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Collaborative B2B Business Development with Regulator and Universities: A Case Study of Glodon Indonesia

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ABSTRACT: Implementation Building Information Modeling (BIM) is aimed to create an effective, efficient and accountable construction process through the application of digital construction technology. This thesis takes PT Glodon Technical Indonesia as a case study, which indicates an empirical study of a company that provides a BIM technology for construction services industry in Indonesia. This study analyzes the role of regulators and universities in the business development of a technology company with B2B (Business to Business) products. This paper discusses the company's situation, marketing methods, strategic collaboration and market coverage. Then analyzed through the impact of government regulations, strategic cooperation with regulators and capacity building with universities. Lastly, based on an analysis of the goals and options of corporate strategic planning, this study puts forward the strategic direction of business development collaboration with regulators and universities.

KEYWORDS: B2B, Business development, Digital construction

CHAPTER I. INTRODUCTION

I.1 Background

Building Information Modelling (BIM) is a digital representation of a building process to facilitate exchange and interoperability of data and information in digital format, enabling all the stakeholders in construction to conduct a collaboration throughout the building life cycle from the design plan up to the end of the building life cycle. Yue et al. (2022) states that BIM model contains physical and graphical information, with the completeness of its elements and the attached information may vary according to the intended purpose of the BIM model itself. By utilizing the concept of big data in construction services, it is hoped that BIM will be able to increase the effectiveness and efficiency of construction industry through digitization.

BIM are divided according to several dimensions, based on their respective position on the construction life cycle processes.

Table 1.1. BIM Dimensions

Dimension	Scope
3D	Modelling
4D	Scheduling
5D	Quantity and Cost Estimation
6D	Sustainability Analysis
7D	Facility Management

Source: Ministry of Public Works, 2018

PUPR (Indonesian Ministry of Public Works and Housing) consider BIM as the solution to achieve a better construction processes, aiming at increasing the effectiveness and efficiency, and lowering the amount of rework that may occurs in construction phase. BIM implementation were first included in *Permen PU 22/2018* (Ministerial Regulation, Public Works

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22/2018), mandating its usage for government building projects that are not simple, at least 2 storey and 2000 m², encompassing structural, architectural, utility (mechanical and electrical) and landscape drawing, and also contain the quantity take off and budget estimate plan. Its is further strengthened by *Peraturan Pemerintah 16/2021* (Government Regulation 16/2021), that mandating utilization of at least 5D BIM, started from *padat teknologi* (technology intensive) category, up to utilization of 8D BIM in the *padat modal* (capital intensive) category.

Other than to solve the current issues in construction projects, BIM also included in the Ministry of Public Works for sustainable construction in Government Regulation 14/2021 for Construction Services, and Ministerial Regulation, Public Works 9/2021. Several regulations to support BIM implementation has been developed, among those are Standard *Protocol BIM in Ministry of Public Works and Housing*, Standard *Kompetensi Kerja Nasional Indonesia* (Indonesian National Work Competency Standard) for Building Drafter and also the formulation of Indonesian National Work Competency Standard for BIM. The aim of the Ministry is to reduce the non-value adding work, friction, data loses and errors that may occurs when an information is being exchanged in a construction process, allowing a better, faster and more cost-efficient construction to be conducted

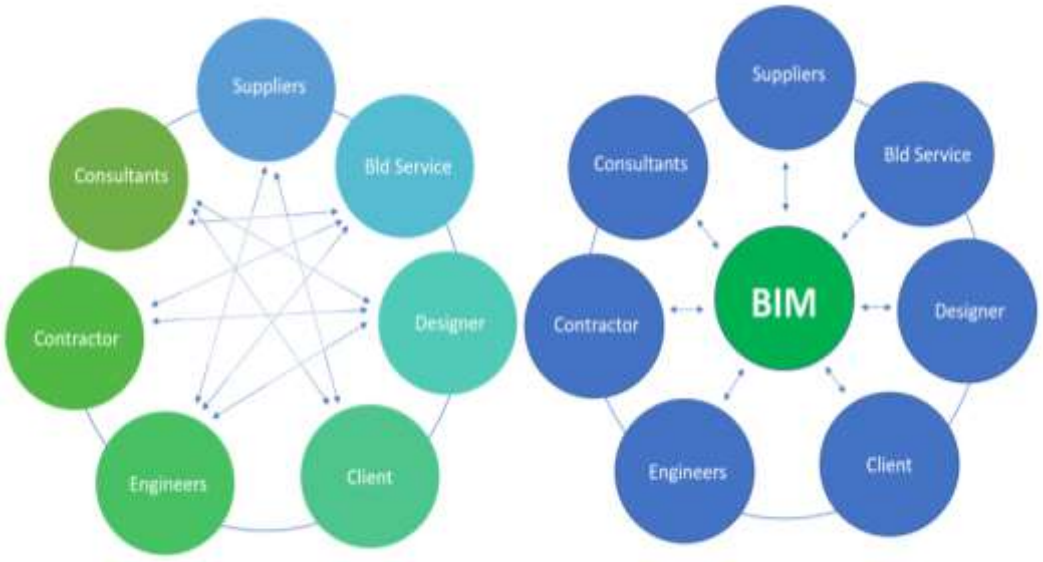

Image 1: Collaboration in Construction Industry, before and after BIM implementation
Source: Ministry of Public Works, 2021

Since BIM is divided by several dimensions, with different vendors providing different softwares, it poses challenges in capacity building and implementation of the technology itself. Ministry of Public Works and Housing seeks to unify all the different parties into a collaboration in a concept of *Open BIM*, in hopes that it will allow a better collaborative processes. The concept of Open BIM defined by (Petrie, 2022) as collaborative process that is vendor neutral, allowing BIM to improve its accessibility, usability, management and sustainability of digital data in the build asset industry. The process of Open BIM defined as shareable project information that supports seamless collaboration for all project participants, and its facilitates interoperability to benefit projects and assets throughout their life cycle. The principle of Open BIM recognize these aspects:

1. **Interoperability** is key to the digital transformation in the built asset industry
2. **Open** and neutral standards should be developed to facilitate interoperability
3. **Reliable** data exchanges depend on independent quality benchmarks
4. **Collaboration** workflows are enhanced by open and agile data formats
5. **Flexibility** of choice of technology creates more value to all stakeholders
6. **Sustainability** is safeguarded by long-term interoperable data standards

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The goal of Open BIM is to benefit the industry by:

1. Greatly enhances collaboration for project delivery
2. Enables better asset management.
3. Provides access to BIM data created during design for the whole life cycle of the built asset.
4. Extends the breadth and depth of BIM deliverable by creating common alignment and language by adhering to international standards and commonly defined work processes.
5. Facilitates a common data environment that provides opportunities for users to develop new workflows, software applications and technology automation.
6. Enables an accessible digital twin which provides the core foundation to a long-term data strategy for built assets

To allow BIM to collaborate between vendors, the software inside the BIM environment need to be able to share data and information through IFC (Industry Foundation Classes). Defined in ISO 16739-1:2018, IFC is a standardized for the digital build asset industry, it allows different vendors to improve their information sharing capability throughout the project or asset life cycle, it aims to breaking down the information silos, enable better collaboration and cooperation between stakeholders regardless of the software that were being used. BIM itself defined in ISO 19650 for managing information over the whole life cycle of a built asset, based from the same principles and requirements as UK BIM framework and aligned with UK 1192 standards, providing recommendation for a framework to manage information including exchanging, recording, versioning and organizing for all factors from strategic planning, initial design, engineering, development, documentation and construction, day-to-day operation, maintenance, refurbishment, repair, and end-of-life. It aims to remove barriers to collaborative working and competitive tendering across borders and increase opportunities.

In Indonesia itself according to Laksono, M.Y. (2022), the construction market shows a recovery trend post-covid, with estimated project value for building projects in 2023 to reach Rp 27 trillion based on the research done by BCI Central in Indonesian Construction Market Outlook (ICMO) 2023. These numbers are dominated by medical sector (Rp 12,29 trillion), educational sector (Rp 8,75 trillion) and hospitality sector (Rp 6,05 trillion). The large market allows a space for improvement that may be achieved through an innovative method such as BIM technology, where Glodon Indonesia solution focused on.

I.2 Company Profile

Established in 1998 at Haidian, Beijing, People's Republic of China, Glodon focused as Chinese construction technology company that concentrates on providing more than 100 products and services ranging from industry big data, new finance and other value added services that covers the entire life cycle of construction project. With more than 80 branches established and over 100 countries and regions serviced worldwide, Glodon providing the services to more than 310,000 clients globally from different stakeholders in the construction services industry in a B2B channels covering from developers/owners, contractors and construction consulting companies. To provide the best services, Glodon continuously develop its business by building several Research and Development Centers (Shanghai, Xi'an, Beijing, US, Finland and Poland) and also collaborate with Regulators and universities (Universities, Vocational Colleges) in People's Republic of China. The collaboration ranging from the development of Digital Construction syllabus and study modules, up to National BIM competition skills with the universities. In 2022, Glodon have more than 1,800 Education partners, accounting for 89% of Chinese AEC college and universities with more than 200,000 students learned the software in their respective college and universities.

Collaboration between Glodon with the Chinese Government both Central and Municipal, ranging from implementing existing regulation into the digital construction software, up to new technology development such as City Information Modelling to create an integrated system from planning, construction and management of an urban areas, covering both the building, infrastructure, transportation and environmental aspects. Several certifications obtained from People's Republic of China government, among those are Enterprise Certification of Key Distribution Software in National Planning, High-Tech Enterprise, Innovative Software Enterprise, Backbone Enterprise of Software Industry Base of National Torch Program, China Famous Brand, ITTS and CMMI. Government honors and awards from regulators are 2020 Excellent and Innovative Software Products, China Construction Industry Informatization Most Influential and Leading Enterprise Award, Outstanding Service Provider of Smart Cities in China, Top 10 Chinese Copyright Owners of CPCC, Best Technology Innovation Award of China

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Software Industry, China Industry Software Service Champion, Top 50 China's Big Data Companies, and Most Valuable Project Management Company in China,

Glodon focus in the technological innovation leads to vast investment in the research and development of digital construction technologies, and driven by a strategy that combines an independent research and development team, supported by cooperative sales and service departments, strong investment and, if deemed necessary, merger and acquisition. This strategy leads Glodon to own 907 software copyrights, 191 patents granted and 471 authorized trademarks, with 34% ratio of R&D investment to revenue (2020).

While other Digital Construction companies that provide service to the AEC industry usually comes from Architectural or Design background, Glodon was established as a digital construction company with core on Quantity Take-Off (QTO) and Cost Estimation in Bill of Quantity (BQ), that closely linked with Quantity Surveying (QS) profession. As a result, the most established Business Group in Glodon is the Costing Business Group. Glodon's Costing Business Group leads the Glodon development of Digital Construction product outside of People's Republic of China, by focusing itself on sales, research and development of 5D BIM. Certified with IFC, Glodon 5D BIM Cubicost is the first software that being marketed in global market, focusing on construction process in costing aspect (QTO up to BQ), and fit with the role of QS or Estimator. Cubicost aimed as a BIM-based solution that offers faster and more accurate QTO and Cost Management, allows a construction services to have less dispute, less waste and less time-consuming process.

Started in 2013, Glodon begins its first extension to South East Asian market by opening a new branch in Hong Kong, followed by Indonesia at 2015. Collaboration in South East Asia following a standardized approach by collaboration with RICS (Royal Institute of Chartered Surveyors) and QS Association. This approach largely successful because the influence of RICS and the role of QS in Commonwealth countries are well-defined, leads to a success in the development of Glodon branches in Malaysia and Singapore.

Since 2019, Glodon Indonesia transform itself to be better serve the Indonesian construction services, first by register itself as Limited Liability Company, forming partnership with Universities and Polytechnics, and also collaboration with the Government, especially the Ministry of Public Works and Housing. The collaboration in Indonesia have a very different approach compared with other countries in South East Asia, with less emphasizes on QS and its association and leaning more towards universities and Regulators.

I.3 Business Issue

While conducting business in Indonesia Glodon faced some business issues, the number of clients remains low, prospects reluctant to purchase the Cubicost 5D BIM solution, sales volume hasn't been able to reach the assigned target and lack of users in the market. The main issue is the lack of regulation for mandating BIM regulation, lack of knowledge regarding BIM in the industry and educational institutions and lack of training facilities available that raising concerns about availability of individuals with capacity to utilize the technology. All those factors are the effect from construction services industries customs that hinder the new technology to be implemented, those customs are as follows:

1. Costs are calculated as project-based. Even if the software purchased is annual subscription or perpetual licenses, the cost will be calculated per project, therefore increasing the estimated cost for implementation.

2. Staffs are often hired as project based, especially in consultants. This means they will hire someone who already have the capability rather than developing their talent in-house. The lack of available talent in the market becomes a concern and objection for their BIM implementation.

Table 2: Sales and New Client Performance of Glodon Indonesia

No	Year	Actual Sales	New Clients	Growth Rate
1	2015	Rp 648,000,000	14	-
2	2016	Rp 960,000,000	25	48%

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3	2017	Rp 2,400,000,000	32	150%
4	2018	Rp 2,100,000,000	15	-12.5%
5	2019	Rp 6,672,000,000	37	218%
6	2020	Rp 9,750,000,000	40	46%
7	2021	Rp 6,228,000,000	30	-36%
8	2022	Rp 14.320,000,000	86	130%

Source: Glodon Indonesia, 2022

In developing business, Glodon Indonesia follows the general roadmap of Glodon business development program in Asia by focusing on collaboration with QS associations and highlight the software benefit for the QS professionals. This collaboration began in 2015 with joint events, promotional campaigns, capacity building and comparative studies to Glodon headquarters in Beijing, People's Republic of China. After 4 years of implementing this strategy, Glodon growth remains low, market coverage that only focused in DKI Jakarta province, lack of market awareness on BIM technology concept and lack of confidence on the software solution from the clients.

In 2019, Glodon Indonesia decided to change their approach in Indonesian construction market from the previous collaboration that emphasized on working closely with QS and QS Association, switched to collaboration with educational institutions and regulatory bodies. This decision were taken considering the following factors:

1. *Business Environment*

   The external factors in Indonesia are different with other countries where Glodon operates. In Indonesia, the QS role is not clearly defined, leads to less influence from the Association and RICS as well that has been decisive in the successful business in other countries. Their associations also doesn't have strong influence in the construction services industry, due to the limited influence of their members in the Indonesian construction service industry. Therefore, a different approach need to be established to support Glodon business in Indonesia, without focusing as a QS software like Glodon did in Malaysia, Singapore and Hong Kong. Since associations role in Indonesia more focused on providing validation of SKK for construction services industry and professionals, collaboration with them will be good for building awareness in the industry, but not a priority.

   Formulating new approach need to consider that BIM is a new innovative method in construction industry with regulators, educational institutions and construction industry services that are still in the early phase of learning and implementing the technology. With stakeholders still trying to figure out about what BIM actually is and what kind of benefit it may bring to their business, Glodon new approach need to fit with the innovative nature of the digital construction technology.

2. *Competitive Environment*

   Digital construction brings more competitiveness for BIM market, even if they market their product in different dimensions, hence different roles and purposes in construction process. Several BIM software may possess a threat for Glodon's Cubicost 5D BIM solution, even if they are not direct competitor in BIM dimension itself. The confusion regarding the digital construction and the potential of overlapping with competitors, leads Glodon to focus itself in 5D BIM sector for QTO and Cost Management, providing differing values compared with other QS or BIM software that are common in the Indonesian market.

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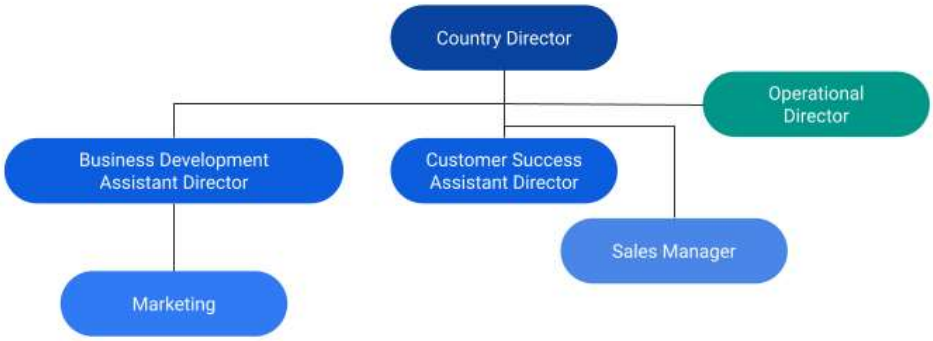

Image 2: Organizational Structure of Glodon Indonesia,
Source: Glodon Indonesia, 2023.

To ensure the effectiveness of those changes, Glodon Indonesia changes its organizational structure to include a dedicated business development department that focuses with government and educational clients, with specialized role as follows:

1. Government relation management. Strategic collaboration with regulators such as compliance with the Indonesian regulations, advising the regulator in strategic implementation of digital building in government projects, capacity building with the government officials and construction industry services. This collaboration aims to create a business direction that aligned with the government roadmap, with products that fit with the Indonesian regulation, and fit with Indonesian construction methods and workflow.

2. Educational sector relation management. Building collaboration with universities, polytechnics and vocational college, ranging from seminars, workshop, training, certification, supporting final projects up to building authorized training centers. This collaboration focused in building a center of learning in different regions in Indonesia by creating awareness, hub for learning, training and certification for students and construction industry professionals, enabling a larger capacity for Glodon Indonesia to create more 5D BIM certified workforce that are ready to utilize 5D BIM Cubicost in the various region in Indonesia.

With PUPR pushing the digitization of construction industry by releasing several regulation that mandates, guides and define the BIM implementation, the opportunity for adoption of Cubicost 5D BIM by Indonesian construction services becomes clearer. Therefore an implementation of a new business development approach that fit with the government initiative will be crucial for Glodon business in Indonesia, whether its from the growth rate, market coverage, product awareness and also clients confidence in the software solution.

I.4 Research Questions and Research Objectives

The following research questions are raised by the research paper:

1. What are the current business conditions and challenges in which Glodon Indonesia is operating?
2. What is the existing business strategy and model used by Glodon Indonesia, and what are the changes which need to be made?
3. What is the most effective strategy that Glodon Indonesia must implement in order to capture the opportunity from BIM regulation?

The objectives of this study, which will focus on Glodon Indonesia, are as follows:

1. To define the current business conditions and challenges in which Glodon Indonesia is operating.
2. To define the existing business strategy and model used by Glodon Indonesia, and define the changes which need to be made.
3. To define the most effective strategy that Glodon Indonesia must implement in order to capture the opportunity from BIM regulation.

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I.5 Research Scope and Limitation

The analysis is limited to the digital construction technology business, especially 5D BIM sector by Glodon in Indonesia. Furthermore, the research is confined to determining the best strategy and business model for digital construction technology in general. Other factors that influence the industry as a whole, may not be included in this research due to the limitation of specific company.

I.6 The Flow of the Chapters

In this research, there are four chapters as follows:

1. Chapter I - Introduction
2. Chapter II - Literature Review
3. Chapter III - Research Methodolody
4. Chapter IV - Result and Discussion
5. Chapter V - Conclusion and Recommendation

Chapter II LITERATURE REVIEW

II.1 Theoretical Foundation

II.1.1. Building Information Modelling

AEC industry is a critically important industry, with World Economic Forum estimates that it currently accounts for approximately 6% of global GDP and predicted to reach 14.7% by 2030, and annually its expanding at around 1%. (Zhao,Y. and Taib, N., 2022). AEC is considered the pillar industry of the national economy in many countries. (Olanrewaju, O.I., *et al*, 2022). However, AEC industry tend to be sluggish in new technology adoption, with building operations are fragmented, decentralized and specialized. In the Fourth Industry Revolution, the popularization of computers and growth in computing power, enables the AEC industry to enter into a new era of information and intelligence through digitization, and facilitated by BIM technology (Zhang, F. et al, 2022). First created in 1974 (Li, J. *et al*, 2018), BIM is considered the second revolution in the AEC industry, following CAD (Computer-Aided Design) technology (Zhao,Y. and Taib, N., 2022).

BIM is widely implemented in AEC industry, due to its ability to provide an integration of information that is crucial to ensure a project success. Most of construction projects are complex, therefore requires careful coordination and control to deliver a successful project in terms of time, cost and quality. Main issues with construction projects are quality control issues, time delays and overrun costs. These issues leads to low productivity, high rate, less innovative and lack of communication between the stakeholders involved, and these issues will lead to suspended projects, wasting resources and energy and affecting country's economy. BIM technology has been proven to be able to reduce the risk of those aforementioned issues. Conventional building methods and techniques and the use of change orders are believed to be the key sources of poor performance in construction projects in developing countries (Zaia *et al*, 2022). BIM also allows AEC professionals to have easier control on every dimension of the projects, provides a common workplace by reducing coordination issues and errors in the created digital construction sector (Fernández-Mora *et al*, 2022). Serial Smart Market reports for BIM clearly indicate that the BIM adoption in AEC projects helps to enhance collaboration among the stakeholders and leads to positive returns on the investment by reducing errors, omissions and project duration. (Yang, J. and Chou, H., 2018), by offering an ability to integrate the 3D model into various other dimensions, such as planning, scheduling, costing, asset management and sustainability (Charef, R., 2022).

BIM were able to provides full life cycle and extensible data integration approach for AEC projects (Wang, H.W. *et al*, 2019), by able to directly offer project data, it is more accurate and can reduce the manual data re-entry (Su, S. *et al*, 2020), it aims to solve old-fashioned construction methods issues such as low field productivity, unreliable quality, high resource and energy consumption, health and safety hazards and environmental damages (Zhang, J. *et al*, 2016). BIM allows data exchange and interoperability between various life cycle phases and optimizing the life cycle management workflow, and has been utilized in the construction as progress control, clash detection, visualization, quality control, cost estimation and data management. (Han, T. *et al*, 2022). BIM can be further utilized to reduce and manage construction and demolition waste (Shi, Y. and Xu, J.,

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2021) and analyze of the existing data for sustainability analysis in green building assessment (Olanrewaju, O.I., *et al*, 2022), as construction quality management (Ma, Z. *et al*, 2018), construction health and safety (Collinge, W. *et al*, 2022). BIM is to provide substantial advantages to the AEC sector such as preliminary conflict control in the design, better project procedures, better evaluation time and cost related to structural modifications, minimizing design conflicts and enhance multi-party approach, support supply chain performance, enables flexible work and improves risk-sharing, less human resources, better coordination and fewer contingencies. (Olanrewaju, O.I., *et al*, 2022).

BIM can be defined as a holistic approach that integrate different design aspects in a common digital environment with a high grade of uniformity (Meoni, A. *et al*, 2022), it represent physical and functional characteristics of building in a digital form and provide a source for generating engineering data, with advantages in visualizations, coordination, simulation and optimization (Cheng, B. *et al*, 2022). BuildingSMART International, defines BIM as a new approach to being able to describe and display the information required for the design, construction and operation of constructed facilities (Gartoumi, K.I. *et al*, 2022). BIM defined as a set of methodologies, technologies and standards that allow designing, constructing and maintaining in a collaborative manner through a digital model that contain the information of the entire project life cycle. can be seen as a digital representation of parametric objects enriched with associated information through the contribution of different specialties, to provide feedback from the early stages of the project, improving the decision-making process, and increasing the efficiency of the project at all stages (Berges-Alvarez, I. *et al*, 2022). BIM is an approach that involves the construction of a model that contains the information about building from all phases of the building life cycle. BIM is a shared digital representation of physical and functional characteritics of a building asset, as a data-rich, object-oriented, intelligent and parametric. (Fernández-Mora *et al*, 2022). BIM compiles building electronic prototype as a BIM model, and this model covers not only geometric and alphanumeric information but also its function and behavior (Sacks, R. *et al*, 2022). BIM is a computer-aided modelling and simulation technology based on objects and its development phases. Based on simulation and visualization characteristics, BIM implementation has made a great contribution to improve the efficiency of AEC industry through enabling collaboration between stakeholders involved, that offers a significant advantages in coordinating and managing complex projects (Chatzimichailidou, M., and Ma, Y., 2022). BIM defined as a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle, from earliest conception to demolition. A basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM to support and reflect the roles of that stakeholder. (Zhang, F. et al, 2022).

BIM able to provide an optimum solution to provide a timely, dependable and practical solution. BIM stores data through artificial intelligence (AI) and by using specialized smart objects that depicts realistic element, with each of the smart object consist of features that fully comprehend object's qualities, role, interaction and influence on the external context, enables consistent and integrated element analysis. This allows an automatic update when changes are made on the smart object, and as a result, minimize errors and inaccuracies that may occurs due to human cognitive limitations (Laali, A. *et al*, 2022). In order to do so, BIM contains large amount parametric information and allows collaborative work between technicians involved in the project (Cortés-Pérez, J.P., *et al*, 2020) by providing efficient access to building data, including types and quantity of components and materials (Su, S. *et al*, 2020). It can facilitate interaction and reduce fragmentation of information among the construction stakeholders in construction life cycle (Xie, M. *et al*, 2022). BIM also continuously undergoes dramatic transformation to response the stakeholders request for technology to solve systematic and reccuring challenges: productivity, time and cost management. (Olanrewaju, O.I., *et al*, 2022).

BIM technology has been widely used in the past decades in various industry from building, bridge, highway, airport and power engineering. In building engineering sector, BIM has been extensively applied in designing commercial, industrial, office and residential building projects in integration with various other technologies (Xie, M. *et al*, 2022). While BIM usually being used on design phase, it may be utilized for existing buildings and optimize rehabilitation process according to its deterioration and damage. It works best as Integrated Project Delivery (IPD) contract, where every stakeholders works based on the same model (Fernández-Mora *et al*, 2022). However, BIM implementation still facing several challenges, such as joint

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participation and cooperation of stakeholders, technical personnel, executives commitment, relevant standards and policy, and industry resistance to change (Xu, H., *et al*, 2022), and also affected by obstacle posed by lack of standard and domestic-oriented tools and lead practitioners to adopt wait-and-see attitude towards BIM application (Xie, M. *et al*, 2022).

Due to its ability to create n-Dimensional model, BIM offers a flexibility to add new layers of development and integrating it. Update can be conducted real-time uses parameters linked among the elements to share the properties, allows a creation of a project model that can be utilized and modified in different dimensions, while keeping all the parameters still linked and updated. The n-Dimensional capabilities allows BIM to introduce new variables and criteria as the development progress to provide the necessary level of analysis on the existing data at the exact point, further ease the decision making process. This allows the AEC professionals to expand BIM to use new design variables that are difficult to conduct. (Fernández-Mora *et al*, 2022). BIM also can be divided into 3 broad model categories, Project Information Model (PIM), Asset Information Model (AIM) and Deconstruction Information Model (DIM). PIM is the model that created in design phase, while AIM will support the whole life cycle of an asset from create/acquire, through use/maintain and on to renew/dispose of, and DIM model that being used for implementing End of Life for the building itself. (Charef, R., 2022).

Among the dimensions of BIM, the 5th Dimension (5D BIM), focused on Quantity Take-Off up to the creation of Bill of Quantity (BQ). BQ method broke buildings into building products that are classified into group with similar features and construction works, and for each construction work, conditions are specified with different unit costs such as labor, material, equipment items etc. Each items will be identified, allowing the comprehensive unit cost to be calculated, and the total quantities of building products in the same BQ items can be summed up. Total comprehensive unit cost and the total quantity of each BQ item later can be summarized to obtain the building budget cost (Liu, Z. and Ma, Z., 2015), Based on the research by Cheng, B. *et al* (2022), 5D BIM Cubicost is more convenient for quantity surveying task, that covers from Quantity Take Off up to Bill of Quantity (BQ).

To facilitate BIM collaboration, vendors are developing cloud-based Common Data Environment (CDE) services for project sharing in accordance with ISO 19650 (Sacks, R. *et al*, 2022), that enables all the information to be accessed by all stakeholders involved. This will benefit all phases of a project life cycle, such as information management in construction sites, which commonly faces issues with managing the exchange of information generated from various sources, that might contain overlapping information (Nikologianni, A. *et al*, 2022). BIM also can be integrated with LCA (Life Cycle Assessment) to minimize energy consumption and improve building's environmental performance from the early stage of design, since BIM have the ability to provide detailed building information that can be used to assess primary source. (Dauletbek, A. and Zhou, P., 2021). Integration with LCA usually follows several focal points, such as design guide, operation analysis, maintenance and end-of-life activities and sustainability (Su, S. *et al*, 2020).

BIM is widely believed to have the potential to create a revolution in the AEC industry, mainly as a result of many government initiatives promoting it to improve the quality and efficiency in delivering construction projects (Abanda, F.H. *et al*, 2015), with many successful cases of BIM implementation strategies with obvious benefits. (Yang, J. and Chou, H., 2018). Government is the largest beneficiary in BIM implementation and receives the majority of benefits. This leads to drive the BIM promotion by various government using national policy that varies between countries. Government-driven approach for BIM implementation done by the Government issuing series of BIM-related policies to lead the industry, and effective for countries where BIM-related activities and its implementation are low, or passive. Government-driven approach may employ many means, from mandates, implementation periods, expected objectives, contents, standards and related activities. BIM Mandate is a clear policy that made by the government, and usually being used as a key element for macro BIM adoption study. (Yang, J. and Chou, H., 2018).

Owners from public sectors from several countries increasingly mandate BIM use for their construction projects, and these pressures lead to widespread use. Its gradually become indispensable criterion from selecting contractors, and therefore they have no option other than implementing BIM technology. BIM becomes increasingly important and become the determining survival factor in increasingly competitive market (Chen, G. *et al*, 2022). Several governments have issues BIM standardization and regulations, such as in 2014 European Union's releases directive 2014/24/EU with goal of BIM implanting in Europe in

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2021, by 2018 UK fully adopt BIM methodology and Spain follows suit in 2020 (Fernández-Mora *et al*, 2022). In 2017, Italy pushes for progressive mandatory implementation for BIM. Netherlands required BIM implementation for public project since 2011. France sets a progressive adoption of BIM in public works since 2017. Since 2015, Germany pushes for digital construction management national strategic plan, with BIM mandatory in 2020. Sweden, Norway and Denmark, adopted a government option BIM mandate for state-supported public services in 2007. (Sampaio, A.Z., 2022). Outside Europe, several government have pushed its implementation as well, such as Malaysia that starts BIM implementation in 2016 and mandates its uses since 2020. To support these objectives, international organizations such as BuildingSmart to analyzes the state and proposes ways to implement BIM technology, International Standardization Organization (ISO) also trying to create a standart to regulate BIM by releasing ISO 19650 as the BIM methodology standardization. (Fernández-Mora *et al*, 2022)

BIM implementation tends to have a correlation with the government policy, such as China where its surged after a plan for series of national-level BIM standard developed by Chinese Ministry of Housing and Urban Rural Development. However, while Chinese AEC industry recognize BIM benefits, they didn't have the time to properly study and research strategic and technical execution approach that fit with local construction requirements, therefore many projects are referring to foreign BIM execution plans, lack of BIM professionals available in the market and the foreign BIM tools that are not designed based on Chinese building codes and do not follow local industry conventions. These issues creates the need to add another workflow in BIM implementation for projects that need local construction rules (Zhang, J. *et al*, 2016). Considering the local compatibility issues, several BIM applications were developed in China to support local BIM development and AEC industry, the top among them is Glodon, with annual operating revenue of 2 billion in 2016 (Li, J. *et al*, 2018).

In the coming years, BIM capabilities will become an competitive skill that are mandatory for the AEC industry stakeholders, with universities needs to implement BIM in their study module and curriculum, evolving and adapting their competencies to the needs of the industry and what the industry seeks in the future, otherwise there will be a knowledge gap in the new generation of engineers and affecting their employability. This is the result of the industry pushing for BIM implementation in an attempt to reduce cost, time and errors while obtaining better accuracy and easiness to obtain the desired data, therefore a talent with BIM knowledge becomes more preferable for their future growth. BIM research shows trend for sustainability such as how BIM may help to incorporate sustainability or embodied energy, enable project to obtain Green Building Certification by analyzing the environmental impact of the structures. Initial implementation of BIM may not be profitable for some companies and it is advisable to utilize BIM on project that company already familiar with rather than using it for a new unfamiliar project type, otherwise the new technology may overburden the workload that leads to negative experience in its implementation. This happens especially in rehabilitation project such as heritage project that require significant investment in time to create geometric model (Fernández-Mora *et al*, 2022)

II.1.2. Government Regulation and Policy

There are six roles of the public sector in BIM adoption, namely (1) initiator and drivers, (2) regulators, (3) educators, (4) funding agencies, (5) demonstrators, and (6) researchers. In this roles, Government takes the role as regulator who issues a series of BIM mandate to push its implementation. BIM collaboration between the government, industry and academics (Yang, J. and Chou, H., 2018)

II.1.3. Innovation

Innovation itself is the core driving force to lead an economic transformation and development, and the role of policy intervention by the government will have a decisive effect (Gao and Yuan, 2022), this is inline with Lenderink, B. (2022) who mentioned that government championing behavior is an important factor that contribute to success in implementing innovation. Lenderink, B., et al (2020) defining Innovation in civil engineering projects as the development and successful implementation of new ideas, products or processes in the design and realization of new civil engineering objects.

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II.2 Conceptual Framework

Conceptual framework is a visual representation in research that is being used to find answers. In this research, author are using Lean Six Sigma Model, considering its effectiveness in service and B2B industry that fit with Glodon Indonesia business model and ideal for business development and improvement projects. The framework is as follows:

A. **Define:** Seek for improvement opportunity
B. **Measure:** The performance of current processes
C. **Analyze:** Find defects and root causes of problems. Author use PESTEL, and SWOT analysis for analyzing external and internal.
D. **Improve:** Address the root causes of the problems by providing business solutions
E. **Control:** Correct any deviations from the improved processes.

Author will analyze utilizing the SWOT analysis on determining the best strategy for Glodon Indonesia to improve the current business based on the role of government and education sector and their influence to the BIM software market.

CHAPTER III. RESEARCH METHODOLOGY

To support the whole research, a data collection process that fit to solve the business issues are essentials, and in this research the methodology that will be used as one of the main processes are as follows:

III.1 Research Design

This study designed to know the effect of collaboration of digital construction technology companies with regulatory bodies (government) and universities (university and polytechnics). The author in this study utilizing a mixed method of quantitative and qualitative approach, with quantitative method based on the sales and marketing data gathered from Glodon Indonesia, and qualitative data obtained by interviewing the government on how they determine the regulations, the implementation and expectations, to provide the context whether Glodon Indonesia strategy and results are aligned with the regulators decision and policy.

In descriptive part, author describes the research study in Glodon Indonesia, on how the business were done and what kind of changes that occurred that allows a closer collaboration with regulator and universities. The result obtained by gathering, analyzing and presenting the collected data, and provides an insight on the research project and its impact for Glodon Indonesia future business development.

III.2 Data Collection Method

To support the whole research, a data collection process that fit to solve the business issues are essentials, and in this research the methodology that will be used are interview from the government with responsibility in BIM implementation in Indonesia, and quantitative data from Glodon Indonesia's sales and business development.

The interview will be done with Director General of Housing, and Director of Human Settlements, Ministry of Public Works and Housing. Both of the source person are the person in charge in the regulation regarding digital construction in building projects. The interview aimed to understand how the regulator sees BIM, where they want it to be heading and how Glodon Indonesia may adjust its approach in business development to be better fit with the government road map. The expected result is whether Glodon Indonesia strategy is already aligned with what the Indonesian government aims for BIM implementation in building projects, and the effect of aligning with government regulation and the sales and market growth of Glodon Indonesia.

Internal Data data is also being utilized, as a quantitative measures on the effectiveness of the new strategy on collaboration with government and universities. The data that being utilized are sales numbers, new client numbers and coverage area of Glodon Indonesia's business after the new strategy being implemented.

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CHAPTER IV. RESULTS AND DISCUSSION

After the interview being conducted, the result were analyzed and interpreted to understand how the regulators are setting up the road map for BIM technology, and how Glodon strategy can be aligned with where the regulators are heading, and also understand the role and impact of universities in technology development in Indonesia.

IV.1 Analysis

After conducting interview with Director General of Housing and Director or Strategic Infrastructure, the author found about where the BIM technology road map is heading according to the regulator, with BIM will become the central part of Indonesian construction industry with an increasing importance in digitization.

IV.1.1. Interview with Ir. Essy Asiah, MT., Director of Strategic Infractructure, Directorate General of Human Settlements, Ministry of Public Works:

BIM exposure starts through SOE companies in infrastructure and water resources projects, and 5D BIM Cubicost began to be implemented in *Perencanaan Teknis* (Technical Planning) in 2020, as a solution for better project quantity take-off and cost management. 5D BIM Cubicost proven to increase both the speed and the efficiency of QTO process, that manages to solve the issues with overestimating structure quantity that occurred in manual QTO, minimizing double volume in calculation process and allowing easier changes/addendum.

Regulation regarding BIM implementation leads to resistance from the construction services industry, and issues as a result of they are still in the process of learning BIM and digital construction technology. This is especially true in cases such as project's payment progress, where the payment process is still being conducted manually. In the development of a BIM technology, the main issues that can be solved by Glodon Indonesia is to be more compliant to local regulations that allows easier implementation in construction projects.

IV.1.2. Interview with Ir. Iwan Suprijanto, Director General of Housing, Ministry of Public Works:

BIM in Indonesia were explored first by Mr Iwan on his tenure at Litbang PUPR (Ministry of Public Works and Housing Research and Development) in 2000-2010. Interest in BIM by Litbang PUPR is due the potential for its faster construction process, accuracy, database management, massive double work. At the initial implementation, the issues in BIM implementation related to the lack of integration of BIM technology in Indonesian AEC industry.

The implementation of BIM begin in 2013 under his role as Kabid PPK Litbang, to answer a new challenges in the technical audit of A.A. Maramis Heritage Building. An audit is required since there is no prior record from this building renovation which poses an issues for the hazard that it may possess from structural issues as a result from decades of renovation process. To ensure the safety on its revitalization process, BIM technology is used to scan the building with the output of model simulation, partial and entire structure model simulation and as built drawings.

Under his role in Directorate General of Human Settlements (2017-2021), he leads the BIM implementation in Strategic National Vital Objects with the goal of determine the project specifications, strength, heritage, complexity and executed efficient and effectively without rework. BIM offers as follows:

1. Conversion from manual methods into integrated 3D
2. Detecting the clash that occurs
3. Synchronize the design up to Bill of Quantity
4. Improve the logistic management that occurs due to error in planning stage.

BIM and digital construction saw increasing utilization along with the restriction in corona virus pandemic times, with cases such as implementation on 17 stadium projects that saw audit can be conducted by utilization of drones, cctvs, plan and realization comparison, and digital measurements. These method saw audit can be conducted more efficiently, with GBK stadium finished in half day audit process.

Starts in 2022 as Director General of Housing, the BIM implementation begin with the focus in solving the issues in the vertical housing, especially in terms of complexity, the construction services quality and improvement on time, quality and cost. Starts with the prototype standardization, bill of quantity and reducing the role of planning consultants to ensure the design quality, and allowing PUPR to focus on construction management. Revamp the tender process by e-catalogue system to eliminate the issues

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of contractor bidding too low, which leads to reduced project qualities or even a stalled projects. The new system based on BIM and e-catalogue, if the bidding isn't proper, it can be rejected outright. This changes can be conducted by BIM implementation start from basic design up to the project costing, with all the data from project stats from the start, the changes records up to the project finalization and handover will be stored in BI-based database. The Directorate General of Housing as a regulator seeks BIM implementation to achieve a construction services to be effective, efficient and accountable. The roadmap heading to lean construction, and better cost and quality control, with engineering in 2022, procurement and implementation in 2023.

The issues faced by BIM in Indonesia is the lack of readiness in the ecosystems with stakeholders competency are still uneven and disconnected, also the need to invest in hardware, software and human resources development that deter smaller AEC services companies to digitize. The education sector also needs to conduct BIM-related research on business process, new theories and new methods. Glodon as a vendor, have a possible role to assist in the synchonization in construction management process, control the owner's request and building a BIM-based ecosystem for the construction services to enable an optimal implementation.

IV.1.3. Glodon Indonesia Educational Sector Collaboration Growth

No	Year	University Numbers	Training Center
1	2018	1	0
2	2019	4	0
3	2020	8	0
4	2021	12	1
5	2022	17	2

When the new strategy initially being implemented, Glodon Indonesia only have 1 University clients, Institut Teknologi Indonesia (ITI) with a limited collaboration in workshop and training for the lecturers and students. The new strategy saw a strategic change in collaboration with new program on students training and 5D BIM software implementation in their respective labs, and the solution implemented in Universitas Kristen Krida Wacana (UKRIDA), Universitas Mercu Buana and Institut Teknologi Bandung (ITB). This strategy followed with certification program integrated with universities students, that grows into Glodon Authorized Training Center (GATC) that allows universities to train and certify students and industry professionals in-house by their own lecturers, started at Polinema in 2021. This system allows Glodon to certify more than 2500 individuals, providing a steady flows of certified BIM professionals.

The regulation for BIM implementation that mentions 5D BIM leads to the increasing interest from the universities to implement 5D BIM Cubicost into their architecture and civil engineering study program. By the end of 2022, there's 17 Universities that collaborate with Glodon Indonesia for their 5D BIM solution, with various methods of implementation as follows:

1. Seasonal workshop
2. Guest lecturers
3. Integrated in the curriculum and regular class
4. Training and certification
5. Authorized Training Center
6. Guide and assist the students final project

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<table>
<tr>
<td rowspan="2">KEY PARTNERS
Construction service industries, especially Medium to Large level. They utilize the 5D BIM technology to allows better coordination and collaboration among the stakeholders, especially in quantity estimation and cost control for building projects</td>
<td>KEY ACTIVITIES
1. Software that comply with local Indonesian AEC regulation
2. Local research and development team
3. Dedicated for costing management solution
4. Solution that answer up to unit price analysis
5. Ability to collaborate with BIM environment through .ifc format</td>
<td rowspan="2">VALUE PROPOSITION
1. Accurate and Fast quantity estimation and cost control solution
2. BIM based solution that offers collaboration and coordination with all the stakeholders involved
3. Solution for fast, accurate and accountable quantity estimation and cost control, based on BIM. The solution allows cost estimation project to be finished faster, minimizing human error and better process at monitoring and evaluation</td>
<td>CUSTOMER RELATIONSHIP
1. Same day software problem solving on bugs and operating issues
2. Customer Success Service, a service center that dedicated to provide services that answer real project issues that occurred
3. Hotline Service, a messenger-based service that answer clients issue in real-time basis</td>
<td rowspan="2">CUSTOMER SEGMENTS
1. Building Contractor, with project especially in government project
2. Building Consultant, Medium to large with project that requires digitization
3. QS Consultant that implement BIM in their workflow for QTO
4. Government, for cost control, monitoring and evaluation
5. Universities, for education and capacity building purpose</td>
</tr>
<tr>
<td>KEY RESOURCES
1. BIM solution
2. Construction cost management solution
3. Project implementation</td>
<td>CHANNELS
1. Branch office as official sales and service center
2. Authorized Agents
3. Authorized Training Centers</td>
</tr>
<tr>
<td colspan="3">COST STRUCTURE
1. Operational Cost
2. Research and Development Cost</td>
<td colspan="2">REVENUE STREAM(S)
1. Software sales
2. Training and Certifications
3. Project implementation consulting</td>
</tr>
</table>

IV.1.4. Glodon Indonesia Business Model Canvas

IV.1.5. Cost Comparison between 5D BIM Cubicost

No	Software	Dimension	Selling method	Price (in million IDR)
1	Cubicost	5D	Branch Office	30
2	Tekla	3D	Agent	445
3	Revit	3D	Agent	30

Compared with other BIM software Glodon price point is fairly competitive, however the competitors are not a direct competitors due to the different dimensions with 5D BIM Cubicost focused in costing, while the competitos are focusing on design. Other main difference is Glodon Indonesia is a direct branch office of Glodon International, while other BIM softwares enter Indonesian market throught agents as a distribution channel, and this affecting the after sales service package and ability to be agile to answer the issues that occurs in the project implementation.

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IV.1.6. Porter 5 Forces Analysis

By utilizing Porter 5 Forces analysis, Glodon Indonesia categorized as within *Competitive Rivalry*, with well-known competitors. This results comes from analyzing several factors as follows:

A. Power of Vendors

1. Backed up by Glodon Company Limited, the largest AEC technology company in People's Republic of China allows Glodon Indonesia to develop software with strong capital, knowledge management and also proven concept.
2. Dedicated local research and development team provide a data that allows a product that fits with local regulation and requirements.
3. Build on BIM platform, allows Glodon software to be able to collaborate with other BIM vendors.

B. Threats of New Entry

1. BIM technology requires a vast amount of capital to develop, since it requires not just technology developer but also AEC expertise to support, that can only comes from,
2. Strong links with the AEC industry, that enable development of software that link and match with the industry requirements, customs and regulations.
3. BIM emphasizes on the ability to collaborate using .ifc files, and regulated with complex AEC regulations that often country-specific.

C. Power of Buyers

1. BIM Software cost is comparatively high compared with the construction services staff salaries, which creates a dilemma of adding technology or adding additional manpower.
2. BIM utilization is directly linked with the owner requirements, therefore if the owner does not demand it explicitly in a tender requirements, the consultants and contractors are less likely to implement it.

D. Substitution

1. Manual methods utilizing excel are less costly compared with initial BIM implementation that includes software, hardware and training cost.
2. Other BIM software can operate calculations for QTO and creates a BQ, albeit the process will be more complicated.

IV.1.7. PESTEL Analysis

Category	Factors
Political	1. Indonesian political stability ensure a firm platform for business development 2. Centralized regulation and standart allows more focused product development

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	3. PUPR includes the implementation of BIM technology in their roadmap of Digital Construction
Economic	1. Steady growth of AEC projects in Indonesia 2. Largest construction market in Asia
Sociological	1. Large English speaker, helps to communicate with Glodon HQ in product development 2. AEC Association lack of interest in BIM technology
Technological	1. Market for AEC technology still not well explored 2. BIM allows better collaboration between construction stakeholders, improving project effectiveness 3. Lack of Indonesian AEC professionals KOL in BIM technology
Environmental	1. Cubicost support better construction project planning, reducing the waste generated
Legal	1. One Data regulation demands data stored locally 2. Local Content Regulation (TKDN) demands more local development

IV.1.8. SWOT Analysis

Strengths	**Weaknesses**
1. Collaboration capability with other BIM softwares, especially Revit (common BIM authoring/Construction design and planning software). 2. Fast and Accurate QTO, up to 1.5 increase in efficiency (based on mandays) 3. Integrated with local regulations, such as Permen PU and SNI. 4. Calculation rules can be adjusted. 5. Local Research & Development team, to better fit with Indonesian market and regulation for local content. 6. Branch office, not an Agent or Representative. Allows more flexible decision making and after sales service 7. Complete service package, training and project guidance.	1. 5D BIM Cubicost divided into 4 different software. 2. Small size of the Product Development and Customer Success team. 3. Lack of new software variants, focused on building products.
Opportunities	**Threats**
1. Digitizing trend on Indonesian construction industry. 2. Regulation that mandates BIM usage for construction projects. 3. Regulation that mandates QS role in construction projects 4. Collaboration with regulator 5. Universities role on technology implementation.	1. Software role and benefits are still unrecognized by the industry 2. Resistance from the industry, due to initial implementation cost 3. Government One Data Policy 4. Associations lack of involvement

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IV.1.9. Action Plan SWOT

	Strengths	Weaknesses
Opportunities	1. Increase the research and development that dedicated for creating a product that comply with Indonesian AEC regulations 2. Increase the flexibility to adjust with the digital trends of Indonesian AEC industry, especially the trend of local content implementation	1. Strengthen the collaboration with regulators, with software with higher compliances with regulators requirements (TKDN, Permen PU, SNI) 2. Conduct Research and Development programs with Universities, focusing on Civil Engineering innovation
Threats	1. Highlight the benefits that can be obtained by 5D BIM technology to the construction industry stakeholders, especially on collaboration, increasing effectivity on QTO and cost management 2. Conduct training collaboration with regulator to highlight the software compliance with the regulations and also acceptance from the regulator 3. Increase the compliance with local regulation, since it provides benefit in the reducing change of workflow in implementation phase by the construction industry services	1. Focusing the product types that allows industry to implement 5D BIM with less initial investment cost 2. Focusing value delivery for 5D BIM benefits for building projects from different point of view of each stakeholders.

IV.1.10. Key External Factors

Key External Factors	**Weight**	**Rating**	**Weighted Score**
Opportunities			
1. Digitizing trend on Indonesian construction industry.	0.1	2	0.2
2. Regulation that mandates BIM usage for construction projects.	0.2	4	0.8
3. Regulation that mandates QS role in construction projects	0.05	2	0.1
4. Collaboration with regulator	0.2	3	0.6
5. Universities role on technology implementation.	0.05	2	0.1
Threats			
1. Software role and benefits are still unrecognized by the industry	0.2	2	0.4
2. Resistance from the industry, due to initial implementation cost	0.1	3	0.3
3. Government One Data Policy	0.05	1	0.05
4. Associations lack of involvement	0.05	1	0.05
Total	**1.00**		**2.60**

IV.1.11. Key Internal Factors

Key Internal Factors	**Weight**	**Rating**	**Weighted Score**
Strength			
1. Collaboration capability with other BIM software	0.05	1	0.05

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2. Fast and Accurate QTO	0.2	3	0.6
3. Integrated with local regulations	0.3	3	0.9
4. Calculation rules can be adjusted.	0.05	2	0.1
5. Local Research & Development team	0.05	4	0.2
6. Branch office	0.05	4	0.2
7. Complete service package	0.05	4	0.2
Weakness			
1. 5D BIM Cubicost divided into 4 different software.	0.2	3	0.6
2. Small size of the Product Development and Customer Success team	0.03	2	0.06
3. Lack of new software variants	0.02	4	0.08
Total	**1.00**		**2.99**

IV.1.12. Grand Strategy Matrix

The Grand Strategy Matrix for Glodon Indonesia shows that it currently in a promising market development, with constantly growing market penetration in costruction services industry. The product development aligned with the regulator roadmap are increasingly compliant to the local regulation and requirements, with new products that designed to work in the same workflow with 5D BIM Cubicost solution. Considering that, Glodon Indonesia categorized in Quadrant I with strong competitive position in a Rapid Market Growth.

CHAPTER V. CONCLUSION AND RECOMMENDATION

V.1 Conclusion

Based on the research and interview conducted in this research, it can be concluded that the role of government as a regulator will be very crucial in the business development of B2B business in digital construction technology. The road map developed by the regulator creates a path for vendor to follow, from the product development, research direction and business development.

In terms of business development, this research found that the compliance with the regulation that mandates the utilization of 5D BIM, integration of local standard methods of measurement and certification that recognized by the regulator has been affecting the sales positively. The construction services industry were seeking for assurance that the software will be utilized

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in the project, and it requires mandates from the project owner, and this is fulfilled by the government regulations that mandating BIM utilization in building construction projects.

The issues that highlighted by Director General of Housing, the human resource problem is the issues that requires the collaboration with the educational sector. Digital construction is an innovative method in the AEC industry that requires an introduction of its concept in early stages on AEC education, to enable them understand its concept, how to collaborate between dimensions, the data that needs to be generated from each of the dimensions and the expected outcome from BIM implementation itself. Therefore, Glodon collaboration with Universities and Polytechnics in Indonesia for BIM training, certification and authorized training center is a development in the right direction, enabling a new workforce that understand, certified and able to utilize BIM in the construction projects for 5D on QTO and cost management. Glodon collaboration for research also allows a case study of BIM implementation that tackles the issue of different construction methods that existed among different countries, and provides a solution that fits for purpose in Indonesian construction industry.

V.2 Recommendation

Based on this research, there are several recommendations that can be conducted by Glodon Indonesia to further enhance the business development capacity, with recommendation as follows:

1. Industry Capacity Building, focused on the professionals in the industry and their ability to implement 5D BIM in real project. BIM is a tools to assist the industry professionals to perform better, and the constant utilization of the software will be a essential to the transformation of the industry
2. Competency Capacity Building, highlight the importance of standardization of the competency required for 5D BIM technology. In this case, there are 2 standardization required, both from vendor and also from the regulator on determining what will be required from an AEC industry professionals to be considered as competent in 5D BIM technology.
3. Better organizational structure, this recommendation for Glodon Indonesia on the separation of role between business development with industry sales role will benefit the company by focusing the task assigned. Considering the early phases of digital construction as an innovation in the Indonesian AEC industry, a more focused role in preparing the regulator and universities will be essential to build the necessary infrastructure to support the growth of the sales in the industry, by establishing the acceptance from the regulator and the creation of BIM certified and competent workforce from universities.

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