COMPARISON OF BUILDING EXISTING PARTITIONS THROUGH BUILDING INFORMATION MODELING (BIM)

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Graphical abstract
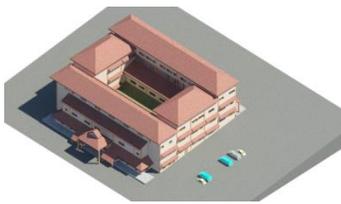
Abstract

Partition walls are considered as one of the most crucial elements on interior space within the buildings. While a considerable amount of research has been carried out studying theses critical elements to be used on the interior space of the buildings, BIM has not been exploited so far in order to enhance the accuracy of work. Therefore, the main purpose of this study is to compare three types of commonly used partition walls in terms of materials, time and cost needed to install each of them using BIM. To achieve the specified goal, a case study was chosen. The framework used in this study consists of modeling the installation steps of each partition wall based on the chosen case study using Revit Architecture and Autodesk Inventor. In order to calculate the materials, time and cost required, Naviswork Manage was employed and it was found that drywall could be considered as the most useful one to be installed on the interior space of the buildings in comparison to the other two types of partitions.

Keywords: Partition Walls, bill of material, time and cost needed, building information modeling

Abstrak

Dinding dalaman adalah elemen penting sebagai pembahagi bangunan. Berbagai penyelidikan telah di lakukan terhadap elemen ini, tetapi Pemodelan Infomasi Bangunan (BIM) masih belum di gunakan sepenuhnya untuk meningkatkan ketepatan kerja binaan. Oleh itu, tujuan kajian ini adalah untuk membandingkan tiga jenis dinding pembahagi yang kerap digunakan untuk binaan dalam bentuk pengiraan bahan, tempuh pembinaan dan kos pemasangan dengan menggunakan BIM. Rangka kerja kajian ini menggunakan perisian Revit akitek dan Inventor dari Autodesk. Untuk kegunaan pengiraan bahan, tempuh pembinaan dan kos, perisian Naviswork Manage juga telah digunakan. Kajian ini mendapati bahawa dinding-kering adalah elemen yang paling sesuai sebagai pembahagi dalam bangunan berbanding dengan dua jenis dinding yang lain.

Kata kunci: Dinding pembahagi, senarai bahan, tempuh pembinaan dan kos, pemodelan Infomasi bangunan

1.0 INTRODUCTION

The important building elements that have great importance in determining the overall life-cycle impacts of a building are the partition walls. There are usually thin elements which are built to divide the indoor space into other compartments and rooms. In addition, there are also being used to enable a better space organization and to provide comfort and safety [1]. In general, the partition walls are non-load bearing and for a load bearing wall, strength to vertical loads is considered to be the most important factor of design as it influences the overall structural behavior of the building. The main structural requirement in a partition wall is to have necessary strength for supporting a suitable surface for the purpose of decoration and to prevent accidental impacts that may result from the occupation of building [2].

According to Addis and Schouten [3], partitions have emerged as building sub-systems, because of several factors which includes the development of frame construction where internal walls in order to have a load-bearing function are no longer required. It's due to the emergent aspects; contemporary internal partition wall design is mainly based on the newer requirements. These requirement includes; the speed of technological change and organization; the aesthetic requirements and quality to satisfy; the increase in the number and complexity of the services to be accommodated; the need for acoustic separation of compartments; the flexibility for changing the organization and area for internal spaces; the need of thinner elements for maximizing net areas; higher environmental life-cycle performance; and to optimize the life-cycle costs.

Building Information Modeling (BIM) is defined as shared digital representation of physical and functional characteristics of any built object forming a reliable basis for making decisions [14]. Due to the technological advancement and prevalence of building information modeling (BIM) and 3D modeling in the field of architectural, engineering, and construction industries various opportunities do exist for improving the scheduling processes. The combining of built-in intelligence of BIM along with the previous research efforts, one can further advance the automation of schedules. By exploiting the information stored in BIM for assisting the generating schedules, it can certainly help in achieving a significant time reductions in scheduling when compared to traditional manual methods required for scheduling. The feasibility of generating construction schedules for construction process using the state of the art technologies along with BIM have been demonstrated in the previous research, but till date, only a partial work has been carried out and directly focused in this topic [4].

The Building Information Models is considered to be as essential tools in the field of construction environment as it is found that most of the estimators utilize BIM for estimating the cost required for construction. BIM tools can certainly help estimators in achieving the precise quantities needed for calculating the cost of construction in a quick and efficient manner. It's because of the fact that BIM has made an automatic method instead of using the manual methods; the quantities that are extracted from 2D drawings can easily affect the process of cost estimation. Not only that, BIM can reduce project cost as it plays the main role in successful determining the cost estimation according to the findings of Halpin, D.W and Senior, B.A [5].

Other useful task that can be automated through BIM utilization is the quantity takeoff (QTO) apart from scheduling and cost estimation. A BIM-based model is the assembly of objects that are being defined with specific properties, which includes the elements of geometric attributes. Most of the BIM tools contain some routines for performing calculations by using element's geometric properties in order to provide spatial quantities like area and volume in the form of text. BIM-based QTO is reported to provide more detailed, simpler and accurate cost estimation for the project, which will help in reducing the expenses and time [6], although it's a tricky feature and mostly used by the experts [7]. In general, there are myriad upsides involved in the utilization of BIM as bellows [15]:

- Decreasing the reworks and design errors pertaining to the construction activities
- Increasing the integration of time and cost
- Enhancing the integration of design and construction phase
- Decreasing the precarious construction activities associated with safety issues
- Correcting the traditional delivery and procurement process
- Eliminating the necessity for traditional documentation
- Increasing the possibility for reusing materials
- Facilitating the site layout plan

On top of all the mentioned advantages as regards the benefits of BIM adoption, BIM has recently played a pivotal role in post-construction phase, since the gap existed between design, construction and facility management would be bridged when the knowledge pertinent to different sectors is shared properly. More importantly, the effective asset management throughout the whole lifecycle of construction projects would come to fruition, as the information related to each stage is properly available [16].

A considerable amount of research has been carried out for the usage of partition walls on the interior space of the buildings, whereas BIM is found not to be exploited in any of these for enhancing the accuracy of work. Therefore, the main goal of this paper is to compare, three most common types of partition walls in terms of materials, time and cost needed to install

each of these by using BIM. To achieve the mentioned goal, a case study was chosen. The framework used for this paper consisted of modeling the installation steps of each partition wall based on the site investigation, reading articles and discussing with experts using Revit Architecture and Autodesk Inventor. In order to calculate materials, time and cost required, Naviswork Manage was employed.

The scope of this research included the connections between internal wall to the external wall, internal wall to the internal wall and internal wall to the column. Section 2 presents the used framework and methodology for achieving the goal of this paper. In section 3, the installation steps of the existing partition walls; block, brick and drywall, is modeled. In section 4, the chosen case study is modeled with the aim of calculating materials, time and cost needed regarding the mentioned partition walls installation. The discussions of the results obtained are explained in section 5, followed by conclusion of the paper in section 6.

2.0 METHODOLOGY AND FRAMEWORK

The framework used in this study to attain the aforementioned goal is illustrated in Figure 1. The first step is to collect and analyze the data through reading articles and papers, site investigation and having discussion with the experts. As a next step, the work process regarding the installation steps of the existing partition walls were modeled with the aim of enhancing the accuracy for taking off materials, computing time and cost needed using Revit Architecture 2011. Meanwhile, fasteners were modeled employing Autodesk Inventor 2011. In the

next step, the chosen case study was modeled in details by employing Revit Architecture 2011 including the plan, elevation, section views and components such as exterior and interior walls, floors, ceilings, columns, roofs, windows, doors and so on. Revit software has the ability to categorize different components of the buildings into sub-categories in accordance to their identifications. Therefore, it can divide all the interior partition walls into different categories in regards to their lengths, widths and thicknesses. Then, in order to compute the quantity, time and cost needed, the modeled case study was further exported to Naviswork Manage, 2014. As quoted by Mohandes *et al.*, (2014), different materials or components used in any objects imported from Revit Architecture could be specified in great details in Naviswork Manage 2014 for taking off materials. Moreover, an exact time scheduling of the whole projects through setting the planned or actual start and finish time of each object could be achieved. Furthermore, cost spent on each item of an object such as the cost of labors, materials, subcontractors and equipment could be put into Naviswork Manage, which results in the automatically calculation of the cost needed pertinent to the whole project[8].

In regard to the above-explanations, take-off from partition walls modeled on the interior space of the mentioned case study was done automatically through identifying the different specifications for each type in Naviswork Manage 2014. Subsequently, time and cost needed to install each type of partition wall was computed based on the quantity takeoff and productivity rate as obtained from the assumptions and the steps involved during the process of installation.
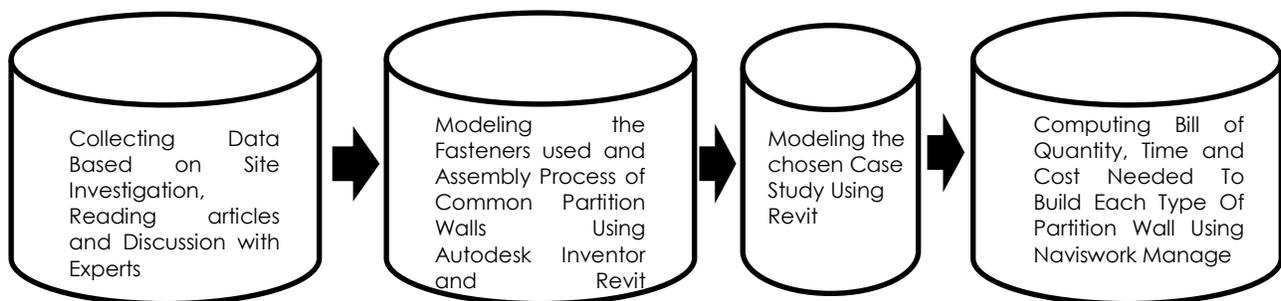

Figure 1 Framework used for computing quantity, time and cost required for partition walls exploiting BIM

3.0 WORK PROCESS

During this research, the work process comprised of different steps of partition walls installation with the aim of enhancing the accuracy for taking off materials and computing the duration and cost needed for each. The different steps of each partition walls installation modeled are shown below.

3.1 Block Masonry Wall

The HCM is considered to be a single ceramic hollow brick (0.30 _ 0.20 _ 0.11 m) wall, whose units are fixed using Portland cement mortar that is coated with a 0.02 m thick Portland cement plaster on both the sides, as a result, a wall thickness of 0.15 m and total specific weight of about 150 kg/m2 can be obtained. The alkyd paint is used to finish both the surfaces. The ceramic hollow brick units consist of

horizontal holes and it represents a regular geometry with four striated sides, which allows for a good adhesion with any type of finishing. Finally, the installations are placed after assembling the wall and before plastering through the execution of grooves that accommodate the installations and are afterwards filled in with mortar. This type of procedure has been reported to produce significant amount of waste material [2]. The installation steps of block partitions include:

Step 1: Locating face of the walls on the floor. Snap a chalk line

Step 2: Constructing the two ends of wall using a spirit level which is necessary for checking the balance measure (Figure 2a).

Step 3: Spreading the mortar bed onto the surface to shape the accepted blocks.

Step 4: Laying the blocks next to each other onto the spread mortar by using a taut string line as a guide to line and level the block (Figure 2b).

Step 5: Laying the half blocks on the mortar at both the ends (as second course), followed by the completion of second course (Figure 2c and d).

Step 6: Placing rebars for every 3 layers in order to enhance the resistance of wall. Rebar should be placed in the column prior to the building of internal walls. In addition to that, other 3 reinforced spaces (rebar and mortar) are needed for the interior wall's corners (Figure 3).

Step7: Plastering both the surfaces of internal walls.

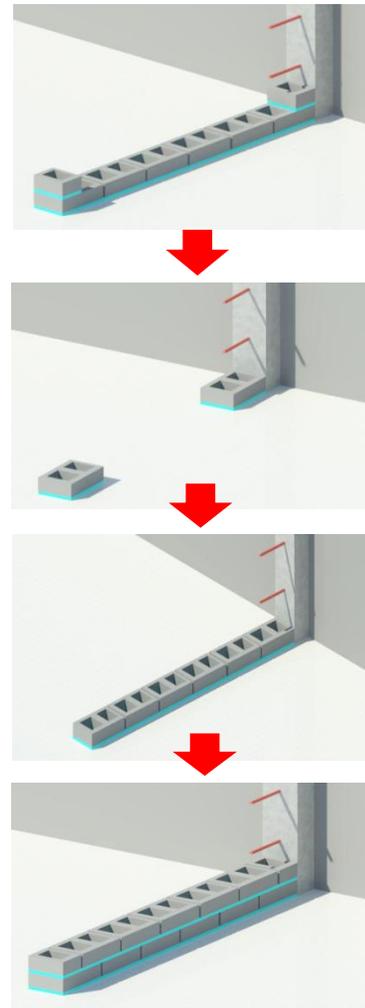**Step8:** Finally, painting the surface of brick walls with desired colors.

Figure 2 Constructing the two ends of wall (a), Completing the first course (b), Laying half blocks (c) and Completion of the second course (d)
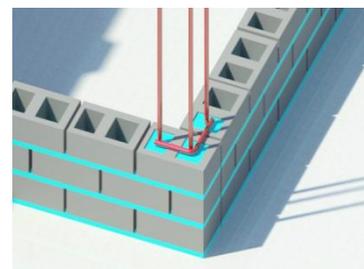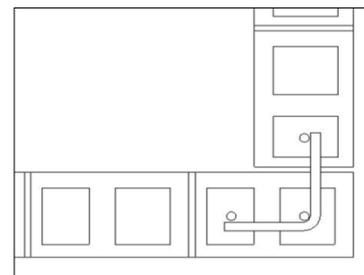

Figure 3 3 spaces reinforced with rebar and mortar (plan view) (a), and perspective view (b)

3.2 Brick Wall

The second type of partition wall is constructed from clay bricks with the dimensions of 215mm in length, 102.5mm of height and with 65mm depth, consisting of 6 voids in two rows. The bricks are held together by using a cement lime mortar in the ratio of 1part cement: 1 part lime: 6 parts sand. Lime mortars are known to provide greater elasticity as compared to pure cement mortars, thus allowing the uptake of moisture movement in the bricks, which are finally coated with Portland cement plaster (25 mm thick) on both the sides. Now, both the surfaces are finished with latex and water based paint layer as the final coating [9]. As a consequence, the total thickness of the wall will be around 150 mm. The different steps involved in building the brick partitions are as follows:

Step 1: Locating the face of the walls onto the floor and snapping a chalk line.

Step 2: Building the two ends of wall using a spirit level in order to check the balance measure (Figure 4a)

Step 3: Spreading the mortar bed onto the surface and to shape the accepted bricks

Step 4: Laying the bricks one after another onto the spread mortar by using a taut string line as a possible guide to line and level (Figure 4b)

Step 5: Laying the half bricks onto the mortar at both ends (in the second course) as shown in Figure 4c.

Step 6: Placing the rebar in every 3 layers as well as for block partition to enhance the resistance of internal wall as shown in Figure 5. Furthermore, rebars should be placed at the intersection points of two interior walls as shown in Figure 4d.

Step7: Plastering both the surfaces of internal walls.

Step8: Finally, painting the surface of brick walls with desired colors.
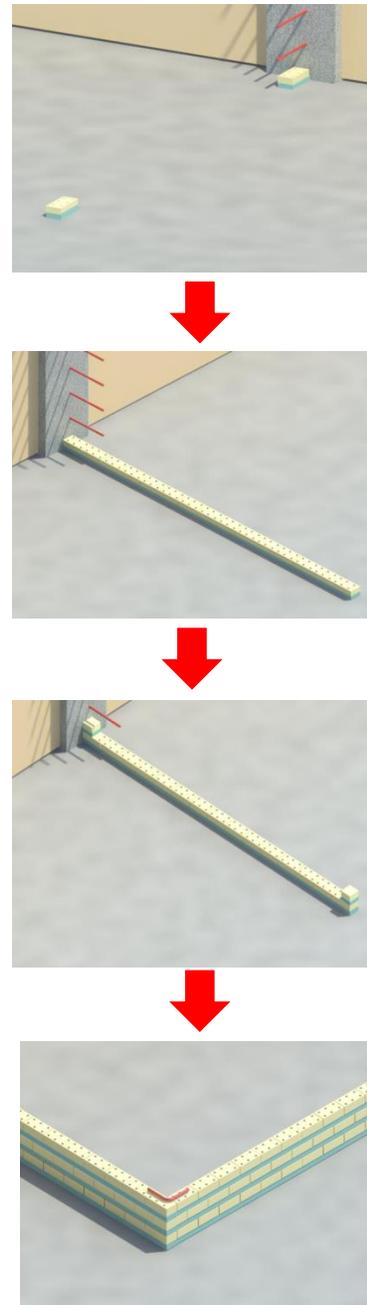

Figure 4 Building the two ends of wall (a), Completing the first course (b) and Laying half bricks fir the second course (c) and intersection point of two internal walls (d)
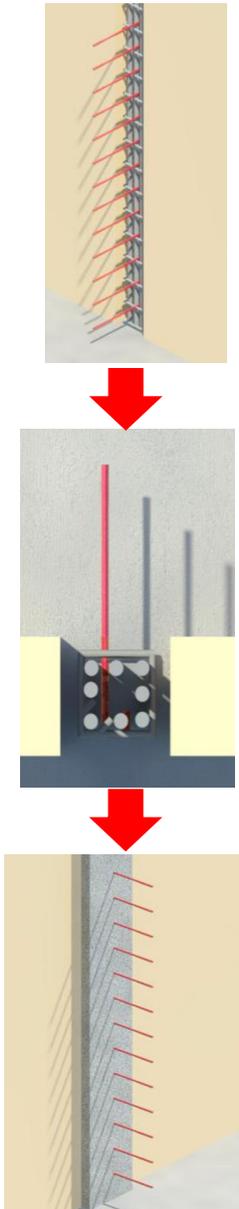
texturing [10]. The drywall partitions are installed in two different ways:

(a) According to the first method, the top track is directly joined to the ceiling, whereas in the second method it is joined to the installed square tube. The different steps involved during the first method of installing the drywall includes the following:

Step 1: Firstly, a chalk line is snapped across the perimeter of floor as to outline where the track needs to go.

Step 2: Insulation of tape onto the back side of each track prior to any installation.

Step 3: Fixing the track onto the floor

Step 4: Plumbing the upper and lower track by using laser level, plumb bob or two of the water levels

Step 5: Once if plumb is established to attach the track to the ceiling.

Step 6: Screwing the studs to the flanking walls or columns with the help of nailable plug and galvanized screw (Figure 6a).

Step 7: Fitting the vertical studs that are remained (Figure 6b).

Step 8: Joining the studs to tracks by clamping the two members tightly by using the drywall screw.

Step 9: Screwing the boards onto the vertical studs using drywall crew TB and to make sure not to screw the horizontal channels (Figure 6c).

Step 10: Finally, installing the remaining wallboards, followed by painting (Figure 6d). Figure 6e illustrates the details of connections made between the fasteners and drywall.

Figure 5 Plan view of placed rebar in column (a), Prespective view of placed rebar prior to casting column concrete (b) and after casting concrete(c)

3.3 Dry Wall

The most common wall finish used for the modern construction is gypsum wallboard, as a part of a gypsum drywall system. The common material used for the covering of timber and steel stud framing is the gypsum wallboard. The panel of wall finish system is a wallboard consisting of gypsum slurry solidified into large panels. The wallboard is connected to the supported framing with the help of the mechanical fasteners, nails, screws, although adhesive is occasionally needed. After the process of attachment, the rest of the operations include the taping and compounding of the joints, painting and

b) In the second method because of some construction limitations such as the conditions of ceiling or existence of some mechanical installations (as well as for this case study), the top track is joined to the square tube which is considered to be the ancillary structure (Figure 7a). Pan head screws LB are used to join the top track to the square tube. The details of connection made between the gypsum wallboards onto the mentioned square tube and top track with used fasteners are shown in Figure 7b to d.
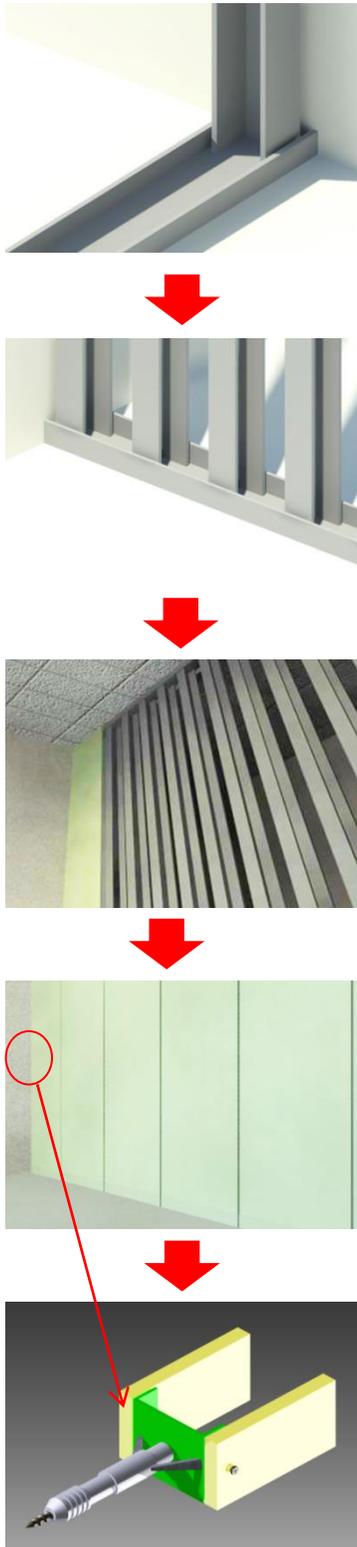

Figure 6 Installing horiozontal track and vertical stud (a), Fixing the remaining vertical studs (b), Installing the first wallboard (c) Installing all the remaining wallboards (d) and Detail of fastener used pertinent to the highllighted red cirtrcle (e)
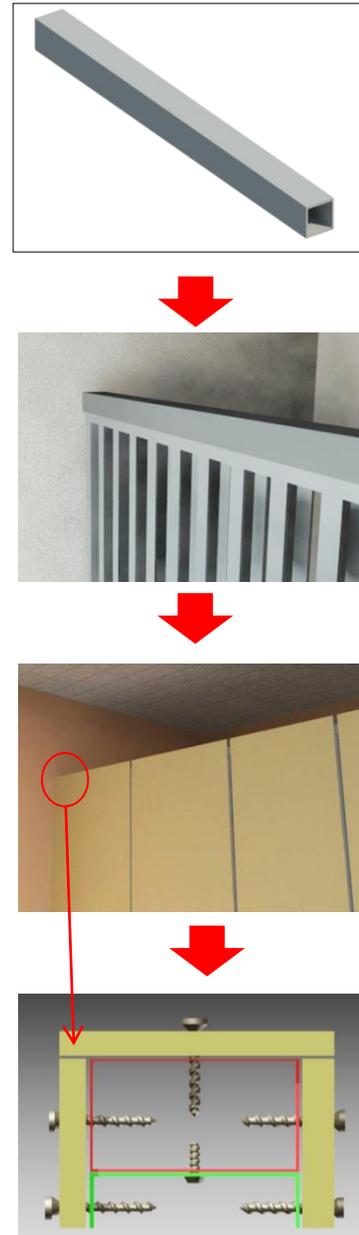

Figure 7 Square tube (a), Installing square tube on top horizontal track (b), Installing wallboards on the vertical studs and square tube (c) and Detail of the fasteners used for the pertinent highlighted red circle (d)
to the highllighted red cirtrcle (e)

3.4 Doors and Windows

In order to install door and window in dry wall, additional vertical and horizontal studs need to be installed as illustrated in the Figure 8a and b.
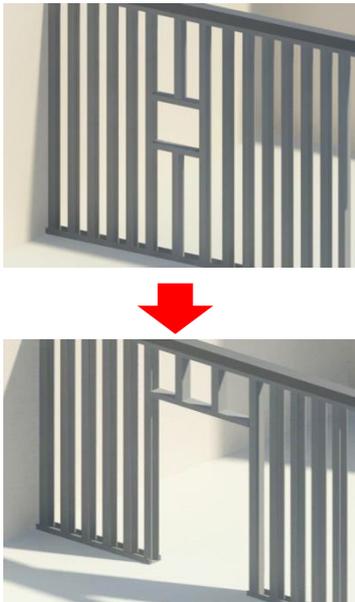

Figure 8 Installing additional studs for window's (a) and door's installation in drywall (b)

4.0 CASE STUDY IMPLEMENTATION:

In order to calculate the materials and time and cost needed for installing partition walls, a case study; faculty of civil engineering at Universiti Teknologi Malaysia (UTM), was chosen. The role of the chosen case study is office building for academicians. This building consists of 7 different levels as shown in Table 1. The perspective view drawn through Revit Architecture is shown in Figure 9.

Table 1 Different Levels in the chosen case study

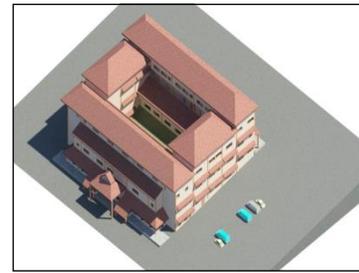| Levels	Base Level's Height From Ground's Surface (mm)	Top Level's Height From Ground's Surface (mm)
Level 1	-2500	+2500
Level 1-1	Ground's Surface (±00)	+5000
Level 2	+2500	+7500
Level 2-1	+5000	+1000
Level 3	+7500	+12500
Level 3-1	+1000	+15000
Level 4	+12500	+17500

Figure 9 Perspective view of the chosen case study

4.1 Data Extraction from Implementing Partition Walls

In this section, the amount of materials, duration and cost needed to install block, brick and drywall partitions are extracted from their implementations on the interior space of a real case study.

4.1.1 Material Takeoff

In regards to the different drawn plans in Revit Architecture, eight types of interior walls are categorized for taking-off in accordance to their lengths, heights, thicknesses and numbers for exporting to the Nawiswork Manage 2014 as shown in Table 2.

Table 2 Types of Interior Walls

Type of Wall	Length (mm)	Height (mm)	Thickness (mm)	Numbers
A	1600	3500	150	40
B	2750	3500	150	24
C	3500	3500	150	146
D	4500	3500	150	66
E	5250	3500	150	55
F	7000	3500	150	17
G	10000	3500	150	9
H	20000	3500	150	2

After exporting the Revit file to Naviswork Manage, different components used during the installation of three partition walls are specified in accordance to their identifications for each type. The specifications identified in Naviswork Manage for Type A of block partition wall are shown as bellow:
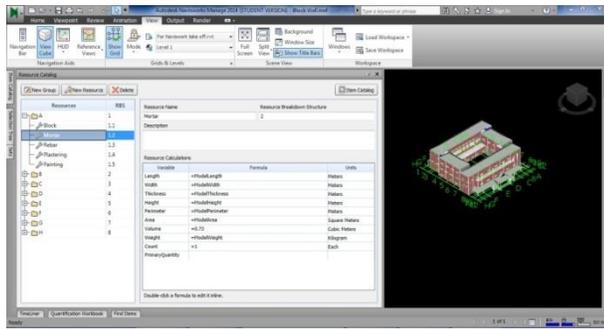
Figure 10 Identifying specifications for block Partitions in Naviswork Manage 2014

The total amount of materials used for installing the block partition walls are shown automatically in Naviswork Manage as below:

Figure 11 Showing the total quantity takeoff from block partitions in Naviswork Manage 2014

Table 3, 4 and 5 show the total quantity takeoff from block, brick and drywall partition walls calculated in Naviswork Manage considering the amount of components used for interior doors and windows as follow:

Table 3 Total quantity take-off from block partitions

Materials	Quantity Take-Off	Unit
Block	54,436.33	Numbers
Rebar Φ10	2,903.54	Kilograms
Mortar	590.86	Cubic Meters
Plastering	9,781.64	Square Meters
Painting	9,781.64	Square Meters

Table 4 Total quantity take-off from brick partitions

Materials	Quantity Take-Off	Unit
Brick	224,992.4	Numbers
Rebar Φ10	1,978.838	Kilograms
Mortar	1,143.755	Cubic Meters
Plastering	9,781.64	Square Meters
Painting	9,781.64	Square Meters

Table 5 Total quantity take-off from drywall partitions

Components	Quantity Take-Off	Unit
Track (Length=4000mm)	837.22	Numbers
Vertical Stud (Length=3400mm)	3,319.8	Numbers
Square Tube (100mm*4mm)	17,709	Kilograms
Drywall Screw TB	81,322	Numbers
Pan Head Screw LB	2,205	Numbers
Nailable Plug	4,359	Numbers
Galvanized Screw	4,359	Numbers
Gypsum Wallboard (1200mm*3500mm*12mm)	2,144.48	Numbers
Painting	9,781.64	Square Meters

4.1.2 Time Calculation

Apart from determining the different types of partitions (A to H) using Revit Architecture, also the exact number of any types at each level was identified. This identification is considered to be as the most appropriate one in terms of calculating the time and cost needed for installing the partition walls in the entire project. These categories are shown in Table 6.

Table 6 Categories of interior walls at each level for time

Type	level 1	level 1-1	level 2	level 2-1	level 3	level 3-1	level 4
A	14	3	9	2	10	2	-
B	-	4	10	1	8	-	1
C	15	15	26	12	28	4	46
D	9	4	20	5	11	10	7
E	14	7	6	7	8	11	2
F	1	-	3	2	11	-	-
G	-	1	3	-	5	-	-
H	-	-	2	-	-	-	-

According to Baker, K. R. and Trietsch, D. [11], the activity duration is computed by dividing the quantity of work involved with the number of resources being used and also including the corresponding production rate of that particular activity. In another research carried out by Kim et.al [4], in order to identify the duration for each activity, it is mentioned that one needs to specify the daily output of required elements (productivity rate of required elements within a working day) prior to computing each activity's duration. For instance, it has been mentioned that if 16 doors are installed within a day, whereby the installation of each door will equal to .0625 day.

In the current study, it is assumed that three skilled labors are working 8 hours daily in order to install the mentioned partition walls onto the interior space of the chosen case study. The starting date for installation is assumed to be on the 1st January 2014. One day is considered as day-off in doing so (every Saturdays). Revit file was exported to Naviswork Manage in order to find out the time required for installing the partitions (block, brick and drywall) .The

duration required for installing each type of the partition wall is specified with regards to different steps of installation, productivity rate and quantity of work that were calculated before.

Figure 12 shows the time computation for the block partition using Nawiswork Manage 2014. The total duration required for installing the three mentioned partition walls at each level and in total can be seen in Table 7.
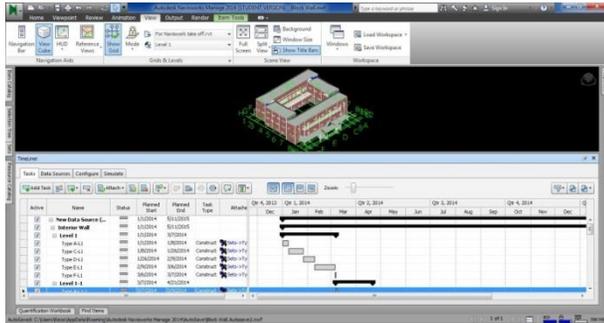

Figure 12 Time Calculation for block partition walls in Naviswork Manage 2014

Table 7 Duration of block, brick and drywall

Levels	Block Partition	Brick Partition	Drywall Partition
1	57 days	58 days	15 days
1-1	39 days	41 days	11 days
2	102 days	103 days	30 days
2-1	34 days	35 days	10 days
3	103 days	103 days	25 days
3-1	35 days	36 days	9 days
4	62 days	62 days	15 days
Total	425 days	434 days	111 days

4.1.3 Cost Calculation

This section compares the calculation of costs involved in installing the three partition walls which includes; block, brick and drywall. The comparison is made based on the materials taken off and the time calculated in the proceeding sections by using Naviswork Manage. The labor cost to install each partition wall is also added to the cost of materials for determining the total cost involved. Table 8 represents the details of cost involved in installing the partitions in terms of the price of materials, labor and total cost. Most of these aforementioned costs are taken from the international construction cost survey [12].

Table 8 Cost calculation of block, brick and drywall

Cost element	Unit	Quantity	Unit cost ($)	Total ($)
Materials (block partition)				
Block	each	54,436.33	1.263	68,753.08
Rebar Φ10	kg	2,903.54	0.985	2,859.98
Mortar	m3	590.86	67	39,587.62
Plastering	m2	9,781.64	8	78,253.12
Painting	m2	9,781.64	3	29,344.92
Total materials				**218,798.72**
Labor (block partition)				
Blocklayer	hr	7,800	5	39000
Plasterer	hr	1,440	6	8640
Painter	hr	960	6	5760
Total labor				**53,400**
Total (block partition)				**272,198.72**
Materials (brick partition)				
Brick	each	224,992.4	0.127	28,574.03
Rebar Φ10	kg	1,978.838	0.985	1,949.15
Mortar	m3	1,143.755	67	76,631.58
Plastering	m2	9,781.64	8	78,253.12
Painting	m2	9,781.64	3	29,344.92
Total materials				**214,752.8**
Labor (brick partition)				
Bricklayer	hr	8,016	5	40,080
Plasterer	hr	1,440	6	8,640
Painter	hr	960	6	5,760
Total labor				**54,480**
Total (brick partition)				**269,232.8**
Materials (drywall partition)				
Track (L=4000mm)	each	837.22	11.72	9,812.21
Vertical Stud (L=3400mm)	each	3,319.8	9.96	33,065.2
Square Tube (100mm*4mm)	kg	17,709	1.2	21,250.8
Drywall Screw TB	box (per 100 pieces)	814	1.3	1,058.2
Pan Head Screw LB	box (per 100 pieces)	23	3.5	80.5
Nailable Plug& Galvanized screw	box (per 100 pieces)	44	5.65	248.6
Gypsum Wallboard (1200mm*3500mm*12mm)	each	4,359	22.50	98,077.5
Painting	m2	9,781.64	3	29,344.92
Total materials				**192,937.93**
Labor (drywall partition)				
Drywall installer	hr	1,704	6.2	10,564.8
Painter	hr	960	6	5,760
Total labor				**16,324.8**
Total (drywall partition)				**209,262.73**

5.0 DISCUSSION

In this research, the assessment of the effectiveness of three aforementioned partition walls is based on the influential factors such as quantity, time and cost needed to install each of them. As mentioned by Navon.R *et al.* [13], labor input for installing the drywall is decreased when compared to the conventional partitions. They also concluded that savings up to 30-40% in the cost of partition can be achieved through the drywall installation. As a result, these savings would lead to at least 1% reduction in the total cost involved in making a complete apartment.

According to the different materials used in the three mentioned partition walls, it is practicable to conclude that quite numerous components or large amount of materials need to be used for installing each of them. On the one hand, large quantity of different materials are needed to install block and brick partition wall as illustrated in Tables 3 and 4. On the other hand, in order to install drywall on the interior space of the buildings, innumerable components are required such as different types of fasteners and studs as mentioned in Table 5.

In regards to the time required for installing each type of partition wall, it can be clearly noted that less time is needed to install a drywall when compared to the other two types of partition walls (see Table 7). Based on the findings of this research, the duration calculated for installing drywall partition is 111 days; whereas 425 and 434 days are required for installing the block and brick partition respectively. As a consequence, drywall would be regarded as the most preferable partition as compared to block and brick types.

As shown in Table 8, it can be clearly seen that from the cost computed for installing each partition, drywall is by far more effective to be used compared to the block and brick partitions. The cost needed to install drywall on the one side and block and brick partitions on the other side seem to be a striking feature. These cost differences would be even more evident if square tubes are not required to install, as well as for the chosen case study in this research due to some limitations such as existence of numerous mechanical installations. However, there are slight differences between the total cost of brick and block partitions. It could be stated that neither block nor brick partition walls are preferable to be built on the interior space of the buildings.

6.0 CONCLUSION:

There are innumerable benefits involved in installing non-load bearing partition walls on the interior space within the buildings such as; maximizing the net areas, higher environmental life-cycle performance, optimal life-cycle cost and improving the flexibility for changing the areas. Despite the fact that relatively a large amount of research has been conducted

concerning the usage of these critical elements on the interior space of the buildings, BIM has not been exploited in any of these concerned areas so far. As a result, this current study is undertaken for taking the BIM into consideration to compare three types of partition walls which includes; brick, block and drywall, in terms of materials, time and the cost required to install. At first, the installation steps for each partition wall and a chosen case study were modeled using Revit Architecture and Autodesk Inventor. Furthermore, in order to calculate the amount of materials, duration and cost needed to install the mentioned partition walls onto the interior space of the chosen case study, Naviswork Manage is exploited. The results show that drywall is the most beneficial type of partition wall amongst the other types investigated in this study. It is also found that the pace of dividing the interior space can be shortened considerably through its installation. More importantly, there is no necessity to spend a substantial amount of money for its installation. On the other hand, very slight differences occurred between the brick and block partition walls installation. Neither brick nor block partition wall is well-suited to be installed because of their longer duration and high cost involved in their installations.

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