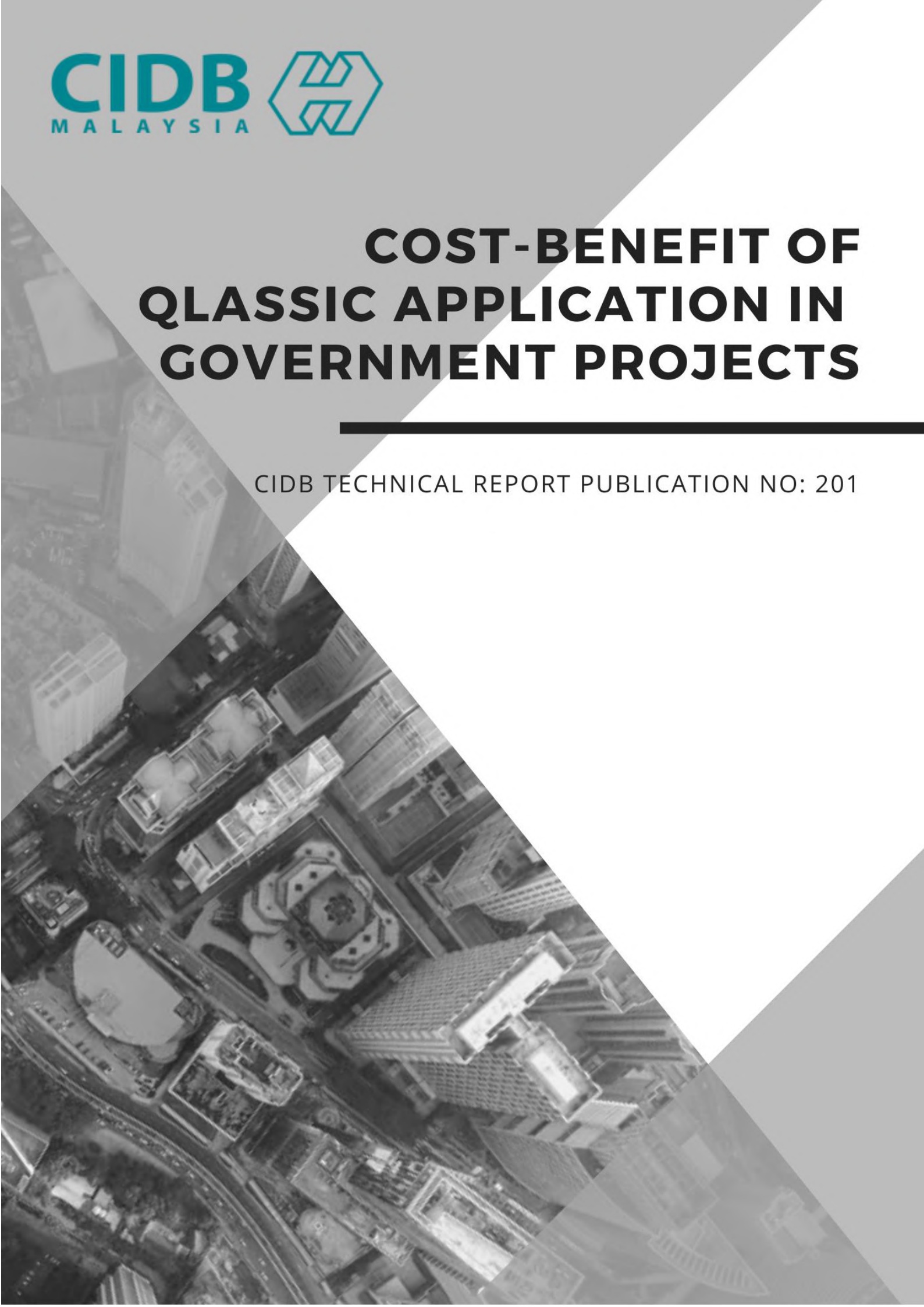


# **COST-BENEFIT OF QLASSIC APPLICATION IN GOVERNMENT PROJECTS**

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CIDB TECHNICAL REPORT PUBLICATION NO: 201



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All enquiries regarding this book should be forwarded to:

CONSTRUCTION INDUSTRY DEVELOPMENT BOARD MALAYSIA (CIDB)  
Level 10, Menara Dato' Onn,  
Pusat Dagangan Dunia Putra,  
No. 45, Jalan Tun Ismail,  
50480 Kuala Lumpur  
MALAYSIA  
Tel: 603-4047 7000  
Fax: 603-4047 7070

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ISBN 978-967-0997-86-5

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# PREFACE

QLASSIC which was developed based on Construction Industry Standard (CIS 7:2014) and was introduced in Malaysian construction industry to address the continuing issue of poor quality in building construction projects. Since its introduction, QLASSIC have been variably been received by the industry. There are clients, consultants and developers that have been actively applying QLASSIC in their projects. In realising its benefits, they have been championing its application. However, there was also others that have been lethargic in supporting the application of QLASSIC in their projects.

This paper presents the study conducted to provide further in-sights to this phenomenon. The aim was to establish the extents of cost-benefit of QLASSIC application in in reducing the cost of defects rectification during the project's Defects Liability Period (DLP).

# EXECUTIVE SUMMARY

The application of QLASSIC in construction projects to date, were found to be very encouraging. Many have applied QLASSIC in their projects have claimed that it was very significant in better quality buildings. This was exemplified from the benefits reaped by leading residential and property developers who have attained higher demand and better sales value from the application of QLASSIC in their projects. Further supporting this was conducted by CIDB 2017 which found the cost of rectifying defects in QLASSIC applied projects were low i.e., between 2-3% of the QLASSIC applied elements. This cost was very minimal if factored with the total construction cost with lesser defects to rectify during the Defects Liability Period (DLP) and against the cost for the QLASSIC application. This in-turn had a knock-on effect of reducing complaints from end user when the projects were handed over. These findings have led to the proposition for QLASSIC to be applied more widely, beginning with government projects. Notwithstanding, several industry stakeholders i.e., clients, developers and contractors have voiced their reservation on the benefits of applying QLASSIC, citing that it was difficult to apply QLASSIC without any negative cost implications.

This study was mooted to assist circumvent this debate by re-confirming the benefit of the application of QLASSIC with minimal cost implication to the project. The unit of measurement the study was the cost of rectifying the defects during the DLP. The premise of the study was eleven (11) selected QLASSIC applied projects which were implemented between 2017 and 2019. The findings support the CIDB study in 2017. The analyses found that the cost of defects rectification for the project were very minimal at only 0.58% (i.e., less than 1%) of the project's building construction cost with an QLASSIC score of 65%. There was a general trend for the cost of rectifying defects to be inversely proportional with the higher QLASSIC scores, i.e., higher scores would result in lesser cost of rectifying defects during the project's DLP. However, it was not possible to conclusively confirm the significance of this inverse relationship given the small sample of projects for this study.

# ACKNOWLEDGEMENT

The members of the project team who contributed to the study and production of this report:

1.	Prof. Sr. Dr. Fadzil Bin Hassan (Project Leader)	University Technology MARA
2.	Hasmawiah Bt. Mohd. Kaidi	University technology MARA
3.	Ts. Dr Haryanti binti Mohd Affandi	Universiti Kebangsaan Malaysia (UKM)
4.	Ts. Dr Mohd. Firdaus b Mustaffa Kamal	Universiti Pendidikan Sultan Idris (UPSI)
5.	Sr Ts. Muhamad Zaihafiz bin Zainal Abidin	Infrastructure University Kuala Lumpur (IUKL)
6.	LAR Dr Sallehuddin Mat Noor	Universiti Putra Malaysia (UPM)
7.	Hairuddin Mohammad	Universiti Tun Hussein Onn Malaysia (UTHM)
8.	Ahmad. Fahmi Bin Fadzil	Aifadz Resources

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# 1.0 Background

Eleven (11) government were chosen for this study. This was purposely selected because of their general similarity in specifications, size and cost. The details of the projects are listed in Table 1.

## 1.1 The case study Projects

**Table 1: List of QCLASSIC applied Government projects**

No.	Project Name
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia,, Cawangan Negeri Perak
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi, Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman
4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor
9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman
10.	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam, Selangor
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan



## **1.2 Establishing the cost of defects rectification**

The cost for the rectification of defects was calculated based on each unit cost of the QLASSIC applied building element. The approach adopted was by normalising the data was undertaken firstly by linking the defects to be ratified based on the QLASSIC assessment categories. The works needed to ratify the defects are then established (eg. to fix unevenness of floor tiles - breaking old tiles and replacing with new tiles; installation; replacing non-functioning fittings - installation of new fittings; defecting paintwork - repainting the wall, etc.). The cost for each of the works needed to rectify the defects are calculated using the Jabatan Kerja Raya Schedule of Rates for Small and Rectification Works (2019) as the standard rate for all rectification works.

# **2.0 Methodology**

To operationalize the study, a sequential approach in analysing the data as adopted as follows:

Step 1: To investigate the construction cost/m<sup>2</sup> of projects

Step 2: To investigate the number of defects in the projects

Step 3: To investigate the cost of rectification of the defects

Step 4: To determine the co-relation between defects rectification cost and QLASSIC scores

## **2.1. Data quality and analysis**

It was not possible to get access to the project's contract documents and the original defects list from the respondents to precisely ascertain the project cost or the cost for rectification of defects due to confidentiality. The data analysed were analyses 'as given' data given by CIDB from the QLASSIC assessments undertaken on the projects. To normalise, only data on QLASSIC assessed elements Floor, Wall, Ceiling, Door/Window, and Fixtures were considered. External Finishes, Mechanical and Electrical and External Works were not included as these elements are uncommon in all the projects, and their contribution to the QLASSIC scores are not very significant. The Jabatan Kerja Raya (JKR) Schedule of Rates 2017-2019 by were used to establish the cost of rectification defects,

## 3.0 Results from the analysis

Results from the analyses were derived from the sequential analysis of data (underlined in Step 1 - 4, 2.0).

### 3.1 Results (Step 1): To investigate the construction cost/m<sup>2</sup> of projects

To facilitate the analysis based on a common dominator, the building were normalised as construction cost/m<sup>2</sup>. This was undertaken by collecting the total cost for each project. The building construction cost for each project were investigated by deducting all other cost i.e., external services, and infrastructure cost etc., from the project construction cost. Once this is derived, the total building cost is divided by the floor area to derive at the construction cost/m<sup>2</sup>. The construction costs i.e., the average of construction cost and cost/m<sup>2</sup> emergent from the analyses is shown in Table 3.

**Table 2: Construction cost (cost/m<sup>2</sup>) of the QLASSIC applied Government projects**

Project		Project Cost (Rm)	Cost (Rm)/M <sup>2</sup>
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia, Cawangan Negeri Perak	27,514,889.47	4,305.93
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor – Kuarters	8,910,633.00	509.70
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	10,944,000.00	3,181.89
4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	16,628,465.81	1,544.78
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	8,910,633.00	12,256.72

Project		Project Cost (Rm)	Cost (Rm)/M2
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	6,595,880.00	1,304.56
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	55,888,000.00	3,156.39
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	10,555,500.00	4,267.47
9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pminta Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	9,109,428.00	1,371.66
10.	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	55,810,428.00	2,671.76
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan	23,838,132.02	973.78
	<b>Average Cost</b>	<b>21,336,908.12</b>	<b>3,231.33</b>

### 3.2 Results (Step 2): To investigate the number of defects in the projects

The defects data were then grouped into classifications as according to QLASSIC defects assessment categories of; (i) Floor, (ii) Wall, (iii) Ceiling, (iv) Door and Window, and (v) Fittings. This is shown in Table 4.

**Table 3: Number of defects in the QLASSIC applied Government projects**

Project		No. of Defects					
		Floor	Ceiling	Wall	D/W	Fixtures	Total
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia, Cawangan Negeri Perak	66	60	137	73	50	386
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor - Kuarters	72	66	137	104	66	445
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	69	46	93	54	60	322
4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	86	81	144	53	74	438

Project		No. of Defects					
		Floor	Ceiling	Wall	D/W	Fixtures	Total
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	71	54	117	101	48	391
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	138	217	170	226	56	807
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	559	882	1062	927	315	3745
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	80	108	115	169	28	500
9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	256	348	360	386	146	1496
10	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	886	1193	1456	1658	627	5820

Project		No. of Defects					
		Floor	Ceiling	Wall	D/W	Fixtures	Total
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan	888	1357	1598	1278	692	5813
	Average	364	307	628	611	298	1982

**\*Note: D/W (Door/Window)**

The number of defects were converted in terms of percentage (%) and the results are as shown in Table 5.

**Table 4: Percentage (%) of defects in the QCLASSIC applied Government projects**

Project		Summary of Defects (%)				
		Floor	Ceiling	Wall	D/W	Fixtures
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia, Cawangan Negeri Perak	17.10%	15.54%	35.49%	18.91%	12.95%
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor - Kuarters	16.18%	14.83%	30.79%	23.37%	14.83%
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	21.43%	14.29%	28.88%	16.77%	18.63%

Project		Summary of Defects (%)				
		Floor	Ceiling	Wall	D/W	Fixtures
4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	19.63%	18.49%	32.88%	12.10%	16.89%
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	18.16%	13.81%	29.92%	25.83%	12.28%
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	17.10%	26.89%	21.07%	28.00%	6.94%
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	14.93%	23.55%	28.36%	24.75%	8.41%
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	16.00%	21.60%	23.00%	33.80%	5.60%

Project		Summary of Defects (%)				
		Floor	Ceiling	Wall	D/W	Fixtures
9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	17.11%	23.26%	24.06%	25.80%	9.76%
10	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	15.22%	20.50%	25.02%	28.49%	10.77%
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan	15.28%	23.34%	27.49%	21.99%	11.90%
	Average	18.81%	21.61%	30.70%	25.98%	12.90%

**\*Note: D/W (Door/Window)**



### 3.3 Results (Step 3): To investigate the cost of rectification of the defects

The cost of rectification of defects in the projects was calculated by firstly multiplying the cost of defects rectification for each QLASSIC element with the cost of rectifying the defects. The results from the analysis is as shown in Table 6.

**Table 5: Defects Rectification Cost**

Project		Rectification Cost (RM)					
		Floor	Ceiling	Wall	D/W	Fixtures	Total
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia,, Cawangan Negeri Perak	6547.20	4530.00	15700.20	1766.60	406.25	28950.25
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor - Kuarters	7142.40	4983.00	15700.20	2516.8	536.25	30878.65
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	6844.80	3473.00	10657.80	1306.80	487.50	22769.90

4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	8531.20	6115.50	16502.40	1282.60	601.25	33032.95
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	7043.20	4077.00	13408.20	2444.20	390.00	27362.60
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	13689.60	16383.5	19482.00	5469.20	455.00	55479.30
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	55452.80	66591.00	121705.00	22433.40	2559.38	268741.78
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	7936.00	8154.00	13179.00	4089.80	227.50	33586.30

9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	25395.20	262740	412560	9341.20	1186.25	103452.65
10	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	87891.20	90071.50	166858	40123.6	5094.375	390038.28
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan	88089.60	102454.00	183131.00	30927.60	5622.50	410224.00
	<b>Average</b>						<b>127,683.33</b>

### 3.4 Results (Step 4): To determine the co-relation between defects rectification cost and QCLASSIC scores

The co-relation between defects rectification cost and QCLASSIC scores was determined by tabulating the cost of rectifying the defects (from findings shown in Table 6) with the QCLASSIC scores achieved for each project (as shown in Table 7) to establish the pattern if higher QCLASSIC scores would correspond to lower cost of defects ratification.

**Table 6: Project's QCLASSIC scores**

	<b>Project</b>	<b>QCLASSIC Score</b>
1.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia, Cawangan Negeri Perak	68.00%
2.	Cadangan Pemajuan Taman Sinar Harapan Tampoi Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor - Kuarters	62.00%
3.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	70.00%
4.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	68.00%
5.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	60.00%
6.	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	57.00%
7.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	60.00%
8.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	71.00%
9.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii).	69.00%

	7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	
10	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	75.00%
11.	Cadangan Membina Dan Menyiapkan 96 Unit Rumah Link 2 Tingkat (24' X 75') Dan Sebuah Pencawang Elektrik Di Jalan Setia Wawasan U13/31, Precint 10, Seksyen U13, 40170 Shah Alam, Selangor Darul Ehsan	65.00%

The tabulation of the cost of rectification the defects (from findings shown in Table 6) with the QLASSIC scores achieved for each project (as shown in Table 7) emerge as shown in Table 8.

**Table 7: QLASSIC score vs % of defects rectification**

	Project	% of Defects Ratification Cost	QLASSIC Score
1.	Cadangan Membina Dan Menyiapkan: I). 12 Unit Rumah Berkembar Dua Tingkat Di Atas Lot Pt 38074-Pt 38081 Dan Pt 38083-Pt 38086, Ii). 17 Unit Rumah Banglo Dua Tingkat Type A Di Atas Lot Pt 38051-Pt 38054, Pt 38056-Pt 38059, Pt 38062-Pt 38065, Pt 38070-Pt 38073 Dan Pt 38082, Iii). 7 Unit Rumah Banglo Dua Tingkat Type B Di Atas Lot Pt 38055, Pt 38060-Pt 38061, Pt 38066-Pt-38069 Di Taman Pmint Perdana Fasa 6, Kg Batin Hulu Takir, Mukim Kuala Nerus, Daerah Kuala Terengganu, Terengganu Darul Iman	0.70%	75%
2.	Pembinaan Rumah Keluarga Angkatan Tentera Kem Sri Miri, Sarawak (Reka & Bina).	0.32%	71.00%
3.	Yang Mengandungi 1 Blok Kuarters Kelas G (11 Tingkat), Sebuah Kuarters Banglo D (2 Tingkat), 2 Buah Pondok Pengawal, Sebuah Bangunan Tnb, Tempat Parkir Motosikal Berbumbung, 1 Buah Kebuk Sampah, 1 Buah Wakaf, Sebuah Sewerage Treatment Plant Dan Sebuah On Site Detention Pond Di Atas Ptd 131200 Mukim Tebrau, Daerah Johor Bahru, Johor - Kuarters	0.21%	70.00%
4.	Cadangan Membina Dan Menyiapkan Bangunan Tambahan Di Kompleks Cidb Negeri Johor	1.14%	69.00%
5.	Cadangan Membina dan Menyiapkan Bangunan Arkib Negara Malaysia,, Cawangan Negeri Perak	0.11%	68.00%
6.	Pembinaan Masjid Baru Di Daerah Baling, Kedah Darul Aman	0.20%	68.00%

7.	Cadangan Membina Dan Menyiapkan 50 Unit Rumah Link 3 Tingkat (28' X 90') Di Seksyen U13, Shah Alam	1.72%	65.00%
8.	Cadangan Pemajuan Taman Sinar Harapan Tampoi, Johor Bahru	0.35%	62.00%
9.	Menaiktaraf 4 Blok Perumahan Sediada, Dewan Serbaguna, Astaka Serta Bangunan Sokongan Secara Konvensional Oleh Kontraktor Dilantik Dan Penyelarasan Projek Oleh Jkr Hulu Langat Dan Perunding Di Penjara Kajang, Selangor Darul Ehsan	0.31%	60.00%
10	Cadangan Membina Dan Menyiapkan 32 Unit Rumah Berkembar 1 Tingkat, Fasa 1 Serta Kerja-Kerja Berkaitan Di Atas Lot Pt 7545 Hingga Pt 7576, Mukim Keluang, Daerah Besut, Terengganu Darul Iman	0.48%	60.00%
11.	Menyiapkan Baki Kerja Balai Bomba Dan Penyelamat Sebana Cove Pengerang, Johor	0.84%	57.00%
	Average	0.58%	65%

A scatterplot diagram was produced to attempt to establish the trend of the relationship (inverse or proportional) between QLASSIC scores with the % reduction in defects rectification cost. This is shown in Figure 1. The result was inconclusive due to the small number of projects samples.

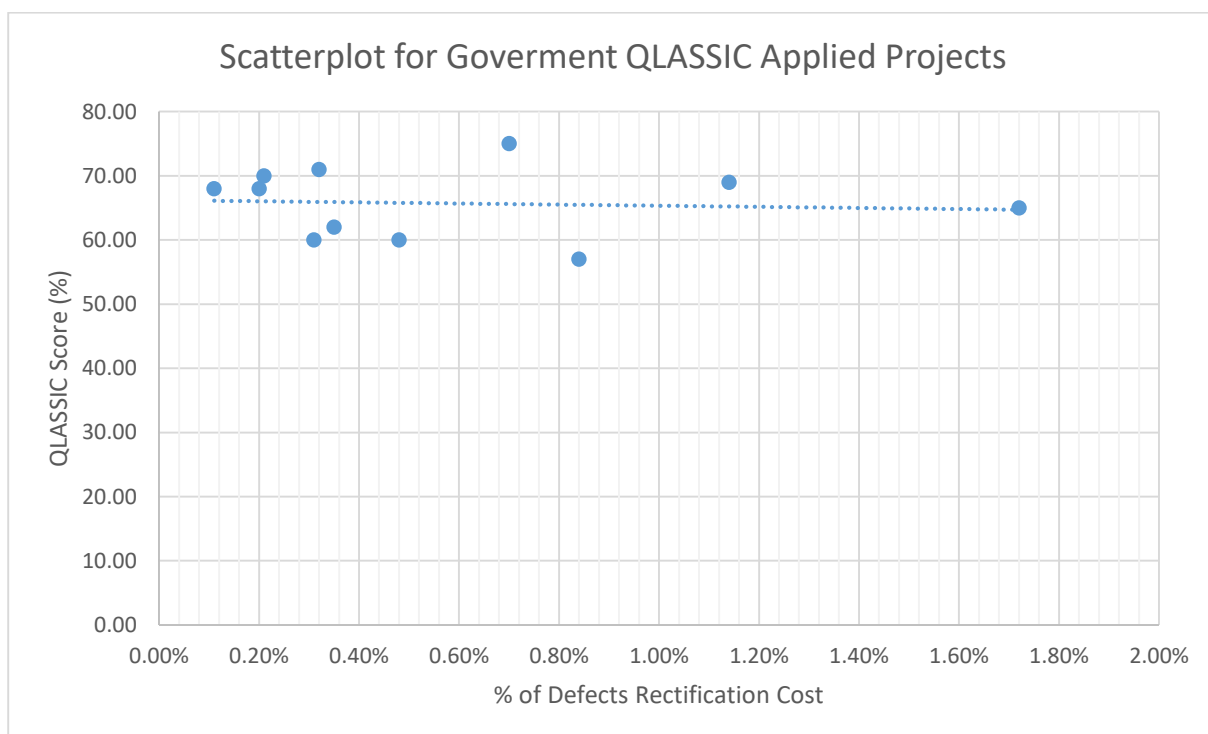


Figure 1: Scatterplot for Government applied projects

#### **4.0 Conclusion**

In concluding the analysis of data for cost-benefit of QLASSIC application in government projects, the findings emerge to re-confirm that the application of QLASSIC will have minimal cost implication to the project. The cost of defects rectification stood at only 0.58% i.e., less than 1% of the project construction cost of with the project's QLASSIC score of 65%. It was not possible to confirm if the cost of rectifying defects would be inversely proportional with the higher QLASSIC scores because of the limited number of project samples.

# GLOSSARY OF TERMS

CIDB	Construction Industry Development Board, Malaysia
CIS	Construction Industry Standard
DLP	Defects Liability Period
JKR	Jabatan Kerja Raya
QLASSIC	Quality Assessment System In Construction
SOR	Schedule of Rates

## REFERENCES

1. CIDB (2015), *Effectiveness of QLASSIC Assessment*, Construction Industry Development Board (CIDB), Kuala Lumpur, Malaysia.
2. CIDB (2015), *Effectiveness of QLASSIC Training*, Construction Industry Development Board (CIDB), Kuala Lumpur, Malaysia.
3. CIDB (2015), *Impact of Con Cost of QLASSIC Application in Government Projects*, Construction Industry Development Board (CIDB), Kuala Lumpur, Malaysia.
4. CIDB (2016), *Data Analysis of Quality Assessment System in Construction or QLASSIC 2007-2012*, Construction Industry Development Board (CIDB) Kuala Lumpur, Malaysia.
5. CIDB (2016), *Data Analysis of Quality Assessment System in Construction or QLASSIC 2013-2015*, Construction Industry Development Board (CIDB) Kuala Lumpur, Malaysia.
6. CIDB (2017), *Construction Industry Standard CIS7: 2014*, Construction Industry Development Board (CIDB), Kuala Lumpur, Malaysia.
7. CIDB (2015), *Cadangan Pelaksanaan Projek Penyediaan Kertas Kabinet untuk Mewajibkan QLASSIC untuk Projek- Projek Pembinaan Kerajaan untuk CIDB Malaysia*, Construction Industry Development Board (CIDB), Kuala Lumpur, Malaysia.
8. JKR (2019), *Jabatan Kerja Raya Schedule of Rates (SOR) for Small and Ratification Works – 2019*, Jabatan Kerja Raya. Kuala Lumpur, Malaysia.



9. N. Manap, Y.K. Goh & N. Syahrom (2017), Compulsory of Malaysia's Quality Assessment System in Construction (QLASSIC), *The International Conference on Eco Engineering Development 2017 (ICEED 2017)*, IOP Publishing Ltd.



ISBN 978-967-0997-86-5



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