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Stage-Based Maturity Model Approach for Measuring Enterprise Governance of Information Technology and Supply Chain Sustainability in Middle East and North Africa Region

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Abstract

Purpose: *To propose an easy-to-use and scientifically developed Enterprise Governance of Information Technology (EGIT) Maturity Models (MM) development methodology which can develop stage-based MMs. The proposed methodology enables researchers in developing countries to build and use scientific EGIT stage-based MMs that can support organizations to measure their compliance to the diverse recent EGIT respective regulations easily while adapting with their local context needs and protect their supply chains.*

Design/methodology/approach: *This study is following an experimental approach by using the proposed methodology to develop an EGIT stage-based MM which is deployed and tested in three firms. The participating firms, which play a great role in supply chains, provided valuable feedback at the end of the experiment.*

Findings: *The participating firms provided evaluation of the tested MM depicting its value in measuring EGIT compliance. The findings show a positive and significant relationship between the use of the MM developed by the proposed methodology and the participating firms' capability to measure their EGIT maturity and increase it. Moreover, the proposed methodology enables small and medium-sized organizations to measure their EGIT maturity levels without consuming much time or resources which they cannot afford like large organizations.*

Research implications and limitations: *During the research there were many challenges including and not limited to lack of EGIT MM developed in or for MENA region and EGIT awareness in MENA region. COVID 19 pandemic and its impact on the three participating organizations. The emergence of new regulations in MENA region during the research. Explaining the EGIT MM to different stakeholders with different background. Collecting and analysing the maturity of the three participating organization in all the processes of the four pillars.*

Originality: *In developing countries like Middle East and North Africa Region (MENA) and especially Arab countries, EGIT plays a greater role in achieving new strategic visions set by emerging developing countries which have EGIT limited resources, lack of knowledge, and higher levels of risk. Although there are many MMs for EGIT, we could not find any adopting stage-based maturity measurement technique that was developed in or for the MENA region. Hence, this paper attempts to develop an EGIT Stage-based MM development methodology for Arab countries.*

Keywords: *Maturity Model, EGIT, Information Technology Service Management (ITSM), Business Continuity, Supply Chain Sustainability, Industry Innovation.*

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Introduction

In Alshamy et al.'s recent publication (2021), the researchers identified a distinct requirement for EGIT maturity Models (MMs) in the MENA region countries. This need has become more pronounced, particularly in the aftermath of the COVID-19 pandemic and the resulting disruptions in global supply chains. The escalating number of cybersecurity attacks and the global chip crisis have further emphasized the significance of EGIT as a prominent area of study and research. Becker et al. (2009) defined maturity Models (MMs) as techniques developed and used to determine the level of performance, capability, or maturity of a process or organization. Rosemann and de Bruin (2005) defined maturity itself "as a measure to evaluate the capabilities of an organisation in regard to a certain discipline" (2005). Becker et al. (2010) define MM as "conceptual models that outline anticipated, typical, logical, and desired evolution paths towards maturity" (2009). They are used to discover strengths and weaknesses to enable organizations to define deficiencies or opportunities for improvement. They are also used to determine maturity targets and how to reach them.

In Alshamy et al.'s (2021) last publication, "Assessing Enterprise Governance of Information Technology Maturity Models in the Middle East and North Africa Region", the researchers covered the characteristics of the MENA region and the existing need for an Enterprise Governance of IT (EGIT) MM based on developing, publishing and analyzing two questionnaires (Alshamy 2019) and (Alshamy, 2020) among participants in the same field and related fields. They concluded that the MENA region needs a specific EGIT MM made for its needs, as the number of new strategic visions in many countries in MENA is increasing with a lot of emerging information/cybersecurity, business continuity, data governance, management, and privacy regulations. The number of organizations that need to measure and have EGIT is increasing enormously, and the types of fines and impacts vary and, in many cases, are intolerable including a huge amount of money and imprisonment too.

It has been observed that there is a growing interest in EGIT among organizations in MENA. According to Alshamy et al.'s (2021) findings from the questionnaire, approximately 80% of organizations are either attempting to implement or have already implemented an EGIT MM. These organizations require an MM that can assess their EGIT maturity and provide guidance for enhancing their performance, meeting goals, and complying with emerging regulations, all while optimizing resources and managing risks. Interestingly, none of the MMs examined in this research employ a stage-based maturity measurement methodology; they solely rely on maturity levels. Consequently, interested organizations are compelled to measure all processes/aspects of their organization against each maturity level, which can be a significant undertaking for small and medium-sized organizations. As a result, many organizations face difficulties in implementing EGIT measurements and improvements due to the absence of a simple, single MM.

In this paper, the researchers present the development and evaluation stages which are the first two stages of a five-stage EGIT MM that is developed based on Becket et al.'s (2009) procedure model for developing maturity models. It is a scientific methodology dedicated to developing MMs and backed up by a well-known research methodology called design science research developed by Hevner et al. (2010). It is important to mention that EGIT governance represents the combination of governance, risk, and compliance (GRC).

Based on the importance of EGIT to enterprises regardless of their size or type, and the need to have a simple and easy-to-use stage-based, and multi-dimensional MM, the proposed EGIT MM has the following main advantages:

- Stage-based: The processes and aspects which are assessed against one stage are not assessed again against any other stage.
- Developed using a scientific methodology and general design principles (DPs).
- Easy to implement and use.

The objective of this research is to create a multi-faceted and progressive MM that can assist organizations in developing countries to enhance their EGIT in a convenient and cost-effective manner, while also ensuring compliance with new regulations. Publishing MM in the future to practitioners who can use it and to managers to decide where it matches their organization's needs could be considered a contribution to the fields of EGIT and MM.

The structure of this paper is as follows. Section 2 provides the background information for this study. Section 3 focuses on the related work. Section 4 discusses the proposed solution. Section 5 presents the results of the proposed MM evaluation method. Section 6 further discusses the proposed MM evaluation method. Section 7 presents the conclusions, while section 8 covers suggestions for future work.

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Literature Review

The design science in Information Systems research introduced by Hevner et al. in 2004 has seven guidelines that are used to design and evaluate the researchers' MM scientifically. Hevner's seven guidelines represent a scientific methodology to follow in Information Systems artifact design, and they have already been used by researchers. The guidelines are G1: Design as an artifact, G2: The relevance of problem, G3: Design evaluation, G4: Research contribution, G5: Research rigor, G6: Design as a search process and G7: Communication of Research.

These seven guidelines cover the requirements of developing a design-science artifact, which in the case at hand is an MM, starting with designing the MM that is relevant to a specific problem that does not have any available solution. The design should then be evaluated, and Hevner provided five types of evaluation: observational, analytical, experimental, testing, and descriptive. Although Hevner's design science methodology can be generically used in information systems, the researchers prefer to use it during the development of the proposed MM because it has scientific and chronological characteristics that effectively guide the development process.

Becker et al. (2009) introduced a procedure for developing maturity models for management, which is the second reference methodology the researchers use in developing the MM research methodology because of its scientific method for developing MMs, which is considered more dedicated to the research at hand than Hevner's. The development of an MM involves eight essential requirements. These requirements include R1: Comparing with existing maturity models, R2: Following an iterative procedure, R3: Conducting evaluations, R4: Utilizing a multi-methodological approach, R5: Identifying the relevance of the problem, R6: Defining the problem, R7: Presenting the results in a targeted manner, and R8: Ensuring scientific documentation. Becker has devised a procedure, illustrated in the accompanying figure, for the development and evaluation of MMs.

In Alshamy et al.'s (2021) recent publication titled "Evaluation of Information Technology Maturity Models in the Middle East and North Africa Region", we covered how de Bruin et al. (2005), extensively analysed over 150 Maturity Models (MMs) that have been developed and published in the past few years aiming to provide support to the field of IT management. Additionally, the researchers investigated the research conducted by Becker et al. (2010) who utilized a keyword search approach to explore ten scientific databases. Their search spanned from 1994 to 2009 and resulted in the identification of more than one thousand academic articles potentially related to MMs. However, when they narrowed their focus to 19 pure IS journals, they discovered only 20 articles that specifically addressed MMs.

It is important to note that there is currently no established scientific guidance or methodology for the development or evaluation of MMs. In light of this, the researchers believe that Becker et al.'s procedure model (2009) offers the most comprehensive and reliable guidance for the development of any Enterprise Governance of Information Technology (EGIT) MM. This model stands out due to its incorporation of eight simple and scientifically grounded requirements. In Alshamy et al. (2021) titled "Assessing Enterprise Governance of Information Technology Maturity Models in Middle East and North Africa Region", the researchers covered how we found more than 100 MMs developed and published in the last few years, as stated by Becker et al. (2009). The researchers analyzed the existing MMs and found that they can belong to one of two different schools. The first one is the commercial one, which is based on the efforts of big service providers and bodies of knowledge. The other school is academia, with many researchers who attempted to develop MMs with limited resources and capabilities, unlike the first school. This section summarizes what the researchers reached in their last publication (Alshamy et al., 2021), which led to continue their research journey to develop and evaluate an EGIT MM that can support organizations in MENA region countries to measure their EGIT maturity and easily improve it. The researchers analyzed both types and found that there is a need for an EGIT MM that matches the requirements of the MENA region based on understanding its special context which can be summarized up in:

- Lack of EGIT processes and their proper documentation
- Lack of unified MM for measuring EGIT
- Using different EGIT frameworks and standards
- Lack of EGIT importance awareness among different levels of employees within organizations
- Rare use of EGIT MM due to their resource and time intensive nature which many organizations in MENA region cannot afford
- Based on the fast emerging of new regulations of cybersecurity and business continuity among others, multi-dimensional MM is needed for EGIT maturity measurement and improvement.

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MM Classification

In the realm of market-based MMs, the researchers have examined various frameworks for different purposes. Specifically, they have explored ITIL v3/2011 (Cabinet Office, 2011) for ITSM, COBIT5/2019 (Lainhart et al., 2011) and (Lainhart, Conboy, and Saull, 2018) for EGIT, ISO/IEC 15504-2 (ISO/IEC JTC 1/SC 7 Software and systems engineering 2003) for process improvement and process capability determination, and ISO 19600 (ISO/TC 309 Governance of organizations 2014), which has been replaced by ISO 37301 (ISO/TC 309 Governance of organizations 2021) in 2021 for compliance management. They have found that in the MENA region countries, the ITIL framework is widely regarded as the most suitable for ITSM, while the COBIT framework is considered the best for EGIT. However, it is important to note that these frameworks still require customization to meet the specific requirements of the MENA region. The ITIL process maturity framework (PMF) (Hunnebeck et al., 2011) is an ITSM MM that can be utilized to assess any other domain. It evaluates all processes against each maturity level within its five levels. On the other hand, the COBIT5/2019 (Dhulipalla, 2019) process capability scheme, known as COBIT Performance Management (CPM), is not a straightforward and versatile EGIT MM for MENA region countries. Many organizations in this region lack several of its processes and do not possess sufficient resources to conduct its complex assessment. Additionally, COBIT5 focuses solely on the process dimension, measuring capability rather than maturity. Other dimensions such as information security, business continuity, and compliance are still necessary. It evaluates all processes against each maturity level within its six levels, highlighting the need for a simplified version tailored to the specific needs of the MENA region.

Implementing COBIT 2019 requires training, experience, and adequate resources. It encompasses four dimensions, measuring capability for each dimension and maturity across all combined dimensions. It addresses ITSM, information security, continuity, and compliance as processes rather than dimensions. It evaluates all processes against each maturity level within its six levels. In academic-based MMs, the researchers covered three different categories. Although the first category, which proposes new MMs, and the second category, which compares the already developed MMs, are important, the last category, which provides guidance on how to develop an MM and is essential, as the researchers use its provided guidance in understanding how to develop a scientific MM for MENA region countries. Organizations in MENA region countries are more interested in market-based MMs than academic ones, as they are well-known for their available training courses, exams, and qualification levels that are not provided by academic MMs. Therefore, the researchers compared their MM with market-based MMs to cover the actual required features and aspects.

Table 1. MM Components Covered by Existing Commercial MMs and the Proposed One
[* Partial representation and ** Full representation]

References	MM Components				
	MM Pillars				Stage-based
	ITSM	Information Security Management	Business Continuity Management	Compliance Management	
ITIL PMF	**	*	*		
COBIT 5/2019	**	*	*	*	
ISO/IEC 33003/33020					
M_o_R MM					
P3M3 MM					
ISO/IEC 20000-1	**	*	*	*	
ISO/IEC 27001		**	*	*	
ISO 22301			**	*	
ISO 37301				**	
ISO 31000					
The proposed EGIT MM	**	**	**	**	**

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In the study conducted by Becker et al. (2010), which examined 20 maturity models (MMs) published in 19 different journals, it was concluded that there is a lack of detailed conceptualization and scientific determination regarding the maturity and maturity models. Another study by Becker et al. (2009) attempted to gather information about the design process used by developers of 51 MMs, but only a few provided feedback. The authors also noted that there is a scarcity of information regarding the motivation, development, procedural method, and evaluation results of these models. Additionally, de Bruin et al. (2005) stated that although practitioners and academics have developed numerous maturity models across various domains to assess competency, there has been no collective effort to generalize the phases involved in developing a maturity model for any specific domain. It is clear now that most of the available MMs have not been developed or evaluated using a scientific development methodology, as stated by Hevner and Becker (2004 and 2009), among others. The researchers can exclude major commercial MMs, such as CMMI, PMF, and the process capability model. They could not find a stage-based MM that assesses every single process in a specific single stage to reduce assessment effort and time.

MENA Region Evaluation

No EGIT MM developed in the MENA region or specifically for the MENA region was found, which addressed its unique needs and context. Instead, the researchers discovered a collection of commercial MMs that were developed outside of the region, along with some regulations that were created by certain MENA countries to ensure compliance. Some of these regulations, such as the National Cybersecurity Authority (NCA) cyber-security control and the Saudi Central Bank (SAMA) Information Technology Governance Framework in the Kingdom of Saudi Arabia, were developed within the MENA region. Additionally, the Egyptian Personal Information Protection Act was also developed locally. On the other hand, regulations like the GDPR, which was established by the European Parliament and the Council of the European Union, originated outside of the MENA region but have global effectiveness. While there are currently no regulations or frameworks in the region specifically addressing supply chain, most of them encompass suppliers and provide guidelines on how to effectively manage their services to ensure their impact on daily operations and business objectives is controlled.

Research Gap

Despite the presence of numerous MMs in the information and technology field, none of them fully encompass all dimensions of EGIT, and some do not even target EGIT at all. Additionally, none of these MMs adopt a stage-based approach when assessing EGIT maturity. This highlights the absence of an integrated stage-based EGIT MM specifically designed for the MENA region countries, which could assist small and medium organizations in measuring their EGIT maturity and effectively managing their supply chains. Developing a new MM that does not add value to the existing market or benefit organizations seeking to measure and enhance their EGIT would be futile. Among the existing MMs, only ITIL 2011 and COBIT 2019 can be considered integrated MMs, as they cover various aspects of the proposed MM, albeit without the stage-based approach. The ITIL PMF lacks a stage-based measurement of maturity as it measures all ITSM processes with each maturity model. On the other hand, the COBIT CPM MM employs a complex maturity measurement technique that is not user-friendly for small and medium organizations and lacks a stage-based measurement of maturity. Furthermore, ITIL, COBIT, and other EGIT frameworks or standards fail to address the relationship between EGIT and sustainable supply chains, which are directly influenced by service management, cybersecurity, business continuity management, and compliance management. Taking all these factors into consideration, our proposed MM aims to fulfil the market needs in the EGIT field within the MENA region, with a specific focus on the necessary capabilities for sustainable supply chains. To evaluate the effectiveness of the proposed MM, it is implemented in three organizations directly involved in the supply chain field as suppliers of services or products to other organizations. The feedback from these participating organizations is collected and analyzed to assess the actual need for the proposed MM and determine whether it has been developed and deployed appropriately to meet the requirements of MENA region organizations seeking to measure and enhance their EGIT. Based on the findings, recommendations are provided.

Solution

Research Method

A comparison between the proposed MM and existing MMs is necessary before developing the MM in more detail to ensure that it is really needed. This comparison is depicted in Table I, and the proposed MM covers

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all components required by EGIT in the MENA region compared to other MMs including stage-based capability. These components were made clear in the two questionnaires developed and shared with the EGIT participants in Alshamy et al.'s (2021) publication "Assessing Enterprise Governance of Information Technology Maturity Models in the Middle East and North Africa Region". It should be noted that although the researchers used existing MMs as a reference, they created a new EGIT MM and did not customize any of the used reference MMs. The researchers' development methodology (Fig. 1) combines the methods of Hevner and Becker to obtain the maximum benefit. Each activity has labels representing compliance with Hevner's seven guidelines and Becker's eight requirements. This development methodology includes five chronological stages covering the life cycle of assessing, developing, evaluating, communicating, and retiring MM when needed.

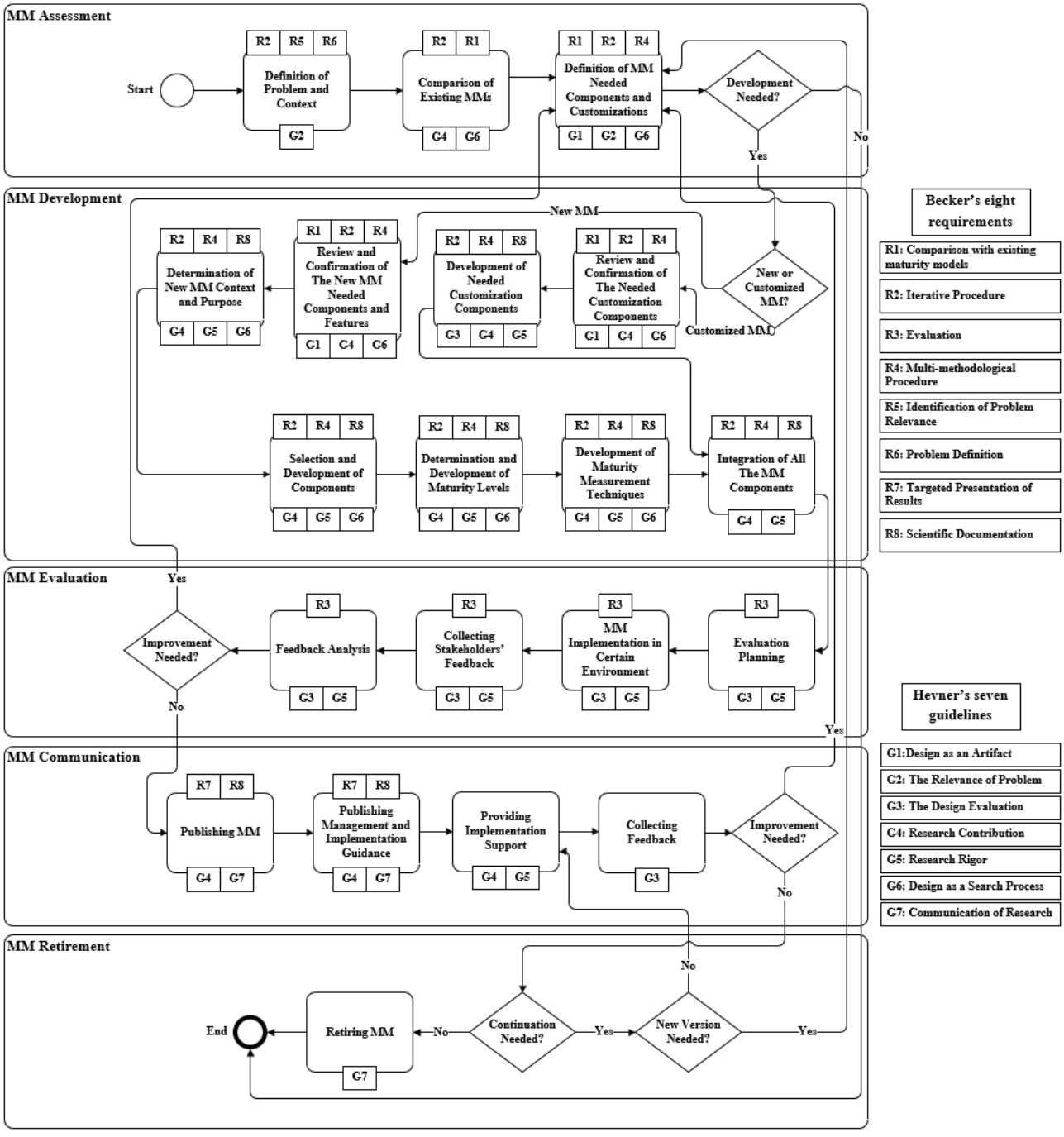

Fig. 1. MM development methodology and lifecycle stages

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The first stage, MM Assessment, covers the problem and context definition, as the development of a new MM should be based on the actual demand in a specific market, and there should be a comparison with similar existing MMs to know what features and components need to be developed or customized in the new one. This helps in defining the components needed to be developed in any new MMs or the customization required to improve existing MMs. Therefore, the initial MM development is based on the market exact demand and the weakness of existing MMs.

The second stage, MM development, covers the development of new MMs or the customization of existing MMs based on the need. The first activity in this stage is to review and confirm the required customization components in any existing MM or the needed components and features of a new MM. To customize an existing MM, the required components were developed. To develop a new MM, there is a group of five activities to develop s new MM and its components. The context of the MM and its purpose is determined from the beginning; in the case at hand, the context is based on MENA region countries and emerging regulations, while the purpose is to help organizations, especially small and medium ones, measure their current EGIT maturity level and support them in choosing and targeting expected or needed maturity levels. Selected components, including principles, dimensions, processes, and other MM components, are developed based on a well-determined and defined context and purpose. The development of maturity levels is based on the required number of levels, the complexity of the context, and the potential audience in the future. Measurement techniques that enable the audience to use MM to measure their respective maturity levels are developed. The last activity in this stage is the integration of all components of the newly developed MM or customized MM.

In the third stage, MM evaluation, the evaluation of MM is offered to a selected group of organizations by providing their top management with the benefits of its implementation. The researchers attempted to have about three organizations of different types and nature to widen the scope of the experiment. Organizations that would like to participate in the MM evaluation are carefully selected, and their needs and feedback are collected and analyzed objectively during the evaluation stage. The MM is implemented in these organizations with the support of top management and respective middle management to measure the level of their EGIT maturity and increase it if required. Measurements are collected, and the results are produced based on all stakeholders' feedback. If MM improvement is needed, then the required updates are implemented by returning to the first stage. If improvement is not required, the fourth stage can be started.

In the fourth stage, MM Communication, MM is published to the market with proper guidance to support organizations' management and practitioners. Although the researchers consider their MM to be easy-to-use, some organizations may need some support in the implementation process if EGIT is new to them or if they do not have competent staff. Implementation support is provided to organizations with less preparedness to enable them to benefit like other organizations with higher maturity and preparedness levels. Feedback is collected regularly every six months to analyze and decide whether the MM needs any improvement. Being a free MM, that can support many organizations of different sizes and nature, enables many organizations to use it and provide feedback for evaluation and improvement purposes. If improvement is needed, then the required updates are implemented by returning to the first stage. If improvement is not required, the fifth stage can be started.

In the fifth stage, MM Retirement, the decision of MM continuation should be made every two years based on the market needs and organizations' feedback. If the MM is no longer needed in the market, then a retirement decision is made. If the MM is still needed, then the provided support to users continue, and if a new version is needed, then the first stage is instigated again.

This paper covers the second and third stages: MM development, and MM evaluation while Alshamy et al.'s (2021) last publication, "Assessing Enterprise Governance of Information Technology Maturity Models in the Middle East and North Africa Region" covers the first stage, MM assessment. In the first stage, the researchers defined the current problem, which is the lack of MM in the MENA region countries that can be used to measure, compare, and improve EGIT in a simple way. A literature review is also provided for the current academic and commercial MMs to discover if they have the required MM features or whether the proposed one can be an addition to the market of MMs. A comparison of the existing MMs and market needs is done by creating, publishing, and analyzing two questionnaires: the first deals with existing EGIT MMs dimensions and their suitability to the MENA region countries, while the second deals with existing MMs and how they can manage compliance. In

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the second stage, the researchers developed a new MM based on existing high-quality MMs frameworks and ISO standards to be considered as an addition to the market of MMs with customization for MENA region countries and its current challenges. In the third stage, they deployed EGIT MM in three organizations to evaluate it in actual environments. All evaluations and feedback comments were collected, analyzed, and discussed to determine whether the new EGIT MM needs further development and improvement.

The Proposed MM Explanation

In developing their research methodology, the researchers used Becker et al.'s (2009) procedure for developing Maturity Models for IT Management due to its scientific method for developing MMs which is considered more dedicated to this research than Hevner et al.'s (2004). The proposed MM has five principles, which are basic and core values that any organization should have and maintain to demonstrate compliance with its goals and objectives. The proposed MM also has four maturity dimensions, called maturity pillars, to be used during any assessment. These dimensions enable organizations to use an easy and affordable integrated MM instead of assessing each maturity pillar separately at a time. However, to measure EGIT maturity, the four pillars should be used in combination. Each maturity pillar has four stages of maturity, which are like other existing MMs which use stages/levels of maturity that have been used for many years. The experimental evaluation approach best suites the proposed MM, and it is used later to support the researchers in collecting and analyzing feedback from stakeholders in the participating organizations in the MM evaluation experiment.

In Section 3.2.1, the principles are briefly explained, and the maturity pillars and their measurement aspects are explained in Section 3.2.2. The four-stage-based maturity levels of each pillar are explained in Section 3.2.3, while the proposed MM stage-based maturity levels and respective processes are explained in Section 3.2.4. The proposed MM interfaces are covered in Section 3.2.5.

Principles

Based on an analysis of both questionnaires developed, shared, and analyzed in Alshamy et al.'s (2021) publication, "Assessing Enterprise Governance of Information Technology Maturity Models in the Middle East and North Africa Region", the MM is built on five principles (Fig. 2) that any organization should have if it would like to continue in the market and remain competitive in the age of disruptive technologies and startups.

All these principles need to be measured and improved to protect their effectiveness and efficiency from decreasing over time. These principles can be measured by conducting internal and external audits with a predefined audit scope and criteria that can discover the level of conformity and integrity among them. Nonconformity is analyzed, and proper corrective actions are developed and approved before implementation. There is a follow-up that is done in view of these corrective actions, and their implementation effectiveness are done before closing any of the nonconformities. These five principles are considered a must not only for EGIT as they are core for sustainable supply chains and all its components.



Fig. 2. The proposed MM principles

Dimensions

The proposed MM is based on the concept of multiple dimensions to enable organizations to measure their maturity from different perspectives, as an organization's maturity cannot be depicted by measuring only one dimension. The proposed MM chooses the most necessary dimensions (Fig. 3): ITSM, Information Security Management (ISM), Business Continuity (BCM), and Compliance Management (CM). Simultaneously, there are three aspects of maturity measurement: process, people, and technology. What is new in the proposed MM is how the three measurement aspects are used to measure the maturity of the four dimensions.

All dimensions and aspects are already developed by other best practice MMs and ISO standards that

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have already been used separately in the MENA region countries. ITSM Process, People and Technology aspects exist in ITIL Process Maturity Framework (PMF) which was developed by Office of Government Commerce (OGC) back in 2007 and they are still used. In 2012, Alshamy used PMF in the research "Information Technology Service Management (ITSM) Implementation Methodology Based on Information Technology Infrastructure Library Ver.3" (ITIL V3). ITSM was selected as one of the pillars based on its importance in managing the IT service lifecycle and all its stages, which are depicted as five stages covering twenty-six processes in ITIL v3/2011. Although there are different sources of guidance and best practice frameworks, those of OGC, currently PeopleCert, are preferred as many people in the MENA region countries know them and their accredited training and examinations are widely available. All the dimensions and aspects of the proposed EGIT MM are enabling organisations to deliver their services and products to internal and external customers of the organization while protecting sustainability.

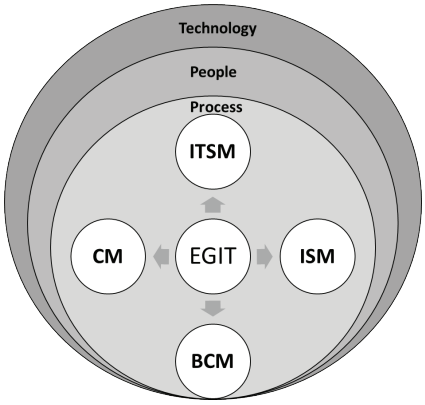

Fig. 3. The proposed MM pillars (Dimensions)

The ISM dimension is measured by many frameworks and ISO standards, the most famous of which is ISO/IEC 27001:2013 (ISO/IEC JTC 1/SC 27 Information security, 2013). No one can deny the importance of information security in our world, whether on business or personal levels, while considering that some organizations consider their data, information, and intellectual property (IP) to be their most precious assets. This dimension guarantees sustainability of the provision of services and products and their benefits which are measured based on the customer security and protection of information assets.

The BCM dimension is also measured by many frameworks and ISO standards, the most famous of which is ISO 22301:2019 (ISO/TC 292 Security and resilience, 2019). The importance of business continuity has increased in the last decade, generally due to the increasing cybersecurity attacks and their impact on business operations in addition to other natural or man-made pandemics like COVID-19 with its worldwide impact, which is still affecting many industries in an unexpected way. Business continuity is one of the main topics for governance in countries and not only for organizations based on the diversified impact on citizens' lives, economy, education, health, and modern lifestyle, among many others. This dimension guarantees sustainability of the provision of services and products by measuring their Business Impact Analysis (BIA) and developing respective Business Continuity Plans (BCPs) and Disaster Recovery Plans (BCPs).

The CM dimension is added due to the increase in regulations and laws that were released in MENA region countries, not limited to, those issued by NCA, The National Data Management Office (NDMO) and SAMA in KSA, the Central Bank of Jordan (CBJ), the Central Bank of Egypt (CBE), the National Electronic Security Authority (NESA), and the Supreme Council for National Security, the National Emergency Crisis and Disaster Management Authority (NCEMA) in the UAE among many others. The compliance dimension uses ISO 37301:2021 as a reference. At the same time, some regulations come from outside the MENA region countries; however, they require the compliance of organizations working in MENA region countries, such as the GDPR issued in the European Union. Compliance does not mean complying with only external regulations and laws; it also means complying with internal policies and procedures. This dimension guarantees compliance to the sustainability of the provision of services and products and their benefits.

Although the four pillars are essential in measuring organizations' EGIT maturity, technology, people, and processes, three aspects are used to enable the achievement of maturity in each pillar. It is impossible to have actual maturity if any maturity pillar is not built on processes that are effectively and efficiently automated and run by competent people. Therefore, the researchers choose these three critical aspects to be used during the assessment and improvement of an organization's EGIT maturity.

Although only four dimensions are chosen, which are the most important, there is still a belief that some organizations may have a special need to add, remove, or change some of these dimensions based on their specific context.

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Four-Pillars Four-Stage-Based Maturity Levels EGIT MM

The proposed MM is a multidimensional model. This means that it has four dimensions (pillars) (Fig. 4) for measuring organizational governance maturity based on information and technology. It has been decided not to use the same six maturity levels used in many MMs, as it will not be easy for many small or medium organizations to measure all their processes and aspects in four pillars against six levels. Therefore, the researchers decided to use only four maturity levels, with each level representing a dedicated stage containing a specific group of processes. These four stage-based maturity levels are initial, established, improving, and optimizing. These four stage-based maturity levels are different from the levels of ISO/IEC 33020:2015 (ISO/IEC JTC 1/SC 7 Software and systems engineering 2015) and many MMs such as ITIL PMF, COBIT 5 process capability model (Peter C. Tessin, 2012), COBIT performance management, and CMMI (Ron Lear, n.d.).

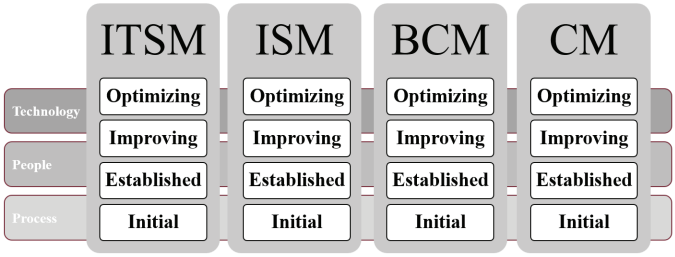

Fig. 4. The proposed MM four-pillar four-stage-based maturity levels EGIT MM

There are three main differences between the proposed MM and all others. The first is the difference in the number of maturity levels, as the proposed MM has only four stage-based maturity levels to enable small and medium organizations to simply use maturity measurement levels without having faraway destinations of maturity, which may not be needed for many organizations. The second is the difference in the names of the maturity levels by using four simple names that depict the maturity of each level, and two of these levels, which are established and optimized are already used by many other frameworks. The third difference, which is unique, is the introduction of stage-based maturity levels instead of normal maturity levels. In all other MMs, each maturity level is used to assess all processes and aspects of a selected reference model, and those processes and aspects that could fulfil these level requirements are moved on to be assessed against the requirements of all other higher maturity levels. In the proposed MM, each stage-based maturity level is only concerned with a specific group of processes and aspects, and whether they fulfil its requirements, then they are not assessed against any other higher level. This means that each stage-based maturity level is dedicated to only a specific limited group of processes, which makes it easy for any organization to avoid a long cycle of assessing the same processes and aspects against different levels of maturity.

The proposed MM has four pillars (ITSM, ISM, BCM, and CM) and three aspects (process, technology, and people). The pillars are normal like those in any other MM, while each of them has four stage-based levels of maturity, which are mentioned above, the three horizontal measurement aspects intersect with the four vertical pillars to shape their maturity.

Each vertical pillar was affected by three horizontal aspects. For example, if the ITSM pillar is discussed, the researchers cannot measure its maturity if they do not consider how processes are automated to increase their effectiveness and efficiency and how they are developed, operated, measured, and improved by people. While the horizontal aspects are used for enabling the maturity level of the vertical pillars, the four stage-based maturity levels depict the maturity level.

Existing MMs assume that an organization cannot reach a specific level of maturity unless it meets all requirements of the previous maturity levels because each level has a different group of requirements for the same process/aspect/component. These requirements are not shared among the maturity levels as they are divided among them starting with the simplest requirements at the starting level, and then the difficulty increases as the maturity levels increase. The proposed MM does not divide the maturity requirements of each process among different maturity levels, as each process is assessed against only one maturity level. Therefore, all requirements of any given process are included in a single maturity level, which includes this specific process. This enables organizations to reduce a lot of time and resources needed to assess their EGIT. Table II represents the four maturity stages of the ITSM, ISM, BCM, and CM pillars, respectively, with their respective processes which deal with supply chain security directly or indirectly.

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Table 2. The Proposed MM Has Four Pillars and Four Stage-based Maturity Levels with Respective Processes

Pillars	Stage-Based Maturity Levels			
	Initial	Established	Improving	Optimizing
ITSM	Organization Context, SM Strategy and Policy	Capacity and Availability Management	Service Level and Business Relationship Management	Portfolio Management
	Incident, Request and Change Management	IT Service Catalogue Management	Release, Testing and Deployment Management	Audit Management and Top Management Review
	Event and Problem Management	Supplier Management	Financial Management	EGIT Integration
ISM	Organization Context, ISM Strategy and ISPs	Network and Teleworking Security	System Acquisition, Development and Maintenance	Outsourced Processes and Supplier Security
	Information Security Risk Management	HR Security and ISM Knowledge Program	Cryptography	Audit Management and Top Management Review
	Information Security Incident Management	Asset and Access Management	Physical and Environmental Security	EGIT Integration
BCM	Organization Context, BCM Strategy and Policy	Business Continuity Risk Management	Business Continuity Communication	Outsourced Processes and Supplier Continuity
	Define Critical Assets	Business Continuity Strategies and Plans	Business Continuity Exercises/Tests	Audit Management and Top Management Review
	BIA	BCM Knowledge Program	Business Continuity Incident Response	EGIT Integration
CM	Organization Context, Compliance Strategy and Policy	Compliance Risk Management	Internal Controls and Procedures	Outsourced Processes and Suppliers Non-Compliance
	Applicable Laws, Regulations and Contracts Definition	Business Compliance Strategies and Plans	Compliance Exercises/	Audit Management and Top Management Review
	Compliance BIA	Compliance Knowledge Program	Managing Non-compliance Incident	EGIT Integration

If an organization has implemented seven processes, for example, which have different maturity levels, the organization has to assess them all against all the maturity levels of any existing MM till each process reaches to the highest applicable maturity level. While in the proposed MM, each process is assessed just one time against its respective maturity level. How can one determine the maturity level of an organization if the processes of this organization are scattered on different maturity levels? If one uses the existing maturity measurement mindset, he/she can determine the maturity level of this organization at the lowest level fully achieved, and he/she may not consider what the organization has achieved at the other higher levels. Unfortunately, this underestimates the effort made by the organization and the respective staff. However, the researchers do not have this mindset in the proposed MM. They have developed another mechanism for measuring the maturity of any organization by evaluating the achievement of each process in all stages. There will be a maturity map depicting the overall maturity of the organization in a specific pillar and this map is called Zoom-In maturity map, while there will be another map covering the maturity of the organization in all four pillars together and it is called the Zoom-Out maturity map.

Each process can have one of three achievement levels:

- N/A, which stands for not achieving the process requirements,
- P, which stands for partial achievement of the process requirements, and
- F, which stands for full achievement of the process requirements.

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Proposed MM Stage-Based Maturity Levels And Respective Processes

Each stage-based maturity level covers only three processes, which are not covered by any other level. Table II depicts the four pillars and the respective 12 processes of each, and how these processes are carefully included in the stage-based maturity level. This proposed MM will enable organizations in MENA region to easily assess the EGIT of their processes without much time and effort. The researchers cover first pillar, which is the ITSM, and how its 12 processes are organized. The first maturity level includes only three processes: organizational context, SM strategy and policy, incident, request and change management, and event and problem management. These three processes are the basics for any organization that needs ITSM capabilities. When an organization is assessed against this level, it can have three status levels for each process which are Not Available (N/A) if they do not invest at all in this process, "Partial" if they cannot fulfil all requirements of this process or "Full" if they fulfil all requirements of this process. The organization can go on and assess the maturity of the processes of the second, third, and fourth levels, which have different processes, even if they do not fully achieve the level for all three processes of level one. This way enables organizations to know their strengths and weaknesses, which may be scattered and not combined in just one maturity stage. It is normal to find an organization with mature processes in a higher maturity stage, while they do not have some mature processes in lower maturity stages. Therefore, the researchers have a maturity map to depict the full image of the organization's EGIT maturity in each pillar. All processes in the four pillars is assessed in terms of the three aspects: process, technology, and people.

Therefore, the 12 processes of ITSM are not assessed on each maturity level like in other MMs. These 12 processes are divided into four maturity stages/levels based on their complexity and dependencies with other processes. Therefore, each process is assessed only once, instead of four times. The other three pillars are handled like the ITSM exactly but with their respective distinctive processes. Thus, organizations can measure their AS-IS and easily define their TO-BE maturity levels. Organizations can now easily set EGIT strategies over time with annual improvement initiatives that can be implemented, managed, evaluated, and corrected easily if needed.

Proposed MM Interfaces

The proposed MM does not reinvent the wheel as it uses current MMs, best practice frameworks, and ISO standards, and adds more features and capabilities. The proposed MM merges, integrates, and improves some existing MMs to provide a more efficient and effective MM for the MENA region organizations. The proposed MM uses the following references:

1. ITIL v3/2011/v4 ITSM framework and ITIL PMF MM.
2. COBIT 5/2019 and process capability/CPM MM.
3. M_o_R and ISO 31000:2009 (ISO/TC 262 Risk management 2009) management of risk MM.
4. PRINCE2 (AXELOS 2017) and MSP (AXELOS 2011) frameworks and P3M3 MM (AXELOS, n.d.).
5. ISO 37301:2021
6. ISO/IEC 27001:2013
7. ISO 22301:2019
8. ISO/IEC 20000-1:2018 (ISO/IEC JTC 1/SC 40 IT service management and IT 2018)
9. ISO/IEC 33003:2015 (ISO/IEC JTC 1/SC 7 Software and systems engineering 3AD)
10. ISO/IEC 33020:2014

All these selected MMs, best practice frameworks, and ISO standards provide support to some components of the proposed MM.

Although there are many other related MM frameworks and ISO standards, these are considered direct sources of guidance based on their success and familiarity in the MENA region market. These four frameworks and their respective MMs and the six ISO standards affect the proposed MM, which has been developed to match the market needs while enabling the organizations to use whatever pillar/s they really need to assess.

The relationship between the proposed MM and the existing MMs and ISO standards in Table I depicts the direct relationship between the pillars of the proposed MM and the pillars of the existing MMs and the requirements of ISO standards. Other ISO standards can be used as references, such as ISO/IEC 38500 (ISO/IEC JTC 1 Information technology, 2008) and ISO 21500 (ISO/TC 258 Project, 2021).

The Proposed MM Evaluation Results

The proposed MM has undergone an evaluation process in three organizations, and the evaluation results are

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presented below. The evaluation process, which is the 3rd stage in the proposed MM development methodology and lifecycle stages, constitutes a full stage and covers the evaluation of the MM before it can be published to the research community and the EGIT MM market. The evaluation starts by planning the introduction of MM to a sample of three organizations that are interested in implementing EGIT MM. These organizations will undergo an experimental implementation of the MM internally with the researchers' support. The introduction procedure will include providing awareness sessions to different levels of stakeholders, including the organization's top management and IT staff, to introduce the MM to them and explain its importance and impact on the organization and its objectives. The need for their participation and cooperation will be explained in the awareness sessions and will be practiced in workshops to increase their preparedness.

Implementation will be performed by arranging and conducting a group of workshops with all respective stakeholders to assess their processes against the MM. At the beginning of these workshops, an example will be elaborated to all participating stakeholders to cover how to use the MM and all its maturity levels. Then, an assessment of their respective processes will be conducted on the MM with the researchers' support. All results of the assessed components will be reviewed by top management to validate the results. If any differences are discovered, the respective components will be reassessed to reach the actual performance.

The MM was introduced to three participating organizations of different sizes and nature. The first is working in the field of security printing and security solutions; the second is managing seaports; and the third is an IT service integrator providing consultancy services. The first is in about seven countries, but the evaluation occurred with the stakeholders of the two headquarters in Egypt and the UAE. The second manages approximately 70 ports worldwide and impacts the worldwide supply chain movement, but the evaluation occurred with the stakeholders of the headquarters in Egypt. The third one delivers IT services and their integration to support their customers' operations in Egypt, Sudan, and the UAE, and the evaluation covers all of them. Everyone delivers different services to their customers, but all of them are interested in measuring the maturity of their EGIT and supply chain capability easily. The first two received support in conducting the evaluation as they requested to have third-party evaluation, while the third one chose to have it first party self-assessment by managing it by themselves after getting the introduction. Table III presents the results of the assessment of the five principles of the three participating organizations. Only one of these organizations, the first one, has fully achieved the five pillars based on the nature of their field of work and its criticality.

Table 3. The Results of Assessing the Five Principles in the Three Participating Organizations
[(p) partial achievement and (f) full achievement]

Organization	The Five Principles Maturity Level				
	Strategy	Change M anagement	Operation Management	Risk Management	Continual Measurement and Improvement
1st	F	F	F	F	F
2nd	P	F	F	F	P
3rd	P	P	P	P	P

Assessing the maturity of EGIT in each organization has specific challenges based on their respective maturity and interests. This also reflects their achieved maturity level, although all of them were interested in increasing their maturity after the assessment. The assessment helped them understand their current state and weaknesses. Table IV presents the results of the ITSM pillar assessment for the three participating organizations. No one has fully achieved this pillar, despite the importance of the processes included. The three organizations can be considered to have some ITSM processes in a manner that supports them in performing their day-to-day operations without reaching a well-documented process with clear roles and responsibilities. Supply chain sustainability is impacted by many ITSM processes including and not limited to Availability and Capacity Management, IT Service Continuity Management, Supplier Management, Incident, Request and Change management and Event and Problem Management.

Table 4. The Results of Assessing the ITSM Pillar in the Three Participating Organizations [(n/a) not available, (p) partial achievement, and (f) full achievement]

Pillar	Stage-Based Maturity Levels	Processes	1st Org. Achieved Maturity	2nd Org. Achieved Maturity	3rd Org. Achieved Maturity
ITSM	Initial	Organization Context, SM Strategy and Policy	N/A	P	P
		Incident, Request and Change management	P	P	F
		Event and Problem Management	P	P	P
	Established	Capacity and Availability Management	P	P	P
		IT Service Catalogue Management	N/A	P	P
		Supplier Management	P	P	P
	Improving	Service Level and Business Relationship Management	P	P	P
		Release, Testing and Deployment Management	P	P	P
		Financial Management	P	P	P
	Optimizing	Portfolio Management	P	P	P
		Audit Management and Top Management Review	P	P	N/A
		EGIT Integration	P	P	P

Table V presents the results of the ISM pillar assessment for the three participating organizations. No one has fully achieved this pillar despite the importance of the processes included, especially the first one, which provides critical security printing services and other security services. The three organizations can be considered to have some information security policies and procedures in a manner that supports them in performing their day-to-day information security operations without reaching a well-documented process with clear roles and responsibilities. Although all of them have invested in information security technical solutions such as anti-virus, firewalls, security information and event management (SIEM), among others, they have not invested in a well-documented and measured management system including defined processes with clear roles and responsibilities. Supply chain sustainability is impacted by many ISM processes including and not limited to Information Security Risk Management, Information Security Incident Management, Asset and Access Management, Cryptography, Physical and Environmental Security and Outsourced Processes and Supplier Security.

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Table 5. The Results of Assessing the ISM Pillar in the Three Participating Organizations [(n/a) not available, (p) partial achievement, and (f) full achievement]

Pillar	Stage-Based Maturity Levels	Processes	1st Org. Achieved Maturity	2nd Org. Achieved Maturity	3rd Org. Achieved Maturity
ISM	Initial	Organization Context, ISM Strategy and ISPs	F	P	N/A
		Information Security Risk Management	F	P	N/A
		Information Security Incident Management	P	P	N/A
	Established	Network and Teleworking Security	P	P	P
		HR Security and ISM Knowledge Program	P	F	N/A
		Asset and Access Management	P	P	P
	Improving	System Acquisition, Development and Maintenance	P	P	P
		Cryptography	P	P	P
		Physical and Environmental Security	P	P	P
	Optimizing	Outsourced Processes and Supplier Security	F	P	P
		Audit Management and Top Management Review	F	P	N/A
		EGIT Integration	P	P	N/A

Table VI presents the results of the BCM pillar assessment for the three participating organizations. Again, none of them has fully achieved this pillar despite the importance of the processes included, especially the second one, which has critical systems to manage a large number of containers and ships per day. The three organizations can be considered to have continuity management technical solutions that support them to have backups, high-availability, and disaster recovery capabilities that can be used whenever needed. They do not have a well-documented process with clear roles, responsibilities, and measurement. Supply chain sustainability is impacted by many BCM processes including and not limited to BIA, Business Continuity Risk Management, Business Continuity Strategies and Plans, Business Continuity Communication, Business Continuity Exercises/Tests, Business Continuity Incident Response and Outsourced Processes and Supplier Continuity.

Table 6. The Results of Assessing the BCM Pillar in the Three Participating Organizations [(n/a) not available, (p) partial achievement, and (f) full achievement]

Pillar	Stage-Based Maturity Levels	Processes	1st Org. Achieved Maturity	2nd Org. Achieved Maturity	3rd Org. Achieved Maturity
BCM	Initial	Organization Context, BCM Strategy and Policy	Partial	N/A	N/A
		Define Critical Assets	Partial	Partial	N/A
		BIA	N/A	Partial	N/A
	Established	Business Continuity Risk Management	Partial	Partial	N/A
		Business Continuity Strategies and Plans	Partial	Partial	P
		BCM Knowledge Program	N/A	Partial	N/A
	Improving	Business Continuity Communication	Partial	N/A	P
		Business Continuity Exercises/Tests	Partial	Partial	P
		Business Continuity Incident Response	Partial	Partial	P
	Optimizing	Outsourced Processes and Supplier Continuity	N/A	Partial	P
		Audit Management and Top Management Review	Partial	Partial	N/A
		EGIT Integration	Partial	Partial	N/A

Table VII shows the results of the CM pillar assessment for the three participating organizations. Again, none of them has fully achieved this pillar, despite the importance of the processes included. Only the first organization has invested in hiring a professional specialist to define the respective regulations and start developing the internal compliance program, while the other two organizations believe that there are no regulations related to them in the countries, they are working in till now. Based on the countries where these organizations work, it is clear why the first one cares about compliance as it exists in the UAE, while the other two exist mainly in Egypt and Sudan. What seems strange to some of them is to consider compliance as an internal pillar, as they think that it should only be managed as an external compliance. All of them are starting to understand the newly published regulations by their governments and try to select the applicable ones to develop their compliance management systems accordingly. Supply chain sustainability is impacted by many CM processes including and not limited to Compliance BIA, Compliance Risk Management, Business Compliance Strategies and Plans, Managing Non-compliance Incident and Outsourced Processes and Suppliers Non-Compliance.

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Table 7. The Results of Assessing the CM Pillar in the Three Participating Organizations
[(n/a) not available, (p) partial achievement, and (f) full achievement]

Pillar	Stage-Based Maturity Levels	Processes	1st Org. Achieved Maturity	2nd Org. Achieved Maturity	3rd Org. Achieved Maturity
CM	Initial	Organization Context, Compliance Strategy and Policy	Partial	N/A	N/A
		Applicable Laws, Regulations and Contracts Definition	Partial	N/A	N/A
		Compliance BIA	Partial	N/A	N/A
	Established	Compliance Risk Management	Partial	N/A	N/A
		Business Compliance Strategies and Plans	Partial	N/A	N/A
		Compliance Knowledge Program	Partial	N/A	N/A
	Improving	Internal Controls and Procedures	Partial	N/A	N/A
		Compliance Exercises/	Partial	N/A	N/A
		Managing Non-compliance Incident	N/A	N/A	N/A
	Optimizing	Outsourced Processes and Suppliers Non-Compliance	Partial	N/A	N/A
		Audit Management and Top Management Review	N/A	N/A	N/A
		EGIT Integration	N/A	N/A	N/A

The Proposed MM Evaluation Discussion

At the end of the MM evaluation procedure, there was a feedback collection from all participating stakeholders. Each type of stakeholder would have a specific feedback as top management can be asked about whether the MM helped them measure their organization's EGIT maturity level and enabled them to move forward, while process and component owners and IT technical staff can be asked about whether the MM is easy to use and whether it covers their expectations. At the same time, both levels are asked whether the MM still needs improvement and in which aspect. Table VIII depicts how the three organizations evaluated EGIT MM after using it for the first time. They were provided with ten questions, eight of which could be answered by selecting a level from one to ten. Level one is the lowest while ten is the highest. The ninth question was about whether they wanted to use the EGIT MM on their own in the next time. The tenth question asked them about what the EGIT MM lacked and asked them to provide feedback and comments. The ten questions are:

Table VIII. The Results of EGIT MM Evaluation in the Three Participating Organizations

The EGIT MM Evaluation Questions	The Answers of the Participating Organizations		
	1st Org	2nd Org	3rd Org
Do you think that the stage-based feature of the EGIT MM is easier to use and saves your time?	7	8	9
Do you think that the multidimensional feature of the EGIT MM is easier to use and saves your time?	9	8	9
Do the ITSM, ISM, BCM, and CM dimensions of the EGIT MM suite your organization EGIT needs?	9	8	8
Do you think that the multipurpose feature suite your organization needs?	6	7	8

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How much do you think the assessment of the EGIT MM is easy?	8	8	7
Do you think that the first, second, and third-party assessment feature suites about your organization?	6	6	6
Is the selection of the processes suitable?	8	7	8
Is the order of the selected processes suitable?	9	8	9
Do you like to use the EGIT MM in the future on your own?	Yes, 3rd Party Assessment	Yes, Self-Assessment	Yes, Self-Assessment
What does the EGIT MM lack?	Detailed assessment and recommendations.	should be automated	should be automated

Based on the results of the analysis and how the MM has been accepted by the three organizations, it will be published to the community. The third organization added that the Incident, Request, and Change Management process in the initial stage of the ITSM pillar should be divided into two processes: incident and request management process and change management process. Table IX depicts the average evaluation of EGIT MM received from the three participating organizations on a scale of 10.

Table 9. The Results of EGIT MM Evaluation in the Three Participating Organizations

Feature	Average evaluation out of ten
Stage-based	8
Multi-dimensional	8.6
ITSM, ISM, BCM and CM dimensions	8.3
Multi-purpose suitability	7
EGIT MM easiness	7.6
Process selection suitability	7.6
Selected processes order suitable	8.6

Conclusions

Many organizations are interested in EGIT in developing countries and specially the MENA region due to the emerging regulations and laws related to governance of IT, Information Security/Cybersecurity and Business Continuity which impact supply chains sustainability. Complying to these regulations and laws does not only protect from legal penalties and fines as it guarantees the survival in an ever-changing market with different types of attacks and pandemics. In this paper, the researchers proposed a stage-based multidimensional process based EGIT MM which is needed in MENA region to match its context and capabilities. The selection of the four pillars, ITSM, ISM, BCM, and CM, was a good choice and combining them in a stage-based MM, making it easy for organizations to assess their EGIT maturity from different dimensions without having to measure each process many times. The selection of the processes is good and can be fine-tuned in the future, and the MM can be automated to make it easier for assessors and organizations.

Future Work

Although the EGIT MM has been developed and evaluated with the participation of three organizations, there are several necessary activities to be undertaken in the future:

1. Revamp the incident, request, and change management process by merging incident and request management into a single process, while creating a separate change management process that is more easily assessable.
2. Consolidate the audit management and top management review processes instead of duplicating them four times. This can be accomplished by sharing these two processes across the four pillars.
3. Create an online website to automate the MM and all its components, allowing organizations to assess their maturity in a user-friendly manner. The website should have the capability for multi-purpose, multi-dimensional, and stage-based maturity level assessments, enhancing effectiveness and efficiency.
4. Develop guidance for individuals interested in becoming assessors, providing them with knowledge on how to familiarize themselves with the proposed MM, the required skills and knowledge, and how to effectively utilize it. This guidance will be accessible on the website.
5. Continuously gather feedback from organizations utilizing the EGIT MM and analyze it every three

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to six months to identify trends and address comments and recommendations.

6. Offer support to researchers who are interested in analyzing or developing MMs related to EGIT, leveraging knowledge and experience.

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