A Survey on Engineering Ethics and Technological Advancement among Malaysian Public University Students

Zambri Harun
Faculty of Engineering & Built Environment
UKM, 43600 Bangi, Malaysia
zambri@ukm.edu.my

Hashimah Hashim
Faculty of Electrical Engineering
UiTM, 40450 Shah Alam, Malaysia
hashimah655@salam.uitm.edu.my

Shuhaimi Mansor
Faculty of Mechanical Engineering
UTM, 81310 Skudai, Malaysia
shuhaimi@fkm.utm.my

Zamri Mohamed
Faculty of Mechanical Engineering
UMP, 26600 Pekan, Malaysia
zamrim@ump.edu.my

Abdus Samad Mahmud
School of Mechanical Engineering
USM, 14300 Nibong Tebal, Malaysia
abdus@usm.my

Kamarul Arifin Ahmad
Faculty of Engineering
UPM, 43400 Serdang, Malaysia
aekamarul@upm.edu.my

A survey at five public universities in the Peninsular Malaysia has been conducted to get a clearer statistics of students' understanding of engineering ethics, technological advancement and safety. Ethical issues, sometimes rampant, occur in the public and private sectors as well as in the society, these have caused poverty in the long run and to some extent the environment. The survey has been conducted over a period of almost one year with the respondents being the third and fourth year engineering and other technical equivalent students. Very significant number of participants i.e. 92.1% indicated their agreements that there exist ethical issues in the country and there are tremendous rooms for improvement. 89.0% respondents indicated that our ambitions towards a developed nation is possible if engineers and technical expertise in the government and private sectors embrace ethics awareness in their dealings. Responses of similar magnitudes also reveal that a lot of man-made accidents and disasters are avoidable i.e. if ethical awareness are put into actions.

Keywords — engineering ethics, utilitarianism technological advancements, safety

I. INTRODUCTION

Technological advancements and modernizations are always in the masterplan of many developing countries. Countries in this region namely the South East Asia are generally developing, with the abundance of raw materials, energy, relatively good location, climate and geo-politics, this region is set to be one of the world's leading economic growth engines. Unfortunately, the people could not catch up with the socials effects brought about by the fast developments. Some of the countries have been plagued so badly by the effects of widespread unethical practices in the government, private sectors and the society.

According to the World Economic Forum, corruption is cited as the top concern for doing business in Indonesia, with 16% of those surveyed reporting this as a significant barrier. Also civil society reports reveal that bribery – in the granting of public procurement contracts, in infrastructure, and in the issuing of licenses and permits – is commonplace. According to the 2013 World Gallup Poll, 88% of citizens feel corruption is widespread in government [1]. To the north of the region, The Human Right Watch (HRW) accuses giant European-based clothing brands of labor exploitation in Cambodia [2]. Workers in Cambodia's garment factories—frequently producing name-brand clothing sold mainly in the United States, the European Union, and Canada often experience discriminatory and exploitative labor conditions. The combination of short-term contracts that make it easier to control workers, poor government labor inspection and enforcement, and aggressive tactics against independent unions make it difficult for workers, the vast majority of whom are young women, to assert their rights.

Back home, Malaysia has its own issues with questionable practices in the public and private sectors. The Transparency International (TI) lists Malaysia's key corruption challenges as political and campaign financing, the "revolving door" and access to information. Political parties are not legally required to report on what funds are spent during election campaigns. Due in part to this political landscape, Malaysia's ruling party has funds highly disproportionate to other parties. This unfairly impacts campaigns in federal and state elections. The "revolving door" is a movement of personnel between roles as legislators and regulators and the industries affected by the legislation and regulation. The risk of corruption is high and regulating public-private interactions becomes difficult, also allowing for

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corruption to take place with impunity. Malaysia is also a rare example of a country where political parties are not restricted in possessing corporate enterprises, another factor which highlights the extent of ambiguity between the public sector and private corporate ownership. Due to the political landscape, the passing of 'the Official Secrets Act' allows any document to be officially classified as secret, making it exempt from public access and free from judicial review. Additional laws such as the Printing Presses and Publications Act, the Sedition Act 1949 (subsequently replaced with the National Harmony Act), and the Internal Security Act 1969 also ban the dissemination of official information and offenders can face fines or imprisonment [3]. The composition of Malaysian ethnics consisting of the Malays, Chinese, Indians have somehow require rare measures to ensure public harmony. Malaysia also suffers from corporate fraud in the form of intellectual property theft. Counterfeit production of several goods including IT products, automobile parts, etc., are prevalent [3].

The problems mentioned above are just some of the known stories of challenges to ethics in the running of governments and rooted in the society. These practices might still be around for long period because of the limited general knowledge on ethics. The country probably needs radical changes to the way audits are performed on companies financial documents following major financial audit scams [4] involving billions of dollars. An academic investigation in the financial system regarding the influence of knowledge of ethics (KOE) on auditors, the perceived ethical problems (PEB), the influence of PEB on ethical judgments (EJ) and the mediating impact of PEB that mediate the relationship between KOE and EJ reveal that significant relationships exist between KOE – PEB and PEB, - EJ. Additionally, PEB are found to mediate the relationship between KOE and EJ. The finding supports major premise of Hunt and Vitell's theory of ethics [5] that predicted personal characteristics influence PEB and EJ.

The connections between ethics, sustainability and environment have to be revisited so that a rational balance could be established. There are many ways conflicts exist between economic and development ambitions against environmental requirements. The *utilitarianism,* both as a theory of personal morality and as theory of public choice has been most influential in economics [6]. The utilitarianism is a branch of the theory of normative ethics of behavior (the study of right and wrong) which states that an action is right if and only if its consequences are optimal, i.e., it produces the best balance of goodness over badness for everyone involved. Its notion of an optimizing economic actor is individuation based. Consequently individual interests or preferences form the basis for social outcomes. In addition, utilitarianism assumes that moral actions are essentially based on rational decision making.

Ethics are actors to bigger event than the issues such as public procurement, permits, child labor, women's rights, multi-billion audit scams, rights to information and democracy discussed so far; the global climate change [7]. There have been strong presumptions that ethics have been neglected in the climate change, could be due to its nature which is necessarily interdisciplinary, crossing boundaries between (at least science, economics, law, and international relations). This fact not only creates an obstacle to philosophical work (since amassing the relevant information is both time-consuming and intellectually demanding) but also makes it tempting to assume that climate change is essentially an issue for others to resolve.

II. METHODOLOGY

A survey has been conducted at five public universities in the Peninsular Malaysia. These universities are Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM), Universiti Teknologi MARA (UiTM) and Universiti Malaysia Pahang (UMP). Since the volume of participations was expected to be large, an internet-based method was used to handle large paper works. Only year three and four students were invited to participate and a note was provided showing that only students from engineering or other technical-equivalent programmes shall participate. The questionaires were discussed among co-researchers to ensure its objectives are achieved. All of the co-researchers who are also co-authors of the article, hold professional engineering certifications from Malaysian authority, which is essential in academia [8]. For this study, as of August 2016, a total of 568 students participated. Fig. 1 shows the participation of students in the survey by university. The biggest participation is from UKM (54.2%). This is followed by USM (18.1%), and then by UiTM (16.2), UMP (9.7%) and UTM (1.8%).

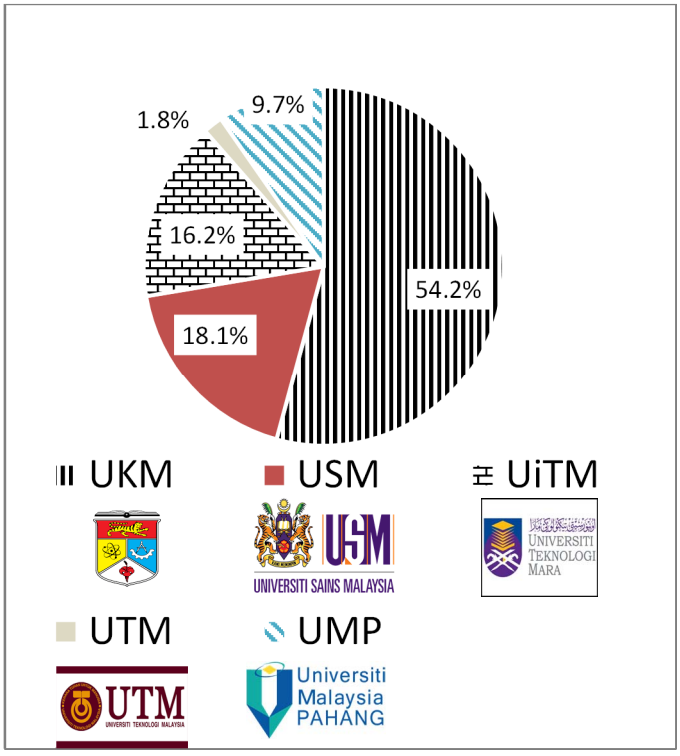

Fig. 1. Student Participation by Universities (%)

Fig. 2 shows students' background. Student with electrical / electronics / computer system engineering make the biggest participations, registering 29.2%. This is followed by students with background in mechanical / materials / aerospace /

automotive engineering or equivalent (27.3%). The next is structural / civil engineering or equivalent and finally chemical/ process / food engineering or equivalent at 13.4 and 12.9% respectively. The other branches of engineering or technical studies make quite significant representation i.e. 17.3%. Entries for the 'Others' have to be inserted/typed by respondents; among the entries are engineering management, manufacturing management and computer science. The spread of the engineering branch seems to be fair and can be considered a fair representation of the local job market.

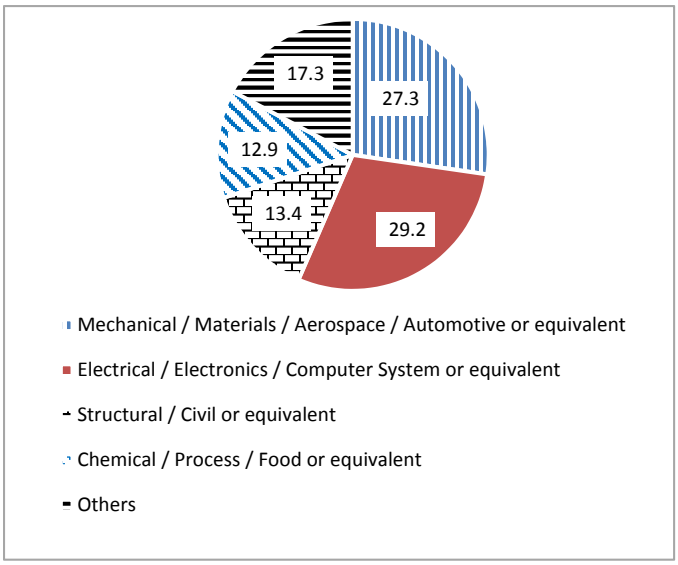

Fig. 2. Student backgrounds (%)

The questionnaires start with general understanding and general issues regarding the dilemma between ethical values and modernization requirements. The first question asked is 'Do you understand ethics and technological advancement issues?' Fig. 3. shows that the majority of students agree that they understand ethics and technological advancement issues. 52.3% and 21.3% chose agree and strongly agree leaving 22.2% neutral and only 4.2% disagree and strongly disagree. Fig. no. 3 also shows the level of comfort in expressing student opinions regarding ethics and technological advancement. 50.2% and 14.8% chose agree and strongly agree. 28.7% neutral and 6.3% have objections to this questions. Sharing of information and sharing issues regarding ethics are important in the work place and the society. Such a culture empowers managers to act with integrity across the spectrum of their varied roles: through management and internal communications, public affairs and marketing; in advertising, media and publishing, and in the use of information technology [9].

Fig. 4 shows that the general trend of weaknesses in the country and in the region highlighted by e.g. the OECD Better Policies Series [1]. Surprisingly, 40.7% and 51.4% chose agree and strongly agree to this question. Only 7.2% were neutral and less than 1% disagree and strong disagree. It seems that the government have to take radical actions especially in the implementation of professional and ethics courses in the middle and tertiary education system or may be the running of the anti-corruption agencies. Fig. 4 also shows that the perceptions of students regarding the ethical awareness with regards to the future of the nation. The question is "if there is a high degree of awareness in the actions by engineers and technical expertise in government agencies and the private bodies, the status towards a developed nation could be accelerated." 40.8% and 48.2% chose agree and strongly agree to this question. Barely 10% are neutral and 1.1% chose disagree. This is in agreement with the perceived ethical problems (PEB) and the consequent ethical judgments (EJ) [2]; i.e. there must be established cultures of ethics before ethical judgments in works places and society.

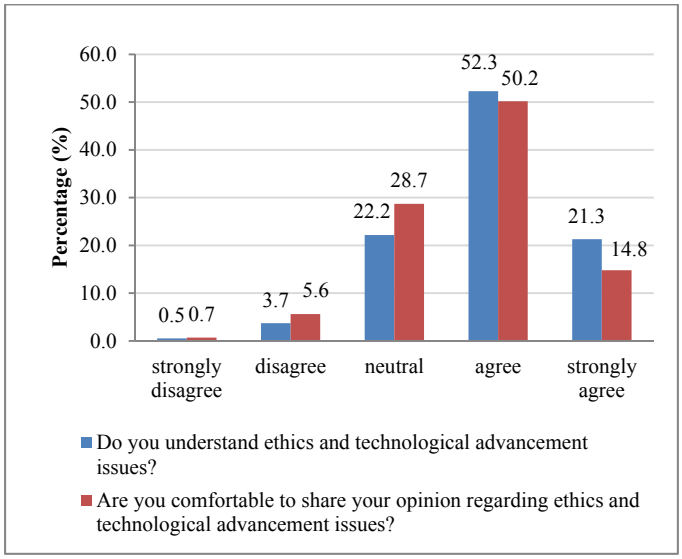

Fig. 3. General question on understanding of ethics & technological advancement and level of comfort in expressing opinions regarding these.

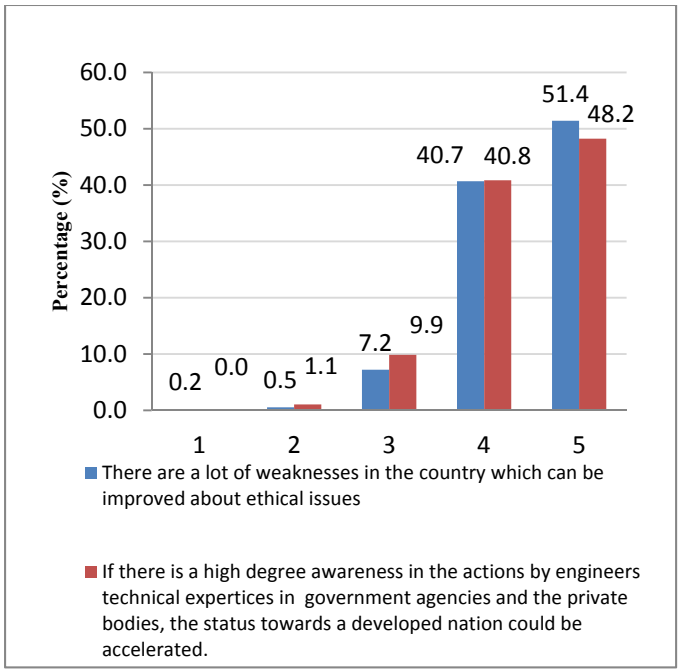

Fig. 4. Question on weakness in the country which can be improved and ambition to be developed country could be accelerated if engineers and technical expertise have a high degree of ethical awareness

Fig. 5 shows the students feelings of man-made disaster with regards to engineers and technical expertise conducts. 86.9% of the participants agreed that it is the responsibility of the professional to practice ethics in developing the nation and putting the safety as the priority. This could imply that man-made disasters are neither coincidences nor accidents, but tragedies that could be avoided. Earlier studies advise that students claimed they have understood the topic but in actual they have not [10]. It is important that candidates who have not undergone proper safety courses are not allowed to be providing services in the industry.

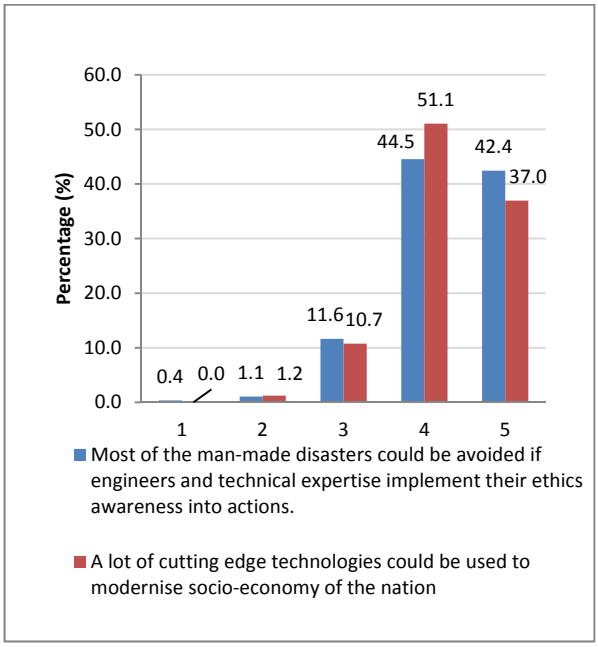

Fig. 5. Perception and awareness of the coexistence of cutting edge technologies and practice of ethics

In the next question, 88.1% of the participants chose that the cutting edge technologies play major roles in socio-economy enhancement. In doing so, they are aware that practicing good ethics coexist with the utilization of technologies. Only 11% of the participants stayed neutral on both issue of ethical practice and cutting edge technologies utilization. This indicates that our future generation of professionals are aware of the coexistence of the use of technologies and ethics in developing the nation.

CONCLUDING REMARKS

Unethical practices in the government, private sectors and the society have been in existence in this region for a long time. These unethical practices involved in government e.g. awards of jobs, manipulation of emission or environment data in private sectors or disproportionate political campaigning finances in the publics. These unethical practices cause poverty in the long term as publics funds are usually spent unwisely. The survey on third and final year students in Malaysia public universities reveal students' feelings that, among others, man-made disasters could be avoided if engineers and technical expertise put ethics and safety into practice. Although Malaysia might miss the target to be a developed nation by 2020 as evident in the latest gross domestic product (GDP) growth, students feel that if there are high degree of awareness among engineers and technical expertise, this status could be achieved. The survey also reveals that the majority of the students agreed most of setback are due to unethical issues. Efforts to reduce or prevent unethical issues need to be enforced in order to ensure the success and sustainable technology advancement in developing the nation.

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