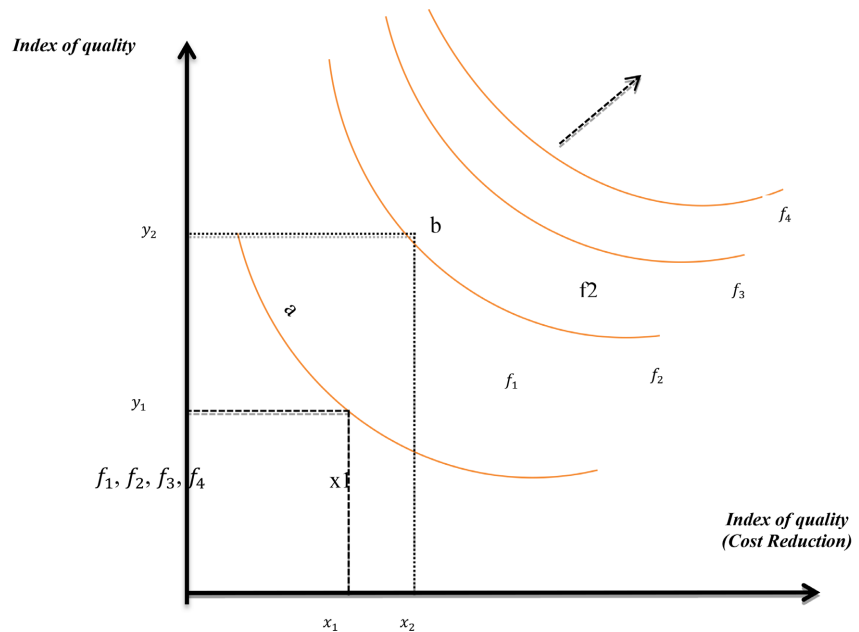


Figure 3. Demonstrates the empirical relationship between the costs of quality. Source: authors developed.

Frontiers are showing the trade-off between productivity and quality. Productivity is defined as the inverse of cost (i.e., $\text{Cost} = \text{Wage Rate}/\text{productivity}$) since productivity increases cost fall. Consider a software firm currently at on frontier 1 (f_1) to compete efficiently; it requires increasing quality and reducing cost (move to a point Likert). In the future, it needs to keep improving both its service quality and reducing its cost; it moves to f_2, f_4 and upwards. When global market conditions change, it increasingly puts pressure on the metrics-driven culture, workflow applicability, and the software business outcomes piloted by CMMI[®]. This paradox also favours the need for the integration of organisational human involvement practices-perceived organisational support. This phenomenon is debatably realistic, at least in UAE. Software businesses have recorded significant difficulties in successfully utilising CMMI[®] as an enabler to generate delivery excellence worldwide. Many scholars argue that one of the key reasons for many Information Technology projects failures is not directly related to human resources or financial implications, but the inadequate quality of software products and processes (Mohamed Hashim & Robin, 2021). Our fundamental model discusses the key elements investigated in this research. The model (Figure 4) explains the cost-benefit analysis of CMMI[®] from a client business perspective, the criticality of the data/system integration and potentially how businesses would evaluate the value delivery of CMMI[®] via concrete measures.

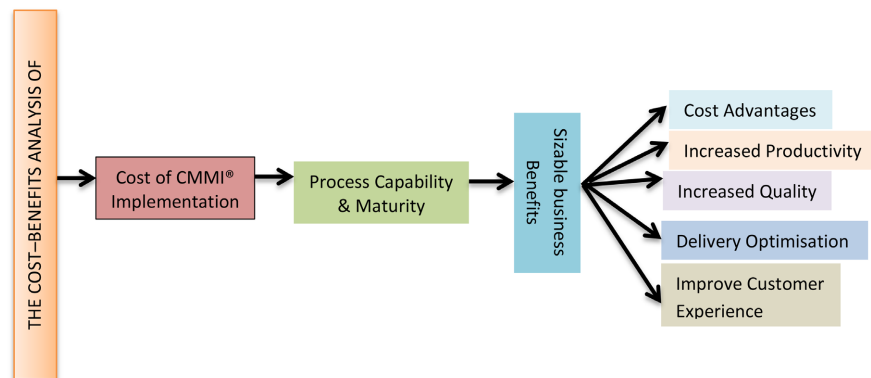


Figure 4. CMMI[®] to software business operation. Source: authors developed.

2.5. The Contribution of POS in the Model

This section spotlights in terms of how the utility of POS could be used to enhance sizeable business benefits generated by the process Model—CMMI[®].

POS is described as the general perceptions of employees to the degree to which the work organisation appraises their work contribution and look-after their well-being. The theory suggests that this concept acts as a mediator between the way employees perceive their organisation and the extent to which their work actions are aligned with its objectives (Kurtessis et al., 2015; Eisenberger et al., 2002). Further, the theory predicts that employees reciprocate by acting in their interests to the extent they perceive their organisation's support (Bartol, 2007). POS construct

has been used as one of the dependable models by previous researchers to understand the workers' perceptions about their organisation and their various tangible and intangible work outcomes (Eisenberger et al, 2001; Farh, et al., 2007). In IT-Offshoring (cost-competitive) employees spend long hours in their work organisations (Elmuti et al., 2010). The word "offshore" has taken a new meaning. It is understood by many of its business users to mean the shifting of tasks to low-cost nations rather than to any destination outside the country. Low-cost nations are those that fall into the economic grouping of "developing nations" or "emerging nations" (Carmel & Tjia, 2005).

2.6. CMMI® Value Creations

This segment provides the bigger picture in terms of how CMMI® embeds and creates values via the operational processes of IT organisations, specifically in the ITO.

2.6.1. Cost Advantages

Outsourcers generate cost advantages to overcome the competition by leveraging the cost pyramid (Singh, 2020). This approach is very convenient because every outsourcer would operate offshore operations in cost-sensitive countries (Asia or South Asian countries). The more, the lower profile resources attached to the cost pyramid build cost advantage, the better the cost advantage or the contribution margin. In this context, many offshoring (outsourcers) use CMMI® as a dependable process model to regulate the cost advantages.

2.6.2. Optimising Delivery

The process approach aims at enhancing delivery optimization practices and product quality or service delivery. The delivery optimization is fostered via the predictable and controllable processors in the application developments. Delivery optimization fosters best practices, enhances reuse, and diminishes potential defects in application development. Thus, the deliverables in a project become predictable and visible to clientele. A good provider of outsourcing services provides high-quality deliverables using efficient optimization capabilities (Kock et al., 2020).

2.6.3. Improving Quality

Quality is another key emphasis of CMMI® adaption. Specifically, due to the highly competitive business nature, companies are increasingly pushed to deliver in quick double time without giving much regard to quality. At this juncture, the researcher argues that the urgency demonstrated to complete a project could undesirably impact the quality of the delivered software application (Chevers & Grant, 2017). Further, re-use is a key practice for improving quality. To what extent are they re-use to assure the quality tested coding is part of the process? What is the re-usage of quality tested codes across businesses within the context of UAE is questionable? Thus, it the important to establish quality road maps

for businesses.

2.6.4. Improving Customer Experience

The superior value creation practices of CMMI[®] provide an improved customer experience by engaging customers in the application development at regular intervals. Specifically, the IT offshoring companies in the inception stage offer clients an overall delivery plan of the proposed application. The delivery is tracked consistently via the weekly and monthly programme updates. Client delight is measured by the offering companies in the UAE using performance indicators such as productivity, on-time delivery, budget burnout and flexibility. Most importantly the CMMI[®] offers robust tools, techniques, and an approach to impart all these vital business expectations from the early phase of application development. This leads to improve customer experience.

3. Research Methodology

This study utilizes a mixed-method approach to investigate the creation and application of the POS-CMMI[®] model. The study integrates the antecedents of POS (**Figure 5**) with the value creation of the CMMI[®] model and validates the integration using 260 data responses from companies in the IT-offshoring industry in the UAE. Structural equation modelling (SEM) and confirmatory factor analysis were used to validate the data. The quantitative data analysis is combined with qualitative data and thematic analysis to develop the POS-CMMI[®] model (**Mohamed Hashim & Robin, 2021**).

The mixed method approach allowed the researchers to create a useful conceptual model (POS-CMMI[®] model) by connecting quantitative data synthesis with thematic analysis, triangulation, and development. This approach also opens opportunities to further develop and expand the model (**Nesher Shoshan & Wehrt, 2022**). By combining qualitative and quantitative data, the mixed method used in this research helped to address potential limitations of using only one method and provided stronger, more broadly applicable evidence for the research findings through the integration of more detailed results.

We used the purposive sampling technique. The large chunk of data responses is deducted to three POS antecedents using the confirmatory factor analysis (CFA)—data reduction technique (**Mohamed Hashim & Robin, 2021**). The antecedent of POS and POS itself and how those variables interact with the value creation in the UAE IT industry was tested using a structural equation model, as below incorporated. POS is a latent endogenous construct that acts as a proxy to predict values created. The data analysis technique deployed to carry out this analysis was the confirmatory factor analysis. At the integration point, the 260 responses (quantitative data) are robustly linked with the 29 semi-structured interview data (qualitative data) derived from the managerial workers using organizational performance metrics. For this purpose, qualitative data collected in the UAE is used. The enhanced/amplified value creation is achieved by stimulating

the employees' perception of organisational support. This phenomenon is used in a case study to develop an organisational support profile for UAE-based IT companies.

The qualitative data includes data on organizational performance metrics, such as quality improvements, cost savings, and customer satisfaction ratings. Further, thematic analysis is used as a qualitative data analysis technique (findings section) to critically examine the key themes and the subthemes to conclusively recognize the value creation of CMMI®. We deployed coding systematically to club the main themes and the closely associated sub-themes to robustly integrate the soft and the hard systems. This approach also enabled us to capture the patterns, trends, emerging themes, and correlations.

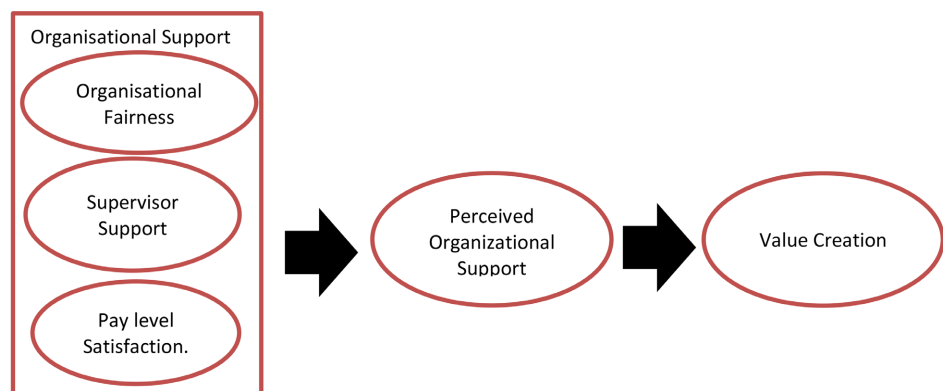


Figure 5. The structural equation model—the antecedent of POS and POS itself. Source: Mohamed Hashim & Robin (2021).

Hypotheses on POS

To provide a holistic view of how POS is derived, the researcher captured the hypotheses in the below-incorporated table; those were derived as part of the synthesis of the literature review and were tested using SEM.

H_1 : a) Organisational fairness, b) supervisor support and c) pay level satisfaction are positively associated with the workers' POS levels.

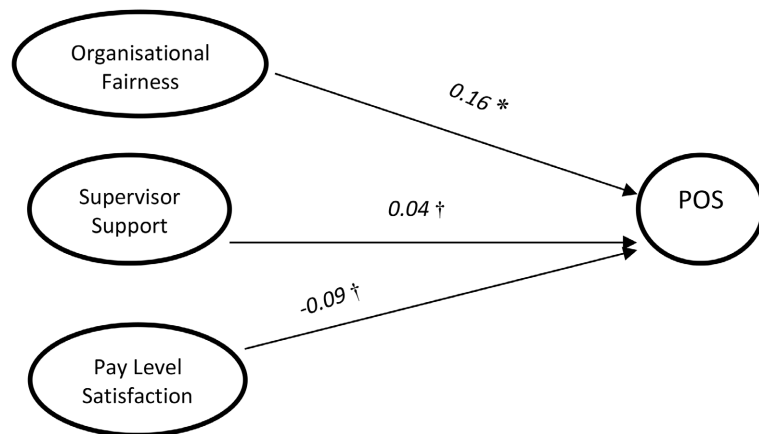
H_2 : Organizational fairness is positively related to the level of employees' POS.

H_3 : Supervisor support is positively associated with employees' POS level.

H_4 : Pay level satisfaction is positively related to the extent to which workers develop organisational support.

The results indicate that Organizational fairness was seen in the sample as the highest contributing factor to POS. This is interpreted as an indication that IT employees value impartiality in organizational policies and procedures. Impartiality in POS includes fair distribution of organizational resources and transparency. Supervisors support was found as the second most contributing factor in POS. Supervisor support is seen as an indication that organizations take ITO employees seriously. Supervisors can make important contributions to helping ITO employees deal with challenging situations, stress and tight deadlines. Pay level

satisfaction was the least contributing factor to POS. The difference of significance was marginal compared to the contribution of supervisor's support (Figure 6).



† p indicates < 0.10 , * p indicates < 0.05 , ** p indicates < 0.01 , *** p indicates < 0.001 .

Figure 6. The Structural Hypothesized POS Model Results. Source: Mohamed Hashim & Robin (2021).

First, the three hypothesised antecedents of POS (H_2 through H_4) were positively associated with the formation of POS. H_1 projected that organisational fairness would be positively associated with the knowledge workers' POS level. Statistically, this particular hypothesis received significant support. H_1 proposed that employees' perception of organisational fairness would be positively associated with workers' POS. This particular hypothesis gained relatively significant support. While the predicted relationship between employee's perception of organisational fairness and POS was in the correct hypothesised direction, the OF \rightarrow POS path was marginally significant ($\beta = 0.16$, $p = 0.25$); the researcher considered only the standardised estimates values generated by the AMOS while estimating the path coefficient.

H_3 , which estimated a positive relationship between the employees' perception of the supervisor's support and POS, was statistically marginally sustained ($\beta = 0.04$, $p = 0.75$). This empirical result provides a dependable base that the supervisor support helps the employees develop a perception that their work organisation would be appreciated by their workers and leads to the adequate formation of POS.

Inconsistent with the H_4 , the satisfaction that the knowledge workers experience with their pay level found was to have a marginally negative association with POS ($\beta = 0.09$, $p = 0.53$), which is an indication that employees who believe that their work organisation offers less significance important pay level satisfaction relative to fairness practices and supervisor support of the organization likely to contribute to the development of POS. Once the SEM testing was achieved the integration of the POS model and CMMI[®] was performed. It is required to

demonstrate the sizable business benefits of software companies-amplifying the values developed/created and validate the robust integration of the POS-CMMI® model.

4. Data Analysis

The subsections critically examine distinct organisational support practices as antecedents of POS based on the research findings. The table incorporated on the next page summarises the hypotheses tested using SEM and its results (**Table 2**). This data analysis was derived from the first authors' doctoral research which investigated the impact of POS on IT employees' value generation (work outcomes). Concerning the hypotheses from $H_2 - H_4$, the null hypotheses are H_{02} to H_{04} , indicating no relationship. The table illustrates that the hypothesis is found with a significant relationship; thus, the null hypotheses are rejected.

Table 2. Captures the hypothesised relationship of antecedents of POS and Its outcomes both at global and local levels. Source: [Mohamed Hashim & Robin \(2021\)](#).

Antecedents of POS	UAE level		
	(β = value)	Individual (p = value)	Significance
OF	0.16	0.25	Marginal
SS	0.04	0.75	Not significance
PLS	-0.09	0.53	Not significance

The chi-square value (χ^2) = 550.87, DF = 480.00, RMSEA = 0.02, CFI = 0.95, GFI = 9.00, and TLI = 0.94.

The analysis indicates that organizational support practices (POS) are valued by the employees as the organizational assurance they provide enables employees to carry out their work effectively and efficiently and to deal with stressful situations (generating value). In the information technology industry employees value organizational fairness, supervisors support and pay level satisfaction as key elements of POS. Notably, the explanation for the pay level satisfaction which demonstrates a negative relationship was due to the knowledge workers' needs of drawing a sufficient level of compensation might have been met, specifically in the context of the UAE.

4.1. Antecedents of POS Global Perspectives—ITO

Perception of organisational fairness was established to have a significant positive influence on POS ([Rhoades & Eisenberger, 2002](#); [Liu, 2018](#)). Thus, this research study's finding proposes that those ITO organisations that afford knowledge workers with supervisors' support to extend and build their work-career prospect, which helps workers grow, are expected to be seen as desirable, caring, and caring to impact their well-being. Thus, H_2 is valid and applicable to the global ITO context. Supervisor support was found to have the 2nd strongest association towards POS development among the knowledge workers (SS \rightarrow POS). Even though there

was a positive connection between the extent to which the knowledge workers were satisfied with their level of supervisor support and the organisational support, it was found that POS development was marginally significant.

Consistent with the prediction of H_3 supervisors, support had a significant impact on the formation of POS (Liu, 2004). Thus, the technical relationship projected by the H_3 is dependable in the global ITO. Supervisor support is one of the key mechanisms by which organisations can develop employee belief that their work organisation recognises their contribution and concern about their wellbeing. The observed association between the SS and POS was found the 2nd strongest contributor in isolation. The findings of both these variables indicate that the degree of support provided by the supervisor is critical for the knowledge workers to carry out their work actively. It also possibly points to the importance that in the ITO, the knowledge workers value the supervisor support as an important means of organisational support irrespective of whether the supervisor support comes as the result of the organisations' genuine intention or not.

Pay level satisfaction was found to have a positive and marginally significant relationship with the POS. This empirical influence was as good as the supervisor's support on organisational support (SS \rightarrow POS). Though pay level satisfaction was an empirical antecedent of POS, it was not playing the primary role in impacting the knowledge workers' behavioural work outcomes as well as the fairness practice. One useful explanation that could be given for this modest impact is the need for a hierarchical perspective. That is, irrespective of the managerial role of the workers, the workers are likely to consider the pay level as their fundamental need, which they want to fulfil regularly. Also, the very same phenomenon was reflected in previous research conducted among IT workers objectively understanding the impact of HR practices on POS. As expected, it was found; H_4 the forecasted that the positive interaction between satisfaction generated via pay level and POS was found to be valid at the global level ITO.

Organisational fairness was the highest, most positive, and significant contributor to the formation of organisational support. One dependable articulation can be given for this phenomenon. Unlike other countries, UAE objectively adopts two distinguished systems (one for domestic UAE workers and one for expatriates). To what extent are fairness practices questionable from a legal, organisational perspective? On this notion, meeting the organisational fairness need significantly may contribute to the formation of organisational support, as 70% of the ITO workers in UAE are expatriates (Stephens, 2009).

In this research, it was evident (ontological stance) that SS is a viable, implementable, and necessary practice to form POS globally among knowledge workers. Thus, any HR practice that promotes the efficacy of SS needs to be facilitated in the ITO. However, SS \rightarrow POS was found to have the second strongest positive impact but very marginal. One of the reasons can be that, specifically in the UAE, the managerial workers are generally the locals (generally due to their local status and not based on their skills, but they draw better perks than the foreigners) who are arguably less skilled when it comes to specific technical skillsets, unlike the

expatriates.

Pay level satisfaction was the 3rd significant contributor to the formation of POS in the UAE. Interestingly, it disclosed a negative relationship in UAE, but it was marginally significant. In this research, it was hypothesised that pay level satisfaction as organisational human resource practice would contribute to the development of organisational support among the knowledge workers; in UAE, it was not. As stated previously, this phenomenon may be unique to the participants involved in this study because they (both local and expatriates) are arguably well-paid IT professionals who do white colour jobs. Thus, meeting their fundamental need of drawing a competitive salary scale is already met.

4.3. The Value Creation of Process Maturity-Thematic Analysis

The thematic analysis incorporated below exhibits the value creations CMMI® in services delivery to the UAE's IT offshoring industry (Table 3). The thematic data was derived from the 9 semi-structural interviews conducted with the IT offshoring managerial workers who have been involved in CMMI® implementation/s. The analysis is comprised of key benefits, codes, themes and subthemes and theoretical connectivity/sensitivity. The outcomes offer justifications as to how various value creations are directly related/linked to the CMMI® rollouts in IT offshoring (Stephens, 2009).

Table 3. demonstrates the value creation of CMMI® in service delivery. Source: authors developed.

Classification	Codes	Subtheme	Respondents' Outcomes
Benefits	BSPM		
	BSPM-P	Improved productivity and efficiency	With a mature software process, we saw a significant increase in productivity. Tasks were better organized, and there were fewer delays and rework. Importance of process maturity in reducing costs and improving profitability
	BSPM-Q	Higher quality and reliability	By following a mature software process, we were able to produce higher-quality software. Our products were more reliable, with fewer bugs and issues reported by customers.
	BSPM-C	Cost reduction	Software process maturity helped us identify and eliminate unnecessary steps and inefficiencies, leading to cost savings in the long run.
Challenges	CISPR		
	CISPR-RC	Resistance to change	Some team members were resistant to adopting new processes and methodologies. It took time and effort to convince them of the benefits and address their concerns.
	CISPR-IRA	Initial investment and resource allocation	Implementing software process maturity required an initial investment in training, tools, and infrastructure. It was a challenge to allocate resources effectively while keeping ongoing projects on track.

Continued

	CISPR-IEW	Integration with existing workflows	Integrating the new processes with our existing workflows was a complex task. We had to ensure compatibility and minimize disruptions to ongoing projects.
Stakeholders Engagement	SEAC		
	SEAC-C	Clear communication and transparency	Having a mature software process helped improve communication with stakeholders. We were able to set clear expectations and provide regular updates, which increased their trust and confidence.
	SEAC-CL	Collaboration across teams	Software process maturity fostered collaboration among different teams involved in the development lifecycle. We worked more seamlessly together, sharing knowledge and resolving issues more effectively.
Stakeholder Involvement in Process Improvement	SIAPI		We actively sought input from stakeholders in the process improvement initiatives. Their feedback and insights were invaluable in shaping the maturity model to better align with their needs.
Project Planning and Execution	PPE		
	PPE- E and F	More accurate estimation and forecasting	With software process maturity, we had a better understanding of project requirements and dependencies. This enabled us to provide more accurate estimates and forecasts for project timelines and resources.
	PPE-RM	Improved risk management	By following mature processes, we were able to identify and mitigate risks more effectively. Risk management became an integral part of project planning and execution.
	PPE-CM	Streamlined change management	Changes in project scope or requirements were handled more efficiently due to the mature software process. We had clear change management procedures in place, minimizing disruptions and ensuring smooth transitions.
Continuous Improvement	CILC		
	CILC-M	Emphasis on process evaluation and measurement	Software process maturity encouraged regular evaluation and measurement of our processes. We collected data and analysed metrics to identify areas for improvement.
	CILC-I	Encouragement of innovation and experimentation	We fostered a culture of innovation and experimentation within our team. The mature software process allowed us to explore new approaches and technologies, driving continuous improvement.
Experience Value Effect	LFPE		
	LFPE-LFPI	Learning From Past Implementations	Lessons learned from previous projects were actively incorporated into our processes. We valued feedback and used it to enhance our practices, avoiding the repetition of past mistakes.

Continued

Organizations' Growth	OG		
	OG-RR	Clear Roles and Responsibilities	Software process maturity provided clarity in roles and responsibilities, reducing ambiguity and positive impact on project outcomes and business success.

*Benefits of Software Process Maturity (BSPM), Challenges in Implementing Software Process Maturity (CISPR), Stakeholder Engagement and Collaboration (SEAC), Project Planning and Execution (PPE), Continuous Improvement and Learning Culture (CILC), Learning from Past Experiences (LFPE), Organizational Growth (OG).

5. Findings

The findings indicate that process capability is an enabler to generate and deliver predictable superior value propositions to clients in the UAE. It is essential to win application development projects/contracts. It also shows the integration POS-CMMI[®] amplify the value creation and the value delivery to the clients. This relationship was validated using both quantitative and qualitative data, selectively. Based on the data analysis performed in the UAE, specifically among IT companies (1st using structural equation methods, considering 260 responses and 29 managerial interviews), it is empirically/systematically feasible to stimulate employees' work outcomes (in this context CMMI[®]) using perceived organisational support practices (POS, organisational fairness, supervisors support and pay level satisfaction). Further, based on the empirical results generated, it was found that the impact of POS on generating employees' work outcomes is contextual (unique in the UAE context).

The 29 qualitative interviews (new qualitative data) are conducted with the managerial workers who have implemented the CMMI[®] model to assess the impact of organisational support practices critically. It needs to be highlighted that most of the variables considered for analysis are latent. Hence required thematic analysis to credibly conclude the effective and accumulated influence of POS on CMMI[®]. This approach enables the researchers to apply a uniform standard and allow for empirical results that can be normalised to a larger population or applied widely. The qualitative data derived from the thematic analysis indicates that the need for process maturity, diminish cost, improved customer satisfaction, leadership, training, process maturity and rewards are critical to show the value addition of CMMI to the customers. Key responses are below included.

- *Response one:* there is a critical need for process maturity to ensure consistency and predictability in software development. Need for standardization in software development processes. Challenges in measuring and evaluating process maturity (Faria et al., 2013). Continuous improvement is a key aspect of process maturity. Clients are increasingly looking for evidence of process maturity before awarding projects. Process maturity as a key factor in client retention.
- *Response two:* the role of process maturity results in reducing rework and improving efficiency. Benefits of process maturity in reducing risk and improving

quality. Lack of standardization leads to inconsistent quality and increased risk. Need for alignment with industry best practices and standards. Reduction of defects and errors with process maturity.

- *Response six:* improved customer satisfaction and increased revenue as benefits of process maturity. Improved ability to meet project timelines and budgets. Challenges in aligning processes across different teams and departments. Importance of cultural change and buy-in from all stakeholders in process maturity initiatives.
- *Response eleven:* need for alignment of process maturity with business goal. Difficulty in quantifying the impact of process maturity on project outcomes. Need for ongoing evaluation and adjustment of process maturity based on feedback and data. Importance of executive buy-in and support for process maturity initiatives.
- *Response fifteen:* the role of process maturity in driving continuous improvement. Importance of feedback loops to drive process improvements.
- *Response eighteen:* the role of leadership plays a vital role in driving process improvements. Need for leaders to actively promote and champion process maturity within their teams. Resistance to change from team members and lack of understanding of the benefits of process maturity. Impact of process maturity on team morale and collaboration. Role of process maturity in reducing technical debt and improving maintainability. Difficulty in quantifying the impact of process maturity on project outcomes. Challenges in implementing process maturity across different teams and organizations.
- *Response twenty:* improved communication and teamwork with standardized processes. Reduced conflict and improved morale with increased process maturity. Reduction of technical debt and increased ease of maintenance with process maturity.
- *Response twenty-three:* the importance of documentation and knowledge transfer to reduce technical debt. Need for flexibility and adaptability to adjust processes based on changing project requirements.
- *Response twenty-nine:* the need for ongoing training and development to keep team members up to date with process changes. Importance of process maturity in attracting and retaining clients. Role of process Maturity in reducing project delays and improving predictability.

The micronized business challenges on onsite and offshore of IT companies could be viewed as but not limited to a) immense pressure to increase the delivery maturity [shorten delivery times], b) diminish the overall cost of delivery c) consistently improve on quality and d) improve the customer experience at last year's cost. C-level executives of these IT organisations are relatively more committed to building business advantages using CMMI® rather than integrating with human involvement using dependable models, probably due to CMMI® nature. Since so much IT activity is offshored, the boundaries of companies have become blurred. Offshored IT companies in the UAE, for example, are part of a supply chain of

parent companies and have ambiguous control over their activities. It was found in the previous research that integration of POS with CMMI® could increase the overall value delivery.

To develop a nested model—POS-CMMI® robustly, the authors examined meta-analysis of CMMI® across global levels, which directly involved examining the value creation/delivery, particularly in the IT industry, but not limited to a) cost, b) schedule, c) quality, d) Customer satisfaction, and e) ROI. Thus, we constructively argue the cases capture the right data input, coverage, and insights for further analysis. Additionally, all the case reveals the yield values in a unique but individualistic manner. Realistically the global information technology industry integrates both West (where the spending comes from) and (acts as the outsourcing hub), thus it is strategically important to select a combination of cases from the West and UAE (Mohamed Hashim et al., 2024). To justify this case using meta-data following cases are brought in.

Case-I: The value addition of CMMI® in the West

A report that discloses dependable quantitative evidence from 35 organisations in the USA Europe and Australia (Table 4) reveals that wider enterprises harvest sizable and tangible business benefits that can be directly associated with the value additions for the client business.

Table 4. Shows the value additions brought in by CMMI® using performance indicators. Source: Jones (2014) and Jorgenson & Wessner (2006).

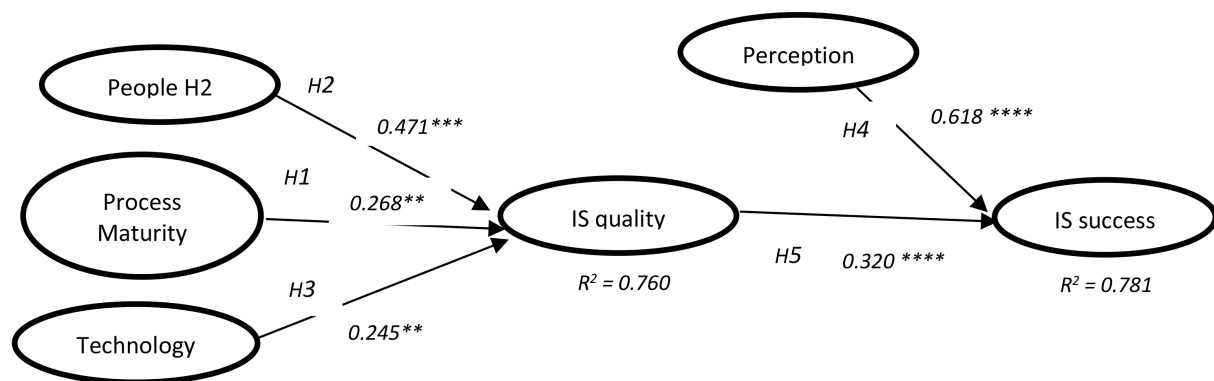
Performance Category	Median Improvement	Minimum Improvement	Maximum Improvement	Number of Datapoints
Cost	34%	3%	87%	29
Schedule	50%	2%	95%	22
Productivity	61%	11%	329%	20
Quality	48%	2%	132%	34
Customer Satisfaction	14%	-4%	55%	7
Return on Investment	4.0: 1	1:7: 1	27:7:1	22

This research has proven that CMMI® based process improvement can lead to yield performance specifically in variables a) productivity, b) quality, c) cost and d) schedule. These results were derived from small and large strategic organizational business units specifically located in the West. On this notion, it is empirically evident that information technology organizations that do business across distinct domains such as software engineering, project management and system integration use the CMMI® as a process model to generate superior business value propositions (Saeed et al., 2017).

Case-II: The role of people and their perception impacting Information System

Research conducted in Canada about worker contributions had the highest impact on information systems over process maturity and quality (Figure 7). Further, it was revealed that people contribute to their work organisation by utilising

their experience, knowledge and skills (Mohamed Hashim et al., 2022b; Chevers & Grant, 2017). Hence, the work organisation must keep the workers' perception about their work organisation at the optimum level because recent research has proven that the workers perceived organisational support directly impacts both various employees' work outcomes and organisational work performance. As stated, this research study yields a primary outcome that employees' contribution and process maturity were the key determinants of software development projects. It also discovered the users' (developers) perception had a significant impact on the accomplishment of information systems relative to information systems' quality.



Note: *** $p \leq 0.001$, ** $p \leq 0.05$.

Figure 7. Exhibits the Impact of People on information system's process quality. Source: Chevers & Grant (2017).

CASE-III: POS and its impact on ITO workers in UAE

The importance of demographic factors and their association with POS is arguably well-established in humanities and organisational literature (Brougham & Haar, 2013; Colakoglu, Culha, & Atay, 2010). Demographic variables are viewed as moderating variables; the degree to which the demographic variables exert influence on POS differs, contingent on a particular context (Gyekye & Salminen, 2009). Further, the demographic variables are closely associated with the organisational studies such as workers' perceptions, attitudes and distinguished employees' work outcomes (Gyekye & Salminen, 2009; Colakoglu et al., 2010).

CASE-IV: Moderating Role of Demographic Factors in the UAE

UAE's global workforce belongs to a relatively lower age group (Gallacher, 2009). About 70% of the workforce are expatriates; their primary motive to work in UAE is monetary (Avgerou, 2010). Recent research investigating the interaction of POS on employees' work outcomes has found that demographic factors moderate the influence of the employees' work outcomes/value generations which are unique and contingent on a specific context (Mohamed Hashim et al., 2021). Further, this research established that senior workers, married workers, female workers, higher educated workers, long-tenured workers and managerial workers expressed greater organizational support in the IT work which is unique to UAE's

demographic and socio-cultural settings. Thus, we emphasise there is a sizeable need to interlink the perception with the application of CMMI® to amplify and regulate the value creations/delivery.

Summary of results

The research findings show that using CMMI® as a process capability can provide significant benefits to IT organizations. It is important to integrate both soft system (POS) and hard system (CMMI®) to fully realize these benefits. The involvement of POS can support the organization and maximize the benefits, but the extent of enhancement and optimization depends on the demographic and socio-cultural factors of the employees. Both quantitative and qualitative data analysis demonstrate that integrating POS-CMMI® leads to tangible benefits such as cost advantages, improved delivery optimization, higher quality, and enhanced customer experiences. Furthermore, the thematic analysis reveals that effective CMMI® implementation results in selective investment in technological advancement, teamwork, learning and engagement, and reduces business risks. This emerging theme requires further investigation and empirical validation, potentially through discourse analysis.

6. Conclusion

This paper confirms that the notion of integrating the CMMI® with people involvement, particularly using POS, is a valuable and applicable phenomenon to generate and amplify value creations for their clientele. It is an influential and nested approach to value creation and delivery. It is proved that effective CMMI® implementations enabled IT and IT-related business organizations to develop new business capabilities-superior value creation in the emerging economic situation. It is well recognized as a dependable process model to drive organizational performance while minimising the cost of delivery, maximising the quality of the delivery, continuously improving customer experience, and enhancing the optimisation of service delivery. This phenomenon reveals that the superior value creations of CMMI® are translated into cost, quality, optimisation, and customer experience terms to track the performances of business organisations.

The literature review offered a consistently positive and significant relationship between CMMI® implementation and organizational performance in worldwide and the UAE. Specifically, the finding suggests that offshoring organizations with higher CMMI® maturity levels tend to show increased performance in areas such as cost, productivity, quality, optimization, and customer experience. Thus, the accumulated impact of process maturity on organizational performance cannot be underestimated. This means mature processes enable organizations to achieve operational excellence, enhance customer experience, foster innovation, and adapt to changing global market conditions. Hence, by investing in process maturity, outsourcing organizations can develop a long-term competitive advantage in today's competitive business landscape.

To standardise and deliver consistency specifically in the economic situation,

IT related service delivery promotes CMMI® effective implementation. Although the process takes significant time organizations view this as an investment decision to develop competitive advantages—better results through process improvements. The process improvements enable the companies to foster a culture that believes in promoting a set of processors, leading to promote greater predictability, repeatability, and consistency. This approach enables organizations to control rationally the project and service outcomes. Superior organizational performances are achieved in the IT-related industry not independently by CMMI® but often it is selectively integrated with industry-specific systems such as ISO, lean six-sigma, and dynamic capabilities models, but in this case POS. Further, the compatibility of POS and CMMI® is found to be robust.

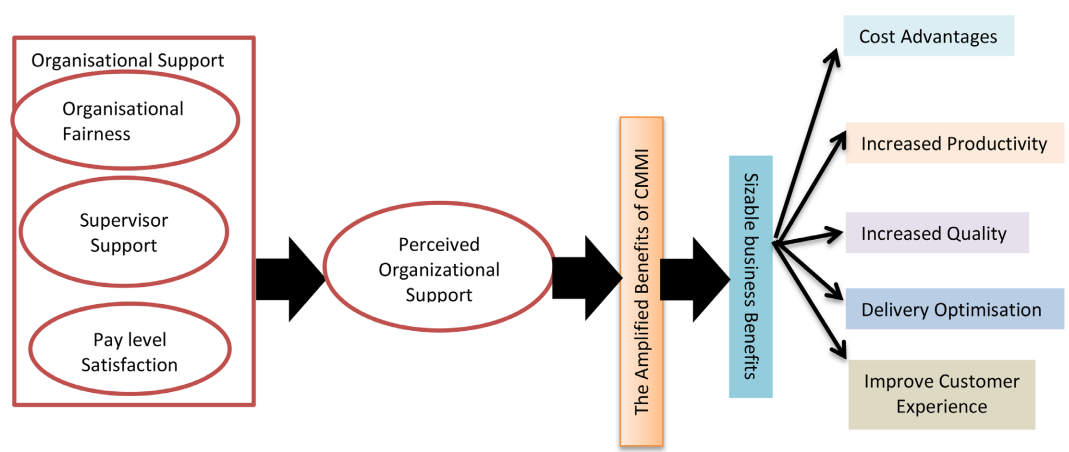


Figure 8. Demonstrates the proposed people-centric model of CMMI®. Source: Mohamed Hashim & Robin (2021), and authors developed.

It also emphasises IT offshoring, process maturity, business value creation and the role of technology specifically in emerging economies. Although this research has brought in four specific cases using those metadata to validate the empirical positioning of the key problem investigated in this research, the researchers use primary data (qualitative data) from the UAE, collected among software managerial workers to develop the POS-CMMI® model (Figure 8). Companies outsource their software development contracts with the primary motive of achieving minimised cost, gaining access to world-class standards, transferring & share risk, achieving critical mass via insufficient resources, improving agility and managing on-going performance (Sharma & Dadhich, 2020). However, businesses are still facing increased challenges from outsourcers, which remain big hurdles to achieving the defined client's business objectives. As per Capers Jones in 2011, the software is blamed for a major business problem more than any other manufactured products. Poor software quality becomes one of the most expensive topics in human history. The figures float around \$150bn per year in the United States and \$500bn per year worldwide.

Achieving delivery excellence, delivery maturity, increased productivity, cost

optimisations, promoting agility, and proactive, on-time delivery are the number one priority of CEOs of every delivery organisation (outsourcers). However, arguably, very little emphasis is given to the most valuable assets (human resources) of the organisations, specifically their perception, engagement and involvement impacting their work deliveries. CMMI[®] pilots outsourcers to achieve cost efficiencies by enhancing re-use, bringing down the maintenance cost via IT consolidation, diminishing the opportunity cost by enhancing team productivity and efficiency, and operating with lower risk since the organisation generates more predictable data to make a data-centric decision which reflects in their daily deliveries.

Finally, benchmarking process maturity can also have a far-reaching impact on the UAE's outsourcing enterprise. Many outsourcing enterprises focus on developing integrity, assurance, and transparency through process maturity. Thus, in the outsourcing landscape process adapting the process maturity process can become a mandated initiative related to improving both pre- and post-application development contracts.

Statement

The authors confirm that this paper complies with the Journal's ethical standards.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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