

# A Study of Cost Estimation and Quotation Tool for Thai Visual Effects Studio

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**Abstract** - This study was a collaborative project with the Thailand Animation and Computer Graphic Association (TACGA) aimed at identifying and proposing the proper basic method for quotation and cost estimation among Thai Visual Effects (VFX) professionals. The existing method used in the industry relied mainly on personal experience or so called “gut feeling”. According to the TACGA, the experience-based method led to many disadvantages such as proposed under-budget quotations, omitting some budget-concerning factors and, therefore, the thinning of the profit margin. The focus group with industry experts showed that a suitable quotation estimation model for the Thai VFX industry should consist of the following elements: 1) Easy to understand and require as little mathematics as possible, 2) Realistic task breakdown structure and have the ability to be developed when technology changes, 3) Flexible input for efforts and other costs, and 4) Emphasis on the risk management in each process.

This project research employed the Delphi technique to survey, collect data and obtain professionals’ opinions to develop a cost estimation model for the Thai VFX industry. The model was built from a simplified idea of the constrictive cost model for software development, like COCOMO. The proposed model from this study was

tested with real-life project cost calculations. The results turned out to be 10 - 15 % higher compared to approximation by the existing method, as now the factors of software cost, detailed task breakdown, risk management, and required profit were taken into consideration in the estimation process.

**Keywords** - Animation; Visual Effects; Cost Estimation; Thailand

## I. INTRODUCTION

At present, Visual Effects (VFX) is one of the most exciting and fast-growing fields in Thailand. However, it is still a relatively young business and faces many business-related problems. TACGA’s document, “Action Plan 2013-2018”, pointed out that the weaknesses of the industry included the lack of knowledge in business management and underpricing issues. Since VFX studio owners tend to be artists trained in artistic fields, meaning they lack a business background, many VFX studios face financial and management problems. One of the most common roots of these problems is the cost estimation process. Most of the time, they use a wild estimation method or so-call “gut feeling” to approximate the cost of the entire project. Some with more experience might use past work as a reference for estimation. The consequences of not having an efficient method for cost estimation cause

many problems for the industry, such as the decreasing of standard price, illegal use of software due to limited budgets, and low compensation rates for artists. Some studios have even been put out of business.

One of the solutions to this problem is to provide them with a cost estimation tool suitable to the nature of the VFX business. Thus, this research examined the costing elements, task breakdown, and quotation structure of the business and proposed a sample model that would be simple and easy to understand by VFX artists.

## **II. RESEARCH OBJECTIVE**

This study aimed to search for a quotation estimation model that suited the nature of the Thai VFX industry and could be used by VFX artists.

## **III. RESEARCH METHOD**

This study was based on the Delphi technique by relying on a group of VFX studios and industry experts recommended by the TACGA. These experts offered their opinions through questionnaires, interviews and focus groups in the following steps:

1) Research was carried out into the standard Visual Effects production process to gather information about the work pipeline, task or job descriptions, the role of each position in the production process, individual skill sets and project management. Then, the costing elements of the VFX production process were determined by assessing each studio process and comparing it to the standard of visual effects production.

2) Research was conducted into the standard estimation methods used in a wide range of industries, consisting of 4 standard concepts: analogous estimation, parametric estimation, three-point estimation and bottom-up estimation, as well as the models or methods that were used in software development projects to compare the similarities and differences of the cost estimation concept. One of the models that the researcher used as a

reference in terms of the concept was COCOMO, which was the model proposed by Barry Boehm in 1981.

3) Two prototypes were created and tested in a focus group of professionals to gain feedback, comparison of the 2 prototype models and suggestions for improvement. The first model tested was Bottom-up, man-hour method based on a shot-by-shot estimation of the work. The second model was designed based on task breakdown in standard VFX workflow in Thailand's average TV commercial work. The task breakdown was then used to estimate the effort required in each task according to difficulty level. After both prototypes were tested and compared, the researcher gathered comments from the focus group to select and improve the most accepted model.

4) The estimation model was developed based on the suggestions from the focus group and the preferred models were forwarded into testing with the second focus group.

5) The estimation model was sent to be tested by the VFX studio to obtain feedback.

6) The research was concluded with the pros and cons weighed, followed by proposing suggestions on the most suitable model for the Thai VFX industry.

## **IV. RESEARCH CONCLUSION**

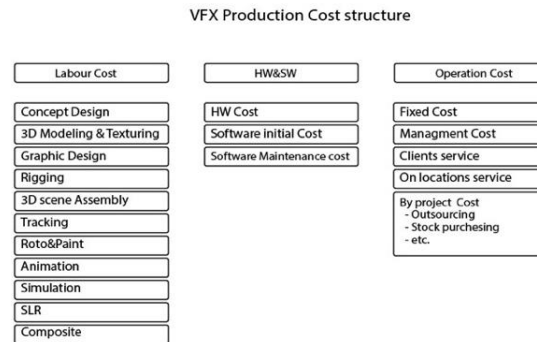
After analyzing the data received from the sample groups and the professionals, the researcher analyzed the research results to determine the model that best suited the research needs. After comparing the 2 models, the focus group concluded that the bottom-up man-hours based model was too complicated, even though it seemed to be more accurate. This method required users to calculate every shot separately and tended to result in estimation that was too high.

The second model used the overall project estimation concept. By focusing on each process instead of shot, the estimator was more focused on task at hand and provided a

judgment of how difficult it would be to create each shot. The model will use a cost and effect function to calculate the labor cost. The focus group preferred this model to the first due to its simplicity.

The model development key was to determine 5 important factors of this cost estimation model as follows:

1) **Costing Structure in the VFX Production Process can be Concluded as Figure 1:**



**Figure 1.** VFX Production Cost Structure us in the Estimation Model.

Labor cost was categorized by task breakdown. Even though this was a basic workflow of visual effects production, each task required a different technique and skilled personnel, even different levels of quality control. The hardware and software parts could be considered a fixed cost. However, this was the most problematic part of the Thai visual effects industry, since there were some piracy issues involved. Therefore, the experts suggested separating this section entirely for a clearer picture.

2) **Efforts Calculation Tool**

Each task breakdown could be divided into 3 levels of labor cost based on artist skill level: beginner, intermediate and advanced. When considering the other factors involved in each task, the effort for each task could be determined using this function:

$$\text{Labor Cost} = \sum_{i=1}^n (S_i \times U_i \times R_i \times P_i)$$

where  $i$  is indicated to each task from the task breakdown matrix which contained the effort list of each task.

$S_i$  is the number of shots for each task.

$U_i$  is the amount of tasks when the task cannot be counted as shot.

$R_i$  is the difficulty rating of each task.

$P_i$  is the repeated pattern rate of tasks, lower rate for tasks with some similarity between shots, in which some processed can be reused not only in the same project, but also throughout studio archives. On the contrary, 1.0 for task is totally unique in the technique of creation.

The effort matrix was a matrix between the difficulty of the task and the class of work force being used for the task. The matrix was the result of collecting data about previous work-hours used in each condition for the task provided by the sample group.

Task	Rate	Beg.	Interm.	Adv.	Effort
Concept Design	Easy	4		1	7.00
	Standard		4	1	11.00
	Hard		8	2	22.00
	Very hard		12	4	36.00
3D Modeling & Texturing	Easy	8		1	11.00
	Standard	16		2	22.00
	Hard		16	2	38.00
	Very hard		24	4	60.00
Graphic Design& Illustration	Easy	4		1	7.00
	Standard	8		1	11.00
	Hard		8	2	22.00
	Very hard		12	4	36.00
Rigging	Easy	8		1	11.00
	Standard		8	2	22.00
	Hard		16	2	38.00
	Very hard		24	4	60.00
3D scene Assembly	Easy	8		1	11.00
	Standard		8	2	22.00
	Hard		12	2	30.00
	Very hard		16	4	44.00
Tracking	Easy		2		4.00
	Standard		4		8.00
	Hard		6	1	15.00
	Very hard		8	1	19.00
Roto &Paint	Easy	2		1	5.00
	Standard	4		1	7.00
	Hard	8		1	11.00
	Very hard	16		1	19.00
Animation	Easy	8		1	11.00
	Standard	16		2	22.00
	Hard		16	2	38.00
	Very hard		24	4	60.00
Simulation	Easy		8	1	19.00
	Standard		16	2	38.00
	Hard		24	4	60.00
	Very hard		32	8	88.00
Roto &Paint	Easy	2		1	5.00
	Standard	4		1	7.00
	Hard	8		1	11.00
	Very hard	16		1	19.00
Animation	Easy	8		1	11.00
	Standard	16		2	22.00
	Hard		16	2	38.00
	Very hard		24	4	60.00
Simulation	Easy		8	1	19.00
	Standard		16	2	38.00
	Hard		24	4	60.00
	Very hard		32	8	88.00
SLR	Easy	8		1	11.00
	Standard	16		1	19.00
	Hard		16	2	38.00
	Very hard		24	4	60.00
Compositing	Easy	6		1	9.00
	Standard		6	1	15.00
	Hard		8	2	22.00
	Very hard		8	4	28.00

### 3) Time-Involved Factors

All variable costs were time-related, as for this model there were: workstation usage, render machine usage, management staff, office rental, supplies and service. After the

project time estimation was determined, this entire factor must be calculated into the final quotation.

4) **Risk Management Factors**

The risk management factor was something that needed to rely on experience or a third party’s opinion. Each client had their own style and way of doing business. Therefore, it was important to find information and take it into consideration when approximating the cost. The professionals suggested 3 issues critical for risk management factors: decision-making, working process and finance. This model provided a risk management grading tool by using a scoring system in 3 areas from 0 to 4 (where 4 is the highest risk), followed by evaluating each factor and grading as follows:

Risk Factors	Weight	Score (0-4)
Decision making	.3	
Working process	.4	
Finance	.3	

- Score of 3-4 was high risk.
- Score of 2-3 was medium risk.
- Score of 1-2 was low risk.
- Score lower than 1 was considered as no risk.

5) **Profit and Other Client Requests from Clients**

The estimation model then added up all the costs, plus risk management score, the profit required and then summarized the final amount to the quotation format, as in Figure 2.

Quotation			
No.	Detail	Effrots / amount	Cost
1	Production Cost		
	Labour	886.50	113,562.50
	Rendering Cost	312.50	23,057.73
	Delivery Cost		5,000.00
	Stock purchasing		0.00
	Version Fee		5,000.00
	Still image		0.00
	Shooting Production supervision		0.00
	Extra Request		0.00
2	Management Fee		
	Office Expense	15	40,500.00
	Producer	15	22,500.00
	Client Service		10,000.00
3	Hardware / Software	15	40,923.35
4	Risk Managemnet Fee	D (No Risk)	0.00
5	Profit		39,081.54
		<b>Total</b>	<b>299,625.11</b>
		<b>Vat 7%</b>	<b>20,973.76</b>
		<b>Grand Total</b>	<b>320,598.87</b>

Figure 2. Sample Quotation from the Estimation Model.

The improved estimation model was sent to sample studios for testing in real-world situations. The average result was that the model estimated quotation at around 10-15 percent higher than the former gut-feeling method of estimation. The extra margin over the old method is due to many reasons:

- 1) The hardware and software costs were now considered.
- 2) More detailed task breakdown brought up some tasks that may have been overlooked before.
- 3) Risk management factor affected the outcome.

4) The fixed profit margin was set.

In general, the sample group had positive feedback concerning the test model, as seen in the following feedback results:

The sample group agreed that the model was useful to VFX studios at a score of 4.1 (out of 5).

The sample group agreed that the model was easy to use at the score of 4.2 (out of 5).

The sample group agreed that the model could be used to calculate accurate cost estimation at the score of 4.0 (out of 5).

## **V. RESEARCH RECOMMENDATION**

This research basically aimed to create a simple solution to cost estimation for the Thai VFX industry, which mostly involves SMEs or individuals. Therefore, this research does not cover various topics such as: overtime payment, research and development and other complex issues in the production process. Moreover, the visual effects industry tends to comprise a technology-related business that changes very rapidly. For this reason, the researcher recommends updating the cost data and even the task breakdown every two years in order to keep up with changes in the industry.

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