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BARRIERS TO STANDARDIZATION OF NEW CABLE COLOUR CODE FOR ELECTRICAL INSTALLATION

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Abstract

The standardization of most recent cable colour code in accordance with IEC 60445 is very importance to ensure sustainable energy infrastructure. Majority electrical installation in Malaysia still used red/yellow/blue the old British cable colour code although majority countries all over the world have changed to brown/black/grey/blue code which in line to IEC 60445 standard. The practice of new cable colour code are very important as current electrical appliances have used the latest cable colour code where the wrong connection using old colour code and the new one will lead to fatal electrical accident, lead to competitive disadvantage for Malaysia as one of the cable producer in the world, and give risk to current cable supply as most cable in this world have used the new cable colour code. As changes to new code is not easy as walk in the park, the study on barriers related to adoption of new cable code are very crucial. Based on focus group discussion with important stakeholders, this study underline barriers that will impede the smooth transitioning to a new standard of cabling code in Malaysian electrical industry.

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Keywords: Barriers, IEC 60445, cable colour code, electrical safety, Malaysia, focus group discussion.

1. Introduction

In Malaysia, electrical installation is under the purview of Suruhanjaya Tenaga Malaysia. All electrical installation must be in compliance with guideline by Suruhanjaya Tenaga (Suruhanjaya Tenaga Malaysia, 2008). Although the changes to a new cable colour code not yet imposed in the Malaysian market, the various institutional pressures such as from the cable and electrical appliances manufacturers, developers, regulators and others have increased the adoption of new cable colour code. IEC 60445 have been introduced in 2010 has provided a guidelines of cable code for a fixed electrical installation (Šučur & Čučilo, 2017). Majority of the countries all over the world including countries in Asia such as Hong Kong, Singapore, China, Japan, and Indonesia have successfully change to a new cable code. As changes on new cable colour code need a through implementation, one of the essential ways are to focus on the factors that can hinder the changes to a new cable colour code. This study via focus group discussion (FGD) conducted to pertinent stakeholders related to new cable colour code have identified main barriers related to the changes (White et al., 2016). The identification of barriers are very important to ensure the smooth transition toward a new cable colour code. The implementation plan to overcome those barriers are also proposed in this study.

1.1. Cable Colour Coding

Cable colour coding is very important for identification of electrical conductors used in electrical installation. The existing colour coding in Malaysia market is based on BS 7671 where Live wire (Red, Yellow, Blue), Neutral wire (Black), and Earth/Protective Wire (Green and Yellow). Nevertheless the current cable colour code has been harmonized to a new cable colour code in accordance to IEC 60445 where Live wire (Brown, Black, Grey), Neutral wire (Blue), and Earth/Protective Wire (Green and Yellow) (Based on Figure 1). The new cable colour codes were introduced to scale down the electrical accident risk related to wrong electrical installation particularly of earthing/protective wire with other electrical functions faced by electrical workers affected by red-green colour blindness (International Standard, IEC 60445, 2006).

Single phase:	Existing	Harmonized
Live	Red	Brown
Neutral	Black	Blue
Earth	Green and Yellow	Green and Yellow

Three phase:	Existing	Harmonized
Phase 1	Red	Brown
Phase 2	Yellow	Black
Phase 3	Blue	Grey
Neutral	Black	Blue

Figure 01. Cabling code and standard based on BS 7671 and IEC 60445

2. Problem Statement

In term of safety aspects, the new cabling code and standard will consist associate the shift of black cored cable from neutral to phase and the blue cored cable from phase to neutral, and hence the change may present the possible risk of wrong cable connections which lead to electrical accident (Burgess, 2019). In term of economic advantages, changes to a new cable colour codes can reduce the cost of cable supply as well as boost the production of Malaysian cable in the worldwide markets (Wire-Malaysia.com, 2018). As countries such as Hong Kong and Singapore have successfully adopted to a new cables codes, there were lack of studies that focus on barriers related to the new practices in Malaysia market. The identification of barriers are very important to ensure the smooth transitioning of the cable colour code change over.

3. Research Questions

1. What are the barriers faced by stakeholders in new cabling colour code changes in Malaysian Electricity Market?
2. What are the possible ways to overcome identified barriers related to the new cabling colour code changes in Malaysian Electricity Market?

4. Purpose of the Study

1. To identify barriers faced by stakeholders in new cabling colour code changes in Malaysian Electricity Market.
2. To propose the possible ways to overcome those barriers related new cabling colour code changes in Malaysian Electricity Market.

5. Research Methods

Focus Group Discussion (FGD) was design to gather information and identify barriers from stakeholders regarding the changes to new cabling colour code for a fixed electrical installations in the Malaysian market (Wilkinson & Silverman, 2004). The stakeholders were grouped into three groups including technical group (representatives from MCMA, Institution of Engineers, Malaysia, SIRIM, JKR Electrical Division, Tenaga Nasional Berhad, Institution of Certified Engineers Malaysia), publicity group (representative from Real Estate and Housing Developers' Association Malaysia, Department of Standard Malaysia, Sekolah Menengah Teknik Kuala Lumpur, Persatuan Rakan Niaga Strategik}, and training group (representatives from Registered Electrical Contractor, The Electrical and Electronics Association of Malaysia, Akademi Binaan Malaysia, Suruhanjaya Tenaga Malaysia). The participants of the focus group study were guided by the moderators and all issues have been discussed thoroughly.

6. Findings

6.1. Barriers Related to Technical Issues

- Low Awareness of public to use competent person for their electrical wiring works (Institute of Certified Engineer Malaysia)

- No proper Installation Guideline to handle Mix Installation (Old Colour Code + New Colour Code) (Electrical Engineering Division, Kementerian Kerjaraya Malaysia)
- Issues related to non-standard cabling (fake) that come with a new standard which purposely to take advantage on the changes to a new cabling colour code (Malaysia Cable Manufacturer Association).
- The safety issue for electrical installers becomes an important priority before the working group can make the decision to change to a new cable colour code (The Electrical and Electronics Association of Malaysia).

6.2. Barriers Related to Training Issues

- All the training related to the latest standard of cabling colour code must be instructed by competent trainer and only for registered electrical workers (Institute of Engineer Malaysia)
- Only competent wiremen can do wiring work and induction courses involving the latest guidelines for the latest cabling colour code (Institute of Certified Engineer in Malaysia).

6.3. Barriers Related to Publicity Issues

- As there are a lot of high scale projects in progress in Malaysia, the committee needs to instil an awareness on the part of project managers and contractors as to the need to adopt the latest cabling colour code (Malaysia Cable Manufacturer Association)
- How to involve all the Contractor Associations, cable traders, and stockists and make them aware of the benefits of the change to recent standard of cabling colour code (The Electrical and Electronics Association of Malaysia).

Based on the above findings obtained from Focus Group Discussion, among of the main themes of barriers can be classified in Figure 2. Based on previous study by Leung and Ho (2009) (Hong Kong) and Jaaffar et al. (2018) (Malaysia) to overcome these barriers a proper implementation plan is need for a transition to a new cable colour code.

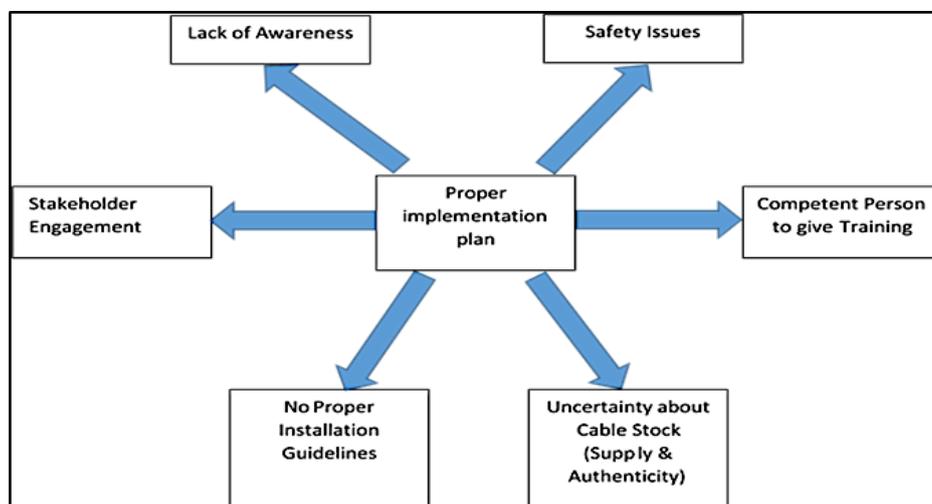


Figure 02. Barriers of cable colour code changes in Malaysian Market

Based on the previous experience in Hong Kong and Singapore market, a 5-years implementation plan towards new cable colour code can be adopted by Malaysia. Nevertheless, the establishment of working group are very important to ensure all stakeholders participate in the design phase of the implementation plan towards current cabling colour code standard in a Malaysia market. The working groups can be divided into three main groups including 1) Technical Working Group; 2) Training Working Group; 3) and Publicity Working Group (Leung & Ho 2009).

7. Conclusion

All stakeholders including industry, consumer, and public have a right to be protected from dangers and risks arising from electrical installation works. As electrical cable is one of the medium to carry electrical currents, a proper enforcement and guideline are needed to minimize the risk of electrical accident as well to ensure the energy infrastructure is sustainable. With regards, to adoption of latest standard of cabling colour code, all stakeholders need to have clear guideline and implementation plan in order to ensure the harmonization in cable colour code happen smoothly. Any electrical installation should be carried out by electrical competent person and not by do-it-yourself (DIY) consumers. Furthermore, all electrical training institution must be aware toward this changes in order for them to prepare new syllabus in future.

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