VALIDITY AND RELIABILITY OF PERJURA FOR STUDENT SELECTIONS TO THE MARINE ENGINEERING COURSES AT MALAYSIAN POLYTECHNIC

NORASHADYMOHD NOOR[1], MUHAMMAD AZIZ SHAH MOHAMED ARIP[2],

EFTAHMOH @ HJ ABDULLAH[3], HANIZA YON[4] & NOR FARAHWAHIDAMOHD NOOR[5]

[1]Faculty of Educations and Human Development, Sultan Idris Education University, Malaysia

[2, 3]Sultan Idris Education University, Tanjong Malim, Perak Darul Ridzuan, Malaysia

[4]MIMOS Berhad, Technology Park Malaysia, Kuala Lumpur, Federal Territory of Kuala Lumpur, Malaysia

[5]Polytechnic of Sultan Azlan Shah, Politeknik Sultan Azlan Shah, Behrang Ulu, Perak, Malaysia

ABSTRACT

Nowadays, in the recent trend of increasing numbers of applicants for sea careers in Malaysia, it is more significant than ever to get the right person for the job. In the early of 2008 there was an argument in Ungku Omar Polytechnic (PUO), Ipoh concerning ways to improve and enhance the admission and structure of selection system for the marine engineering student. The prevailing system did not consider to take into account that working as a Marine Engineer or Maritime Officer has special requirements and hazards and often demands more endurance from a person than ordinary jobs ashore. The current system assumed that anyone with the appropriate educational qualifications background could apply for this course. There was no attention of the candidate's personal suitability for this type of profession. However, it is very essential to select at the entry level, student candidates who possess the relevant and appropriate personality to successfully face towards the challenging career at sea. Successful screening at this stage will assist in eliminating candidates who are not able to confront effectively with the stress on board, less emotionally supported from family and friends, and disable to adapt to changing environment. This research will review the content of assessment that will be develop to examine the personality-environment (P-E Fit) suitability of the student candidates related to Five Factor Model (FFM) and Workplace Personality Inventories.

KEYWORDS: Student Selection Assessment, Personal Suitability, Five Factor Model, Workplace Personality

INTRODUCTION

Marine Engineering Diploma Program (DKP) was introduced at the PUO in the year 1972, initiative by the Government of Malaysia in partnership and collaboration with Japanese International Corporation Agency (JICA), an agency of the Japanese under the Colombo Plan. The Japanese government has provided equipment and learning facilities worth 1.3 million dollars and five Japanese advisors. While, Malaysian Government has provided basic facilities such as workshops, laboratories, local trainers, basic equipment and utility expenses. This program covers all the operation and maintenance of a ship, power plant and construction-related equipment and naval architecture. DKP program also has adopted a curriculum that meets the requirements of 'Standard of Training, Certificate and Watch keeping for Seafarers' (STCW 1995) since 2008. It is recognized by the international body, the International Maritime Organization (IMO). The curriculum and syllabus for the DKP are formulated in accordance with the guidelines "Model Course 7:04, Officer In

Charge Of an Engineering Watch".

Table 1: **Structure of DKP Program**

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7
PUO	PUO	PUO	(3 months) Industrial Training	(6 months) Sea Training	PUO	PUO

The DKP program in PUO is very exclusive and different from other engineering programs offered by any other polytechnics in Malaysia. An on-ship-yard on board training for 6 months period need to be completed by students. This cruise will give an ample time for students to fully practice theories they learned in lecture from previous 3 semesters. This training will test mental and physical endurance of students to cope with remarkable difference of situation in the ocean compared to the mainland. The 6-months cruise is a great exposure to the students, where only determined and well-adapt students will remain the course to the end of their study period.

Current Student Selection Approach for DKP Program

The current method of student selection for DKP program was done through interview session. It was conducted by panel consisting of a group of senior lecturers in the Department of Marine Engineering. Academic qualifications are the key factors that determine whether a candidate is successful or not to be called for that interview. Before the interview session begins, all the candidates are required to take a color test to ensure that they are free from color blindness. During that interview session, interviewers can be influenced by certain internal or external factors in assessing the candidates.

Self-confidence, ability to interact, problem solving skills etc. are the internal factor to be evaluated. While external factors such as the code of behavior, good manners, grooming and many more also be covered (Phellas, Bloch, & Seale, 2011).

The interview was conducted in the form of structured and unstructured format. In general, the panel of interviewer will use a structured interview method so that each candidate has an equal opportunity to present information and being assessed accurately and consistently. Interviewers can also reduce the tendency to be biased during the interview session by using this method (Hogan, Barrett, & Hogan, 2007). However, bias and error evaluation also takes place in a structured interview process. For example, the interviewer may give a high evaluation marks to applicants who have characteristics that favoured the interviewers. They also have tendency to give a high assessment marks to all candidates or a low assessment scores for all candidates.

Sometime, the interviewers also tendtorun in anon-structured interview because it is more interesting and its implementation is easier and relaxed(Phellas et al., 2011). Still the condition often causes the interview to be too subjective until it can degrade the accuracy of the assessment. Studies show that unstructured interviews are not able to show the actual performance of the candidate and will usually show a low level of reliability of scoring consistency between the interviewers.

Based on the great challenges faced by each interviewer, psychometric assessment such as screening personality assessment can be the best alternative as a complementary tool to improve the accuracy of selection. There are two commonly used psychometric assessment to screen in takes called personality tests and career interest test(Turner, Betz,

Edwards, & Borgen, 2010). Psychometrics is the field associated with the theory and technique of educational and psychological measurement. It includes the measurement of knowledge, abilities, attitudes, and attributes(Robertson & Smith, 2001). For that reason, PUO's management should include the psychometric assessment as a part of condition for student to qualify this program.

The Importance of Personal Suitability

In the future it will be equally important to assess a candidate's personal suitability, considering the great responsibility for human lives, the environment and economic value that is placed in the hands of the person who is in charge on the bridge. Life at sea as a marine engineer, is demanding and there is no reason whatsoever why nervous, stress-prone, easily-exhausted, unbalanced, disorganized or anxious people should receive training for the responsible work on a ship's bridge(Rengamani & Murugan, 2012). There are plenty of other jobs in society, qualified jobs, where personal traits like these are quite acceptable and where limits and tolerances are broader than at sea. There are plenty of other interesting and important jobs to choose where misjudgements and mistakes mostly are without serious consequences.

A well-organized assessment system could give great advantage to many people. Apart from the PUO itself, it also gives great advantage to applicants too. It is very vital not to encourage youngsters to invest hard work and energy in pursuing a profession that is not suitable for them (Butcher, 2013).

It is particularly essential nowadays in Malaysia when many applicants are lack with experience with life at sea and consequently unable to know whether they are fit or not with career or study program that they have choose. Therefore, the researcher felt it is the aspiration for the researcher to develop a new personality & career interest inventory that specifically focuses on DKP's student. This inventory will measure the correspondence between personality and career interest of students with the maritime world especially for the job as a marine engineer.

Selection System Approach From Other Maritime Academy around the World

The issues to be considered by the researcher when selecting or developing an assessment strategy or specific assessment tool are very complex. While so many candidates may apply for this program in every semester, quantity does not guarantee quality. Assessment procedures can be a cost-effective tool in narrowing down large applicant pools. evaluation tools such as psychometric evaluations can make the selection decision process more efficient because the time spent less and less resources are spent while dealing with applicants whose qualifications do not match to what is needed by the Maritime Academy (Rothstein & Goffin, 2006). By using effective assessment tools also will reduce the degree of error in making hiring decisions. Well-developed assessment tools will allow the committee program to specifically target the competencies and skills they seek.

This matter has already been implemented in several worldwide maritime academy. It was proved by many literature reviews. PUO as a leading educational institution in the field of maritime in Malaysia, was moving towards to use psychometric assessment as a complementary to current method of student selection. Professionals, such as Jensen (2014) of Danica Crewing Services, Ukraine and Nakaya (2003) of NYK Ship Management, Japan, wasargueabout the elements of seafarers qualities. Talent, personality or personal characteristics, knowledge, skills, and behaviour in a diagrammatic arrangement (**Figure 1**) form the basis of in-depth knowledge of marine engineering, problem-solving skill, and sense of responsibility. By referring that figure, the elements that are most difficult to measure is 'Personel

Characteristics'. These elements are difficult to predict because it has been embedded in every person and cannot be seen easily with the naked eye.
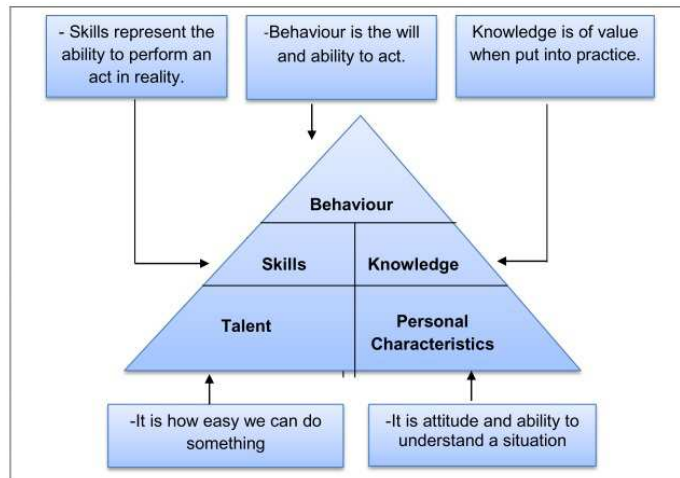

Figure 1: Personality and Competence Requirements for Seafarers

From this view, to become a high-competencyseafarer, a person must have certain IQ, EQ and ability to understand problems and pick-up new ways of doing things. It further suggests that a high-quality seafarer needs to have good personal characteristics, such as making correct decision under pressure, and acquireenough knowledge and skill.

Table 2: The Role of Admission Process among Marine Academy

	Marine Academy around the World	Type of Assessments						
		Medical Test	Colour Test	Fitness Test	Written Examination	Entrance Examination	Interview Season	Psychometric Assessment
		1	2	3	4	5	6	7
1	Ungku Omar Polytechnic, Malaysia	●	●				●	
2	Malaysian Maritime Academy (ALAM), Malaysia	●	●	●			●	
3	Institute of Maritime Studies, Goa, India	●	●	●	●	●	●	●
4	Bangladesh Marine Academy	●	●	●			●	●
5	Philippine Merchant Marine Academy, Philippine	●	●	●		●	●	●
6	Australian Maritime College, Australia	●	●				●	●
7	Royal Marine Academy, UK	●	●	●			●	●
8	U.S. Merchant Marine Academy, US	●	●	●	●		●	●
9	Massachusetts Maritime Academy, US	●	●	●	●		●	●
10	Warsash Maritime Academy, Southampton, UK	●	●	●			●	●

The above table shows the process of admission practiced by worldwide Maritime Academy.

The selection process has been use for many years and has proven successful in placing candidates with ability to cope with naval training and who will enjoy sailing. A strong academic foundation is not enough to be successful in merchant navy career (Lodde et al., 2008). Mostly, the administrator will test their applicant at least three on each of seven test. Thus, this will give great opportunity for candidates to prove their aptness to fit career with the marine engineering program.

Each and every Maritime Academy runs medical test and colour blind test. It is mandatory for every applicant because job as a seafarer need high physical and mental fitness. They also require each applicant to undergo an interview. The main purpose of an interview is to assess enthusiasm and personality of students. At that time students should highlight the characteristics of being a tough-minded seafarers and adventurous. Life at sea in the long term requires a strong soul. This is why varioustests wereconducted toobtain the best candidateswhocan adapt to thesailing world (Lindgren, 2011).

The academy which stringent in terms of student selection will undoubtedly be able to control the quality of students. If referred to the **Table 2**, there are several academies that run more than six assessments on their candidate students. The most interesting part is psychometric assessment. It is the only way to check out and assessing who the person really is; how, or will they perform. There is a lot of difference between can the candidate perform very well in study and how they will perform in their study (Robertson & Smith, 2001). The the study. …there is no problem for administrators in assessing whether candidates can perform in study, but they will be influenced by emotion, personel impression and gut feel in assessing how candidates will perform during study.

Psychometric will use scientific approach in understanding innate personel, characteristics, mental abilities and attitudes of potential student (Latif, Kechil, Kesuven, Shahrul, & Sains, n.d.) These are the characteristics which is impossibly be assessed or observed during the selection process by interview session or from referees judgement.… They can only be measured through a validated and reliable psychometric assessment. Just because a person presents well and communicates effectively during an interview does not guarantee they will perform satisfactorily on the real situation.

For an instance, Institute of Maritime Studies, Goa, India used psychometric tests in the selection process of students since 2006. This test was known as "Merchant Marine Personality Evaluation (MMPE) test". All aspirant candidates must clear this test before they are granted to be admitted into any pre-sea training program. Psychologists with years of experience working in marine industry has developed MMPE tests to evaluate key factors in…personality which have a bearing on successful functioning in the industry. The test will evaluate factors such as adaptability, emotional strength, frustration tolerance level, tendency towards anger and aggression, anxiety, depression and loneliness etc.

Designing a Marine Engineer Personality Inventory (PERJURA)

All psychological testing aims at finding out the main characteristics of an individual. For the purpose of PERJURA development, some modifications need to be done in order to make sure that all the items used in the PERJURA can accurately measure the personality of marine engineer specifically. The construct and items must also match the requirements for Marine Engineering Program(Robertson & Smith, 2001). Since these requirements are not universal, the researcherhave definedevery special requirements for DKP program, of course may vary due to national culture, traditions, academy preference and work style. It is vital for PUO to develop its own instrument as different

country may perceive certain personel qualities unequally important… in another(Rothstein & Goffin, 2006).

PERJURA been developed based on the combination of Big Five Personality Theory(Rothmann & Coetzer, 2003) and Workplace Personality Theory. Therefore, it requires an expert in psychology to verify the items that are included in these instruments. Experts in the field of shipping and marine engineering lines are compulsory to include the elements of the working environment on board into every item. It includes also an expert in the field of industrial and organizational psychologist to make sure the item of personality and workplace match together.
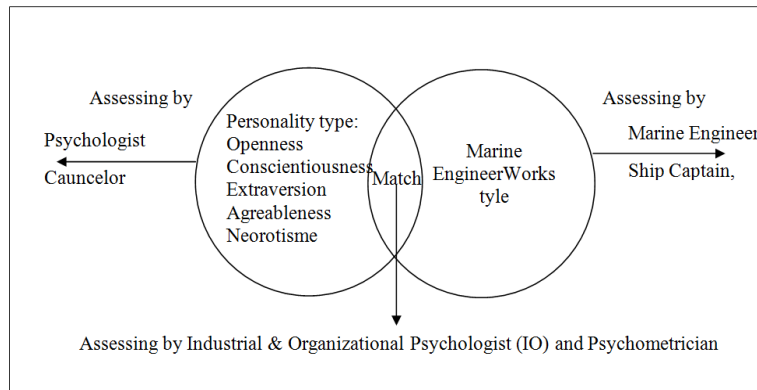

Figure 2 Conceptual Framework of Content Validity Assessment

The Big 5 Personality model is currently one of the most accepted classifications forpersonality traits(Sajjad Hussain, 2012). McCrae and Costa, (1987) suggested that personality of a person can be described in 5 factors and most people score near the middle of each trait with only a few scores for the extremes. Below is the Big 5 Personality Theory summary.

Table 3: Definition of Big Five Personality Theory

Big Five Dimension	Definition
Openness	This trait features characteristics such as imagination and insight, and those high in this trait also tend to have a broad range of interests.
Conscientiousness	Common features of this dimension include high levels of thoughtfulness, with good impulse control and goal-directed behaviors. Those high in conscientiousness tend to be organized and mindful of details.
Extraversion	This trait includes characteristics such as excitability, sociability, talkativeness, assertiveness, and high amount of emotional expressiveness.
Agreeableness	This personality dimension includes attributes such as trustworthiness, altruism, kindness, affection, and other pro-social behaviors.
Neuroticism	Individuals high in this trait tend to experience emotional instability, anxiety, moodiness, irritability, and sadness.

However, limited study was found to validate the construct for each personality type in Big Five and theresearcher has found none done in Malaysian maritime sector's. For that reason, this research is also carried out to certify each construct for each personality type.

There is another construct in this instrument which is 'Survival' construct. Researchers has developed their own items containing six sub construct. All of the sub construct was obtained from a survey conducted on 80 marine engineers

all over Malaysian shipping company and interviews among a number of engineers and highly experienced sailor. These six sub construct are define as follow:

Table 4: Definition of Survival's Construct

Survival Dimension	Definition
Adaptability/ Flexibility	Job requires a willingness to take on responsibilities and challenges.
Initiative	Job requires a willingness to take on responsibilities and challenges.
Independence	Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
Integrity	Job requires being honest and ethical.
Persistence	Job requires persistence in the face of obstacles.
Leadership	Job requires a willingness to lead, take charge, and offer opinions and direction.

Information on the personality requirements of marine engineer job are very useful in personnel selection among the applicant of DKP program in order to identify candidates with potential for high job performance. Six constructs which is obtained from O*NET Content Model will be used as a basis for the construction of item for Survival Personality.

Psychometric Assessment on PERJURA

To test the validity of the PERJURA, the authenticity method was carried out by experts. The assessment was conducted through the evaluation among 14 subject matter experts (SME) selected via judgment sampling. Seven professional university experts involved with the expertise in psychology, psychometric, educational measurement and linguistics. The field experts specializing in particular fields of study consisted of seven practitioners who worked in the polytechnics field and maritime industry. The instrument involved 288 items with six main constructs.

Table 5: The Distribution of Item Revised

	Construct	Number of Items	Number of Revised
1	Openness vs Clossedness to experience	48 item	9 item revised
2	Conscientious vs Lack of direction	48 item	1 item revised
3	Extraversion vs Introversion	48 item	5 item revised
4	Agreeableness vs Antagonism	48 item	2 item revised
5	Neuroticism vs Emotional stability	48 item	3 item revised
6	Survival vs Give up	48 item	18 item revised
Total 6 Main Construct		**288 Item**	**37 Item Revised**

In conclusion, a total of only 37 items required refinement thus showing that the items were built with a good operationalization and conceptualization. The researcher suggested that all 288 items that were refined would undergo a pilot study by polytechnic students. Next phase was conducted to obtain the reliability of PERJURA. After obtaining the validity of the content, the PERJURA questionnaire was given to 200 of Marine Engineering students which were randomly selected at Politeknik Ungku Omar. The findings of the study are as follows. Based on Table 2, the reliability of PERJURA is found to have a high overall reliability coefficient of 0.909. According to (DeVellis, 2003) inter item reliability of Cronbach's alpha coefficient exceeds to 0.70% is considered as high.

Table 6: Reliability of PERJURA (N=288)

Construct	Number of Item	Reliability Value
PERJURA (as a whole)	288	0.909

Openness	48	0.718
Conscientiousness	48	0.762
Extraversion	48	0.713
Table 6		
Agreeableness	48	0.764
Neuroticism	48	0.741
Survival	48	0.700

The reliability of all construct are found to be moderate level, however the overall value of Crombach's alpha for PERJURA construct are found to be high. All of the value of Cronbach's alpha for all the item also showed acceptable consistency as they were >0.7.

CONCLUSIONS

Result of this study has practical impact as a complementary method for student selection practice. After presenting the above list of important traits for Malaysian marine engineer, the researcher should make it quite clear that the development of this personality assessment are by no means looking for any superman or elite group. The candidates that Malaysian Polytechnic would like to see as a students in the Marine Engineering Course should be people of good quality whom we can expect to become skilful in their tasks and who have the personal qualifications characteristic of people in responsible professions. Furthermore, the findings of the research contribute a sourceful information about marine engineer personality. It would be useful for the PUO to identify the potential student to train and ensure that shipping in its entirety, with the help of technology, will be adapted to people and that ships can be maneuvered and operated safely by specially trained, but ordinary, balanced and sensible persons. The researcher suggested that all 288 items that were refined and analyse would undergo more specific evaluation using the Item Response Theory (IRT) model. Through the IRT model, the items can selected after some due consideration such as the appropriateness statistics such as unidimensionality, local independence, item fit, item polarity and differential item functioning in order to fulfil IRT Model assumptions.

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