Proposal for a BIM Adoption Framework in the Syrian Engineers Syndicate: A Case Study of the Homs Branch

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Abstract

The application of the Building Information Modelling (BIM) concept has become an indispensable necessity in the Architecture, Engineering, Construction, and Operations (AECO) sector. This has been evident in the experiences of numerous Arab and foreign countries that have changed their policies and issued new standards, guidelines, and codes for implementation. In Syria, we must also embark on the reconstruction phase, with its massive investment projects, using BIM technology. The primary driver of this change will undoubtedly be the government sector by imposing new policies at all levels across all institutions. Therefore, this study aims to highlight the mechanism of the Syrian Engineers Syndicate as a political authority capable of making structural modifications to the policies followed in carrying out engineering works and, from its position, able to mandate the use of BIM. Accordingly, the researcher analyzed the internal system of the Syrian Engineers Syndicate to examine the required modifications and proposed a framework for adopting BIM in engineering syndicates. The study focuses on establishing a "Building Information Modelling and Management Committee" within the Engineers Syndicate in Homs Governorate as a case study, suggesting its structure, job titles for its members, and their roles. This study aims to develop current policies and create the first-of-its-kind guide for engineering syndicates in Syria. The researcher relied on the content analysis method of previous studies to benefit from international experiences related to the importance of activating the government's role in adopting the BIM concept. Additionally, the researcher adopted the strategic plan methodology for the adoption of BIM in Syria, considering it the general guide and leader in the digital transformation process in Syria

Keywords: Building Information Management; Policy Axis; BIM Adoption Framework; Syrian Engineers Syndicate; Internal System

1. Introduction

There is no doubt that Building Information Modelling (BIM) is a fundamental pillar in the construction of modern civilization. It represents an advanced technology that combines innovation and technology to achieve the highest levels of efficiency and organization in construction processes. The biggest benefit is time reducing in schedule preparing trough BIM technology[1] Many issues are raised such as failure to meet the client requirement, delay in delivering projects in time, cost overrun, low quality, conflicts among parties, shortage of qualified workers, safety issues, increasing requests of change order, increasing in material wastes and project complexity.

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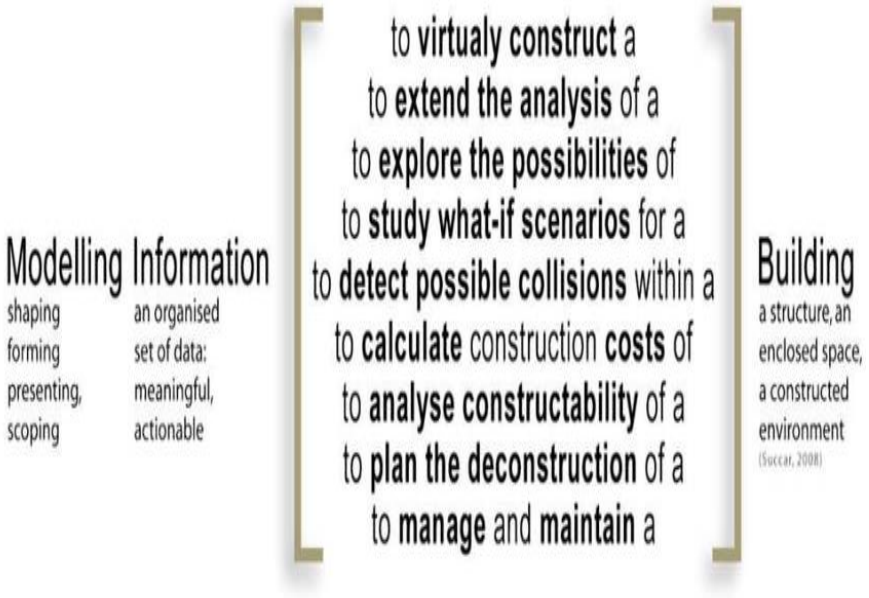

Figure 1: Some common connotations of multiple BIM terms (Succar, 2008)

This study will serve as the foundational nucleus to practically and methodically adopt BIM within the workflow. It will encompass an in-depth analysis of the internal regulations of engineering syndicates and related entities, along with necessary structural requirements for BIM adoption, ultimately leading to its official implementation in Syria. Building Information Modelling (BIM) is an expansive knowledge domain within the Architecture, Engineering, Construction and Operations (AECO) industry.[2] This research aims to propose a comprehensive framework for Syrian engineering syndicates to integrate Building Information Modelling into their systems. Previous studies have addressed policy amendments for BIM adoption, emphasizing the government's essential role in leading the digital transformation towards BIM. Some studies discussed the automation of governmental processes for electronic issuance of building permits and suggested new frameworks as part of the transition to a BIM environment, a responsibility that lies with governments. Research related to the Syrian context highlighted barriers to BIM adoption and proposed solutions to advance the Syrian engineering sector in line with global best practices, stressing the Syrian government's role in strategizing mandatory BIM adoption. The key study referenced in this research outlined comprehensive strategic planning concepts for Syria and developed a strategic plan for BIM adoption aligning with the Syrian government's developmental programs. It shed light on policy-related aspects and their practical application in this research. However, none of these studies deeply explored BIM adoption at the level of governmental institutions like the Engineers Syndicate, nor did they propose development frameworks or plans, despite these being crucial entities in the public sector. Engineering syndicates are pivotal in facilitating any engineering project, issuing mandatory regulations, and capable of developing improvement plans. They also serve as social hubs for engineers, promoting the rapid spread of BIM adoption across all engineering sectors. In general, Syria has not yet commenced developmental planning or necessary frameworks for BIM adoption within its governmental institutions. In addition, there is a lack of awareness regarding financial returns, the main reason for unclear economic benefits is that the use of BIM technology will increase the cost of technology and personnel training, while reducing the cost of resource use, and the time cost brought by BIM technology cannot be quantified. [3]

2.Methodology

The descriptive methodology was employed in this study to achieve a precise and detailed understanding of the problem elements, aiming to reach the main objective of modifying policies and procedures necessary for the comprehensive shift towards BIM in all Syrian governmental institutions. The study relied on the case study approach and utilized qualitative

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analysis tools to review literature, examine various countries' experiences, and derive suitable plans and strategies for the Syrian context. Additionally, it explored the job titles of BIM environment workers according to best global practices. Furthermore, the internal regulations of the Syrian Engineers Syndicate, established in 2010 under Decree No. /80/, were analysed. The research community included the Syrian Engineers Syndicate in Homs Governorate, affiliated with the Ministry of Public Works and Housing. The research's temporal boundaries were between April and July 2024, with the human boundaries comprising the syndicate's president, engineers with engineering offices, and engineers working in the syndicate's building. Previous literature was analysed, and information was collected on the role of the public sector and its impact on the adoption of BIM in several countries worldwide. The study significantly relied on the research that provided a comprehensive roadmap and strategic plan for BIM adoption in Syria. Additionally, the internal regulations of the Syrian Engineers Syndicate were reviewed to gather information and observations, study its structure, assess its current state, and then propose plans and modifications that the syndicate could adopt to reach a new structure compatible with the requirements of BIM adoption in Syrian governmental institutions.

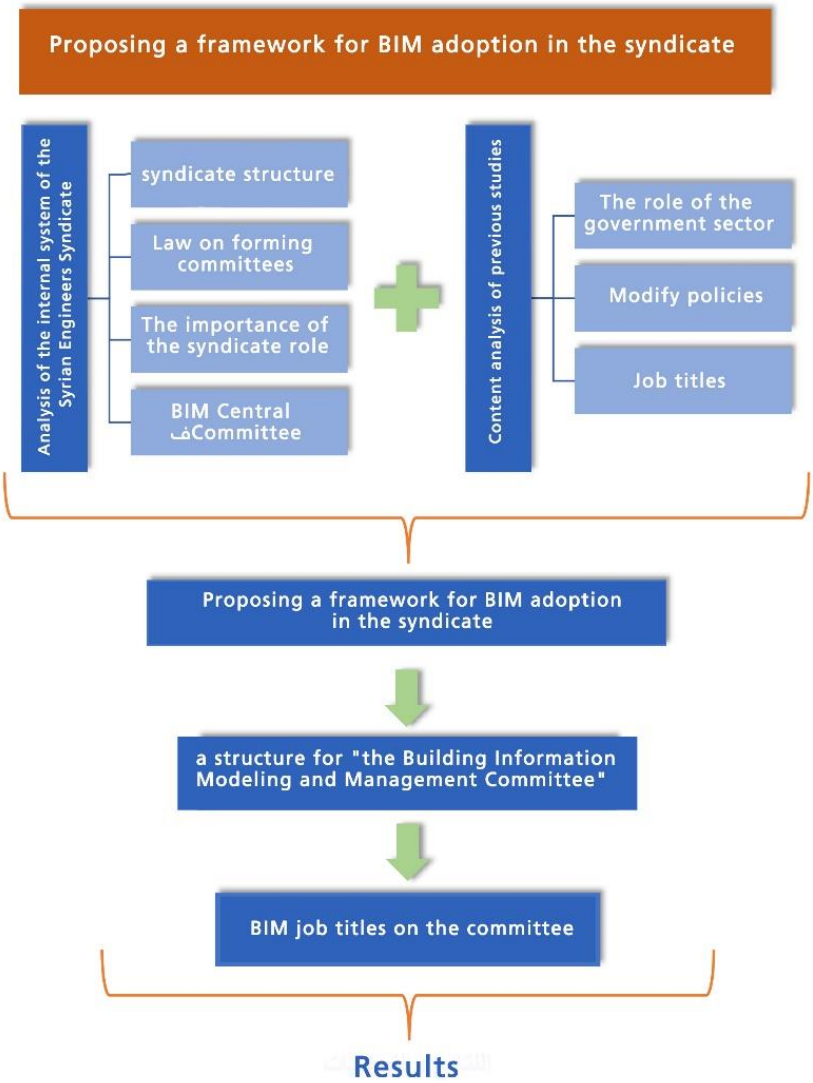

Figure 2: a framework for BIM adoption in in the Syrian Engineers Syndicate

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3. Literature Review

Overview:

Previous studies have addressed issues related to policy modification for BIM adoption. Most of these studies emphasized the crucial role of the government sector in leading the digital transformation towards BIM. Some studies discussed the automation of government processes for issuing building permits electronically and proposed new frameworks for these processes as part of the transition to a BIM environment, which is a responsibility of governments. Certain studies focused on the Syrian context, highlighting the obstacles to BIM adoption and suggesting solutions to improve the engineering landscape in Syria in alignment with the local context and global best practices. These studies emphasized the role of the Syrian government in developing strategies to mandate BIM adoption.

Obstacles to applying BIM in the construction sector in Syria:
AEC projects in Syria faced numerous challenges, including delays, budget overruns, poor quality, low productivity, lack of sustainability, and more. Nevertheless, Building Information Modeling (BIM) has demonstrated its potential to address these problems effectively. Some of the main obstacles to BIM adoption in Syria include [4]:

- Risks of ambiguity (unclear specifications, client requirements, required task quality).
- Information theft and subsequent errors in construction work.
- 3D models and their 2D exports are not updated due to a lack of collaboration between project parties.

POTENTIAL ROLES OF THE PUBLIC SECTOR FOR BIM ADOPTION:

six major roles of the public sector regarding BIM adoption are analyzed and illustrated in figure. 2, which are (1) initiators and drivers, (2) regulators, (3) educators, (4) funding agencies, (5) demonstrators, and (6) researchers.[5]

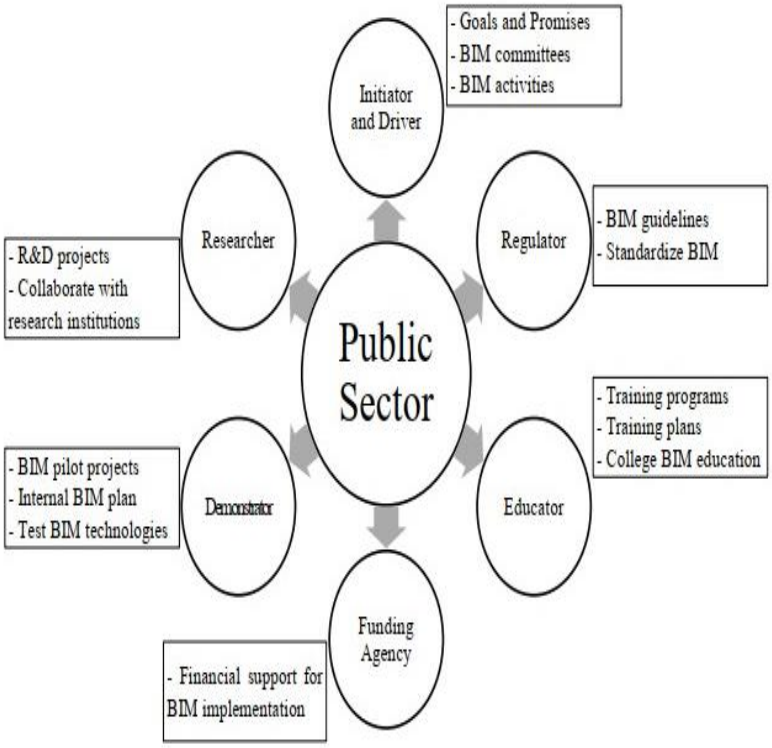

Figure 3: Roles of the public sector for BIM adoption

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The Strategic Plan for BIM Adoption in Syria:

Researcher Hamza Omran initiated a unique project by developing a strategic plan for BIM adoption in Syria. He prepared the plan based on the general comprehensive planning methodology, which serves as a blueprint for the enabling environment of the BIM plan in Syria.[6] The methodology for preparing the plan is illustrated in figure 4:

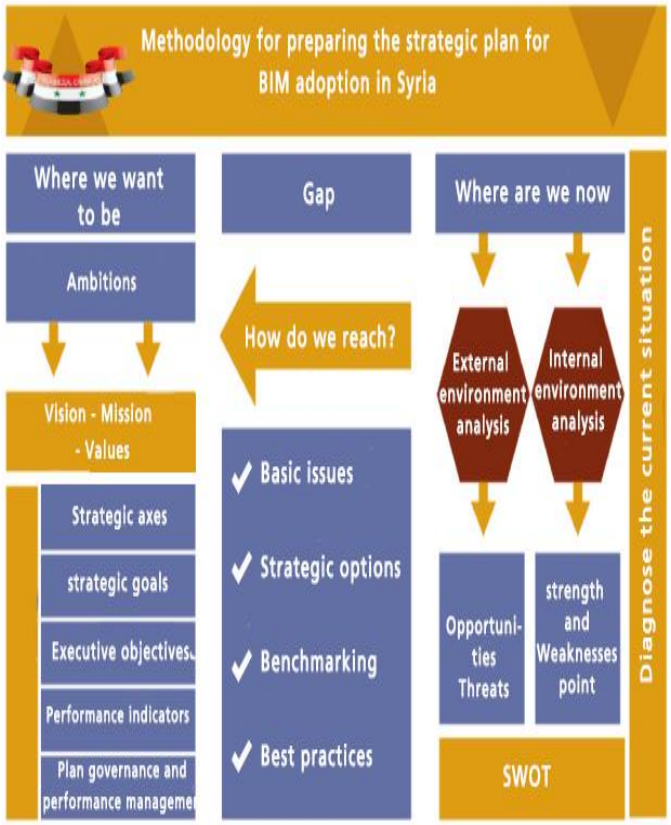

Figure 4: Methodology for preparing the strategic plan for BIM adoption in Syria

4. Results

The Importance of the Syrian Engineers Syndicate in Enforcing BIM Adoption in Engineering Work:

The most significant organizations representing the government sector are syndicates and similar entities that bring engineers together in a unified body, facilitating the management, development, and enhancement of the engineering profession through collective participation. In today's era of significant engineering advancements and the advanced industrial revolution, BIM (Building Information Modelling) is the digital transformation tool that the Syrian government, like other governments, is calling for. Given this context, the serious adoption of BIM in Syria necessitates a supportive environment to disseminate, reinforce, and officially implement the concept of Building Information Modelling and management. Undoubtedly, the Syrian Engineers Syndicate is the stable cornerstone and the ideal incubator for initiating this journey of development. One of its primary goals, as stated in Article 2 of its internal regulations, is "comprehensive sustainable development, societal advancement, and the construction of human civilization."

Establishing a permanent committee under the name "Building Information Modelling and Management Committee"

The researcher proposed the establishment of a new committee to be added to the list of permanent committees within the Syrian Engineers Syndicate, Homs Branch, under the name

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"Building Information Modelling (BIM) Committee." This committee would be linked to the central committee in the Damascus Syndicate, based on the objectives of the syndicate outlined in the internal regulations of the Engineers Syndicate, specifically: "The formation of divisions, departments, and permanent and temporary committees," as stated in Article 2, Section B.

Additionally, this proposal is based on Article 106, which stipulates: "Each branch council has the right to form permanent committees similar to those mentioned, in accordance with the provisions of Articles 98, 99, and 100 of these regulations, to facilitate its work. These committees are formed, and their operations are defined by the branch council, with the branch president acting in place of the chief to call the committees to convene."

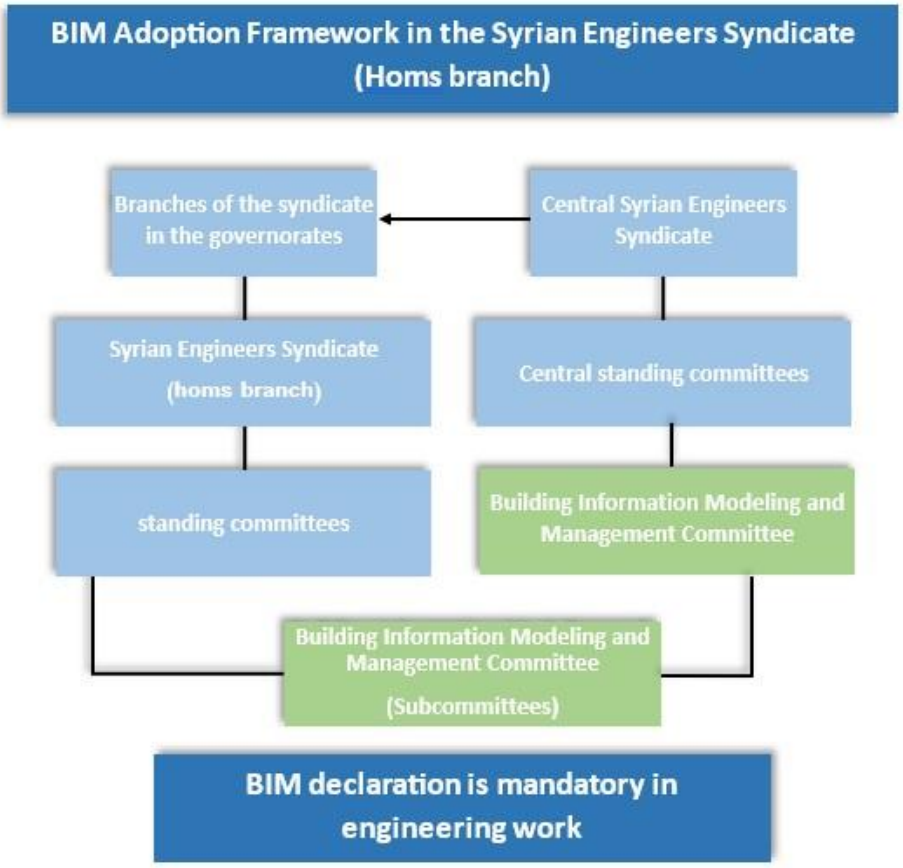

Figure 5: BIM Adoption framework for the Syrian engineer's syndicate (Homs branch)

Proposed Conditions for Accepting Members into the "Building Information Modelling (BIM) Management Committee"

If a committee is formed based on modern concepts, such as the BIM committee, there will be a need to make some amendments to these foundations in order to fit the requirements of this committee**.**

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Table 1: Conditions for Accepting Members into the "Building Information Modelling (BIM) Management Committee"

Proposing a structure for "the Building Information Modelling and Management Committee"

Proposed Conditions for Accepting Members into the "Building Information Modelling (BIM) Management Committee"	
The member of the "Building Information Modelling (BIM) Management Committee" must hold a Bachelor's degree in one of the engineering disciplines (Architecture, Civil, Electrical, Mechanical) in addition to a Master's degree in Building Information Modelling and Management	1
least half of the members of the BIM Committee must be engineers who hold the rank of (Consultant one of the disciplines + experience in BIM / Master's in BIM) or (Practitioner in one of the disciplines + experience in BIM / Master's in BIM).	2
A member of the BIM Committee must be an engineer with at least 3 years of professional experience or possess a portfolio demonstrating their expertise in Building Information Modelling and Management, with a specific number of projects to be determined later to qualify for committee membership.	3
The committee chairperson must be an engineer with the rank of (Consultant in one of the engineering fields + experience in BIM / PhD in BIM) or (Practitioner + experience in BIM / PhD in BIM).	4

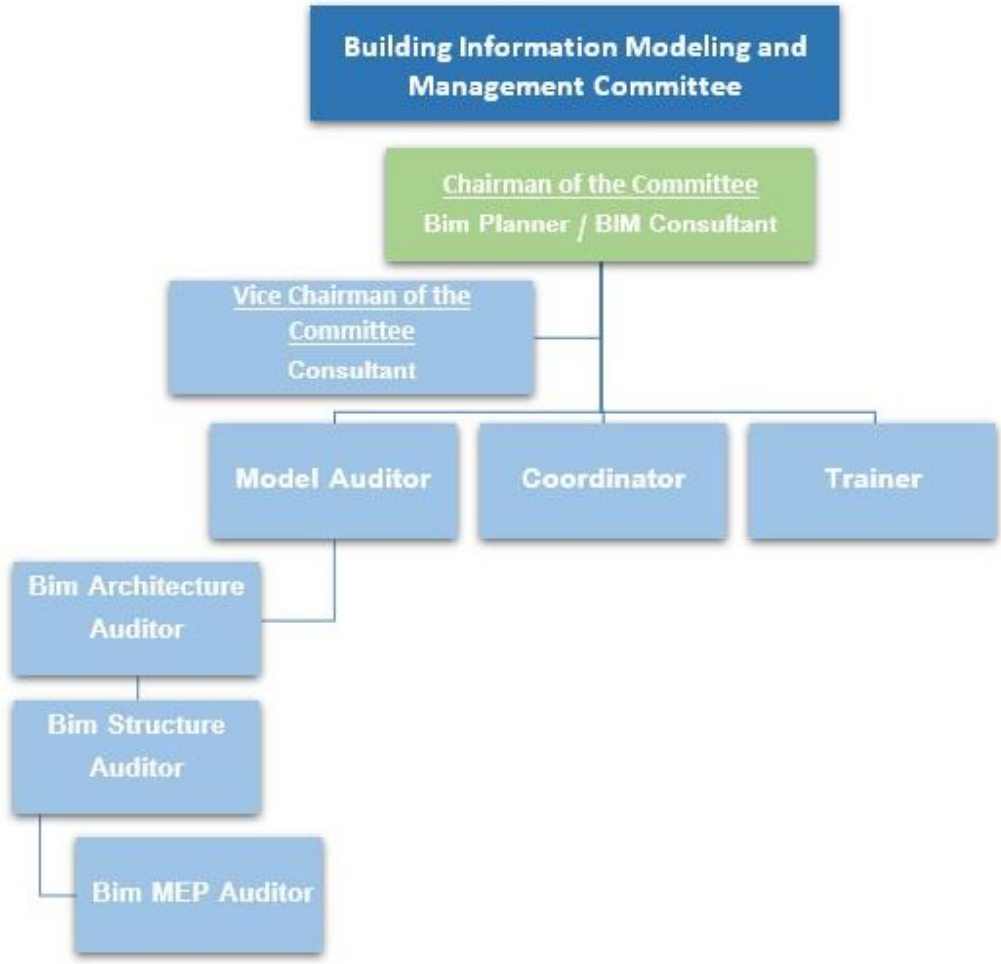

Figure 6: Proposing a structure for "the Building Information Modelling and Management Committee"

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Expected tasks of the "Building Information Modelling and Management (BIM)" committee

The success of the work of the BIM Committee and its official approval depends on the belief in its importance and the qualitative shift it will bring about in the engineering sector. To enhance the chance of success of this committee, it needs the support and participation of other committees to unify the goal and reach it in the spirit of one cooperative team. According to this vision, the "Building Information Modelling and Management" committee will carry out some tasks in partnership with other committees in the syndicate. In Table No. (2) there is the Expected tasks of the "Building Information Modelling and Management (BIM)" committee

Table 2: Expected tasks of the "Building Information Modelling and Management (BIM)" committee

Expected tasks of the "Building Information Modelling and Management (BIM)" committee			
Task	No.	Task	No.
Study the legal aspects related to the application of BIM	8	Supporting teaching curricula to integrate BIM into education	1
Communicating with government agencies concerned with engineering works to inform them of the new mechanism for working in the BIM environment	9	Create an electronic BIM library	2
Introducing new graduates from engineering colleges to the work of the syndicate	10	Preparing to hold training courses and rehabilitation programmes	3
Establishing an association or association for Syrian engineers specialized in BIM and residing abroad affiliated with the Syrian Engineers Syndicate to exchange experiences.	11	Follow technological developments and digital transformation tools	4
Create an electronic business exhibition	12	Interest in alternative energy within the context of sustainability	5
Special budget study for the "Building Information Modelling and Management" committee	13	Preserving and documenting heritage	6
Working with the book "The Syrian Guide to Modelling Construction Works"	14	Supervising the process of automating construction and licensing processes	7

Responsibilities related to each job title in the "Building Information Modelling and Management BIM" committee.

In Table No. (3) there is an explanation of the responsibilities related to each job title in the "Building Information Modelling and Management BIM" committee.

Table 3: responsibilities related to each job title in the "Building Information Modelling and Management BIM" committee.

Description	Role	Job Title
Working with committee members to develop and implement a BIM strategy	Strategizing	**Committee Manager** BIM Planner/Consultant
Taking an active role in creating BIM standards for projects or organizations	BIM Standards	
Contribute to developing the BIM Execution plan	BEP Set	
Planning on how to follow design and coordination procedures for project members	Develop procedures	
Develop a strategic plan and form a team to develop a BIM guide in Syria and develop the Syrian code for BIM application	Issuing manuals and codes	

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To organize the relationship between the designing and implementing party and the owner in the form of BIM contracts	Study legal aspects	
Training engineers within the syndicate to work in the BIM environment	Developing and training engineers	Educator / Trainer
Preparing qualifying training courses for everyone who wants to learn the concept of BIM and its applications	Preparing training content	
Check BIM knowledge in the syndicate to assess demand for training	Assessing knowledge of BIM in syndicate work	
Develop new modelling methods and apply them to the project	Creating modelling solutions	Coordinator
Create a new library of form components	Contributing to libraries	
Experience in managing model licenses	Software maintenance	
Hold a coordination meeting with syndicate committees	Leading coordination meetings	
Scheduling the committee's work and setting meeting dates	Automate committee tasks	
Detect conflicts and resolve them in models submitted for auditing or returning them to designers to find solutions	Verify the validity of the form	Auditor Architecture/structure/MEP
Performing automated auditing of models through the 3D model browser, and showing cases of non-compliance with building code requirements, enabling the consultant to review the audit results and correct the detected problems early".		

5. Conclusion

The process of keeping pace with the accelerating digital and technological transformation in the world requires a lot of review of scientific research and looking at the pros and cons of global experiences to benefit from them as lessons learned that help in the process of adopting BIM in Syria. Many modern complex building projects in the public and private sectors are characterized by its poor information management which is manifested by time and cost overruns around the world. Building Information Modelling (BIM) is currently being adopted around the world with various countries mandated its implementation.[7] The United States is believed to be one of the leading countries in adopting BIM models because of its flexibility. The integrated model is user-friendly, efficient and easy to use[8] .In addition, General Services Administration (GSA) is the pioneer in implementing BIM in the US on public sector projects [9]This research sheds light on the policies followed around the world in the approach to adopting BIM, and focuses on the importance of the various roles that the government sector must play, such as including BIM in education, supporting scientific research, leading the process of change, providing the necessary financial support, and reviewing what has been successfully implemented, in addition to setting standards. Manuals and codes specific to each country or in partnership with other countries. "Generally, most countries that have started to develop BIM standards and initiatives, have placed more emphasis on design and information with seemingly little emphasis or consideration of project planning measures such as contracts, EIR and BEP documentation." [10] In this research, the bylaws of the Syrian Engineers Syndicate were analysed and the necessary amendments to its structure were proposed to enable the creation of a new permanent committee under the name "Building Information Modelling and Management Committee" in the Homs Governorate branch To help the syndicate complete all engineering work and issue building permits using modern digital methods,The building permit is an indispensable connection between the approval authority and the executive client within the construction process.[11] The structure of the committee, the conditions for its establishment, and conditions for membership affiliation were studied, and appropriate job titles for the

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committee were proposed. With the popularization of smart devices and the application of artificial intelligence and other automation technologies, numerous industries have leveraged these technical advances to innovate their business processes [12] .So that it must be mentioned that in Syria, the effort to adopt BIM began at various levels, starting with education, where a master's program for building information modelling and management was established, and the decision was again issued regarding deepening the use of BIM in teaching curricula, and also at the level of scientific research. Many scientific papers were published by Syrian researchers and the central committee "Building Information Modelling and Management Committee" was established in the Central Syrian Engineers Association in Damascus, in addition to developing a road map for adopting BIM in Syria. Preparations were made to issue the "Syrian Guide to Building Information Modelling" in addition to working on other very important guides, and many courses were conducted. Training within the Syrian Virtual University and the establishment of training programs within Damascus Governorate. From another angle, many workshops were held and many scientific days participated, all with the aim of raising the level of BIM adoption in Syria. On the other hand, performance measurement serves as a vital catalyst for change. It allows an organization to evaluate its progress toward established goals, identify strengths and weaknesses, and inform future initiatives. However, it is worth noting that knowledge of BIM in Syria is still below the required level and that this concept is still informal and non-binding. From this standpoint, the concerned authorities and the engineering segment, in addition to everyone who wishes to invest in the building and construction sector in Syria, must intensify efforts to create an enabling environment for the concept. BIM will be officially implemented in the future reconstruction phase.

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