



Evaluation of basic safety training using the CIPP model

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Abstract. This study aims to investigate the impact of context, input, process, and products on education and training services of Basic Safety Training at the Merchant Marine Polytechnic, Indonesia. The study uses the ex post facto approach. The research location was at the Merchant Marine Polytechnic with a sample of 86 people. The research data was collected using the questionnaire method and the answers were analyzed using evaluative analysis techniques through descriptive-quantitative analysis. The mean score of the post-test was higher than the mean score of the pre-test using the CIPP Model, with 23.17%. The correlation coefficient of the pre-test and post-test was 0.895, showing a significant correlation. The N-Gain Index was 0.799, in the high category, meaning that the implementation of the CIPP application system model was good and effective in improving learning. Result of t-test showed that the model was effective. CIPP also concludes that all the aspects embraced were in the good categories for education and training services of BST at the Merchant Marine Polytechnic.

Key Words: context, evaluation, input, process, product, service.

Introduction. Transportation by ship has a positive impact on the employees who work as the ship's crew. The Baltic and International Maritime Council (Bimco) noted that in 2020 the world needed 1593198 seafarers. However, there were only 1555281 seafarers, so the number should be increased. It is an opportunity for those who wish to work aboard ships, as there are more job vacancies on the seas than on land (Mamahit 2014).

One of the base educations and training programs that prospective seafarers must follow is Basic Safety Training (BST). The program aims to provide training participants with understanding and skills about the basics of safety on board. They must also be able to practice the knowledge to prevent and overcome emergencies while sailing (IMO 2000).

Merchant Marine Polytechnic is an educational institution under the Ministry of Transportation of Indonesia. The campus arranges education and training services of BST for members of the general public who want to work as seafarers. The main objective of the training is to improve the participant's skills, to be capable of performing a rescue in an emergency condition. They must be able to prevent fires and extinguish them. In addition, they are expected to understand various emergencies, occupational health and safety, light medical care on board, and self-rescue. Participants are also required to engage in preventing marine pollution and develop social communication aboard the ship (IMO 2000).

At the initial field observations and interviews with education and training managers, many deficiencies were found in the education and training services of the BST program at the Merchant Marine Polytechnic. One of these shortcomings is the schedule of teaching and learning activities in the classroom and field practice, which are arranged in an unstructured or systematic manner. One schedule often collides with another due to inconsistent lesson times. The problem is indicated due to the limited number of lecturers and inadequate facilities. Other findings indicate that the planning, implementation, and evaluation of education and training are not prepared based on management principles, so the implementation is less effective. From the results of the interview with the Head of the Seafarers' Education and Training Unit, the learning focuses on conveying knowledge verbally, and it has not yet reached the stage of giving

training participants the opportunity to develop their own insights and judgment when they face critical situations. That means that the learning methods are not sufficient in attaining their objectives.

The CIPP (Context, Input, Process, Product) evaluation model offers a more complex application since it covers both formative and summative evaluations. The results of the context, input, process, and product evaluation will be useful in making decisions (formative) and create accountable information (summative). Hence, it will add more various strategic options applied by institutions in conducting educational programs (Mahmudi 2011). Two CIPP evaluation results register a conventional count of 91% and a computational count of 91.6%. Based on the analysis, the Computer-Assisted CIPP evaluation model is able to calculate more quickly and accurately than conventional models, although the difference is not significant. Therefore, further empirical research is needed to discuss the controversy (Gede & Divayana 2015).

Correct safety training is beneficial to reduce the risk of work injuries that may occur anytime and anywhere. Hence, every ship's crew is required to join safety training (Waehrer & Miller 2009). In the findings of the effectiveness of BST on safety, safety training is efficacious in the sailing world. However, it needs to be supported by appropriate learning methods and models so that they can easily practice it while working. With the support of technology, learning becomes easier and increases the training participant literacy to understand the material (Buted et al 2014). The evaluation of modification of BST as a response to a disaster, shows that this training has proven to play an essential role in public awareness, and it is suggested to improve it. Communities having experienced BST have been proven to be more alert and responsive in dealing with disasters (Pateña et al 2016).

Context Input Process Product (CIPP) is an Information Service Evaluation Model. It is the answer to solve problems in the evaluation of services. The CIPP evaluation model was designed to overcome problems in assessing different services. With CIPP, information services can be evaluated comprehensively (Muyana et al 2017).

Management of education and training. Massie (1985) revealed that management is a process of forming cooperation in a group, which later creates a common goal. Sisk (1969) asserted that management is the communication of various resources developed from the planning, organizing, and controlling processes to achieve certain intentions. Based on these ideas, management is defined as a process for solving problems with effective methods to achieve organizational goals and objectives by employing existing resources efficiently. Management consists of many aspects such as control, coordination, motivation, design processes, development, and the influence of organizational goals and resources in achieving goals (Karnani 2009). Administrative experts such as Sergiovanni, Coombs, and Thurson stated that management is the process of working with and through others to accomplish organizational goals efficiently (Bafadal 2003). Based on the definitions above, management objectives always discuss some aspects, including a) cooperation, b) conducted by two or more people, and c) achieving common goals. Therefore, management is a process involving many people effectively and efficiently to attain organizational purposes. Management in an organization functions as an attempt to carry out certain activities, so its main objectives are achieved productively and efficiently.

Basic Safety Training. This skills, education and training aim to ensure that participants have basic competency and safety skills while sailing. Participants must practice emergency rescue as an indicator of mastery of skills. They have the competency to prevent fires as well as to extinguish them. The participants are also expected to understand several types of emergencies, occupational health, and safety (K3). Apart from the indicators above, there are other points such as medical care skills, self-rescue during an emergency, preventing marine pollution, and maintaining social communication on board. This BST also enables participants to comprehend the basic knowledge of safety and to practice it to prevent and overcome problems while sailing. Accordingly, training participants are not only proficient in theory, being also good practitioners.

Material and Method. This research was conducted at the Merchant Marine Polytechnic, Makassar, Indonesia, in 2021. It is an evaluative research on research and development. The study population is represented by training organizers, totaling 86 people. The data were collected through questionnaires and interviews. Before the questionnaire was submitted to the respondent, the instrument was passed through the validity and reliability stages. Valid data in the validity test results was used for research. Two items of data were found to be invalid during the validity test. Reliability test using Cronbach showed a context of 0.807, input of 0.815, and product of 0.907. In addition, all CIPP components were also reliable with a Cronbach Alpha value greater than 0.60.

To analyze the data, descriptive statistical methods were used. The methods were then combined with the CIPP, to evaluate the implementation of the program at the Merchant Marine Polytechnic. The next step was selecting the education and training model through the Planning, Implementation, and Control approach. This determined the appropriate model for the Merchant Marine Polytechnic and could be useful as a training development strategy.

This study intends to obtain a concrete picture of the BST implementation through the CIPP approach. The development research also reports in detail the behavior of training participants, training activities, and exploration to determine the proper method and development. The process also utilizes the CIPP components. After the event was thoroughly understood, the next step was exploring the research subject to check the overall situation in everyday life.

Stufflebeam & Zhang (2017) emphasized that policymakers must make decisions. The context in CIPP means conducting research based on needs, problems, and opportunities to determine the target, and to ensure the quality of graduates. Input plays a role in planning and coordination in maximizing human resources. The process leads to the implementation of planning, and the product serves to identify and assess its effectiveness (Stufflebeam & Zhang 2017).

In this study, there was parametric statistical test conducted (t-test) to determine the level of effectiveness of the model using IBM SPSS Statistics 24. The effectiveness of the model was then tested using a t-test and the average increase from the pre-test to the post-test results. Calculation of Gain index was carried out to determine the increase after the implementation of CIPP management in BST. Gain test is used to determine level of effectiveness of a treatment on expected results, which in this study was CIPP management model in BST. The Gain index was calculated by the following formula:

$$\text{Gain index} = (\text{Post-test score} - \text{Pre-test score}) / (\text{Max score} - \text{Pre-test score})$$

The criteria for interpreting N-Gain results are presented in Table 1 (Meltzer 2002).

Table 1

Gain Index Criteria

No	Index value	Criteria
1	$g \leq 0.3$	Low
2	$0.3 > g > 0.7$	Moderate
3	$g \geq 0.7$	High

Results and Discussion. Table 2 shows that pre-test score before implementation of CIPP management model with correct use and procedure with management functions starting from planning, implementation to evaluation obtained a mean of 73.7442, with a standard deviation of 4.88259. Furthermore, result of post-test analysis after the implementation of the CIPP management model in learning obtained a mean of 50.5698, with a standard deviation of 3.80878. It can be said that the implementation of the CIPP management model that has been developed has resulted in improvements and is in accordance with the objectives of this study. Description results with numerical score are presented in detail in Table 2. Descriptions of pre-test and post-test analysis of the CIPP management score are presented in detail in Table 3. Paired statistics of pre-test and

post-test of implementation of the CIPP management model are presented in detail in Table 4.

Table 2

Results of pre-test and post-test analyses of the CIPP management model

<i>Descriptive Statistics</i>					
	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Pre Test	86	42	64	50.5698	3.80878
Post Test	86	63	93	73.7442	4.88259
Valid N (listwise)	86				

Table 3

Description of pre-test and post-test analysis of the CIPP management score

<i>No.</i>	<i>Score range</i>	<i>Pre Test</i>	<i>Post Test</i>
1	42-49	36	0
2	50-57	45	0
3	58-65	5	2
4	66-73	0	46
5	74-81	0	33
6	82-89	0	3
7	90-97	0	2
	Total	86	86
	Min	42	63
	Max	64	93

Table 2 shows that the maximum mean score of implementing the CIPP management model in the pre-test was 50.56, while the mean score in the post-test was 73.74. Accordingly, there was an increase by 23.18.

Before the implementation of the CIPP management model in BST, the highest score obtained was at intervals 50-57 (52%), which was in the fairly good category. Meanwhile, after the implementation of the CIPP management model in BST at Merchant Marine Polytechnic, the highest score obtained was at intervals 66-73 (54%), which was in the good category.

Table 4

Paired statistics of pre-test and post-test of implementation of the CIPP management model

<i>Paired samples statistics</i>					
		<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
Pair 1	Post Test	73.7442	86	4.88259	0.52650
	Pre Test	50.5698	86	3.80878	0.41071

Table 5 explains that the CIPP management model used in BST for this study was good, indicated by a correlation coefficient of 0.895. The results of the pre-test before implementation and after implementation of the CIPP management model had a positive and significant correlation. In addition, computer output Sig. was 0.000, smaller than alpha 0.05. It demonstrates that the created CIPP management model in BST was good and effective with pre-test and post-test results having a positive and significant correlation. A better implementation of the CIPP in BST brings better learning outcomes.

Table 5

Correlation analysis of pre-test and post-test of implementation of the CIPP management model

<i>Paired samples correlations</i>				
Pair 1	Post-test & Pre-test	N	Correlation	Sig.
		86	0.895	0.000

Pre-test results showed that the mean value of CIPP management model in BST was 50.56, while the result of the post-test of implementation of the CIPP management model in BST was 73.74, indicating that there was an increase after the implementation of the CIPP management model. The level of effectiveness of the model applied in this study based on the Gain Index was 0.799. Based on the Gain Index, the effectiveness of the CIPP management model in BST implemented in Merchant Marine Polytechnic was in the high category. Accordingly, the CIPP management model in BST developed was effective in improving basic safety training skills at Merchant Marine Polytechnic with a high level of effectiveness. Results of t-test on pre-test and post-test results of CIPP model in BST are presented in Table 6.

Table 6

Results of t-test

<i>Paired samples test</i>									
		Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error of mean	95% confidence interval					
Pair 1	Post-test			Lower	Upper				
	Pre-test	23.1744	2.25019	0.24264	22.69198	23.65686	95.508	85	0.000

Results of the t-test show that the t value was 95.508 with a significance level under 0.000 ($p < 0.05$), meaning that there was a significant difference between the average score of the pre-test and the post-test. Therefore, it can be concluded that the CIPP model is effective in improving management in BST at Merchant Marine Polytechnic. In summary, the effectiveness test can be demonstrated by the following:

1. The mean score of the post-test was higher than mean score of the pre-test (an increase of 23.17%).
2. The correlation coefficient of the pre-test and post-test was 0.895, meaning that there was a significant correlation.
3. The result of N-Gain was 0.799, in the high category, meaning that the implementation of the CIPP application system model was good and effective in improving learning.
4. The result of the t-test was significant, meaning that the model was effective.

Conclusions. The BST implemented at the Merchant Marine Polytechnic using the CIPP model is in a good category. The mean score of the post-test was higher than the mean score of the pre-test with 23.17%. The correlation between pre-test and post-test results was significant. The N-Gain Index was in the high category, meaning that the implementation of the CIPP application system model was good and effective in improving learning. The results of the t-test showed that the model was effective. Overall, the implementation of BST at the Merchant Marine Polytechnic using the CIPP model is good. Based on the research results, the researchers suggest to use the application for registration, payment, and sharing of training schedules online, to optimize the use of learning media and information technology for training implementation in the classroom, and to emit the certificate online and deliver it timely.

Conflict of Interest. The author declares that there is no conflict of interest.

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