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Cost Information Types and Ego Depletion : The Role in New Product Development

Titin Nurjanah[1]*, Dyah Ekaari Sekar Jatiningsih[1]
[1]Universitas Muhammadiyah Yogyakarta
Jl. Brawijaya, Geblagan, Tamantirto, Kasihan, Bantul, Yogyakarta, 55183, Indonesia.
Email: titin.nurjanah.fe19@mail.umy.ac.id

ABSTRACT
This study examined the effect of cost information types and ego depletion tendency within designers on new product development (NPD) performance. While previous research has tested the role of cost information types and found empirical evidence of such effect on NPD performance, specific designer condition has not been observed. A kind of individual phenomenon of ego depletion hence is examined in the study since previous research confirmed its significant effect in audit context. The research used product cost effectiveness as measurement of NPD performance. Using laboratory experiment, hypothesis proposed in this study is tested with business students as participant. Results found that cost information types affect product cost designed in new product development, and ego depletion of the individual designer does not affect new product development performance. Further implication is discussed

Keywords: New Product Development, Cost Information Types, Product Cost, Ego Depletion

INTRODUCTION

The current business environment is very competitive; an organization must be able to manage costs well, especially in the process of developing new products. Product development is about winning the organizational competition by providing maximum value to consumers and having innovative producing creative modification ideas, and high value (Ellram et al., 2020). The ability to develop new products, is important consideration in today's rapidly changing organizational environment, and can be facilitated by cost information. Cost information plays an important role in new product development. The results of previous research show the effect of costs on the performance of products produced by designers (Jatiningsih, 2021). Developing new products is inseparable from the influence of various factors, both external and internal, for example, work pressure, environmental demands, and other aspects. This could be affect information processing and decision making of an individual. Previous research in the context of accounting, there are confirmed psychological factors influencing judgment and decisions, for example ego depletion in the context of auditing (Mursita et al., 2019). The results of the study Sjåstad and Baumeister, (2018) state that ego depletion may arise from physical factors due to fatigue, environmental pressure, mental pressure which makes individuals unable to control themselves. According to Friese et al., (2019) ego depletion or ego depletion is a reduction in self-capacity or self-will that occurs temporarily, at any time during activities that require energy because energy has been expended. Individuals who experience ego depletion spend quite a lot of resources and energy it can cause stressors (Mursita et al., 2019). stress can hinder in developing an innovative new product development. success in developing a new product is influenced by the extent to which the performance target. This target includes market targets, profitability, sales, and cost information where cost information has an important role in developing new products (Darawong, 2021).

Necessary basic information and timely decision- making. This includes the quality of information and the time it takes to make decisions (Rahatulain et al., 2021). In developing new products, cost information can be used, where cost information has advantages that are beneficial to organizations in saving production costs (Jatiningsih & Sholihin, 2015). Cost information is a part of financial information. This cost information is needed by management, especially for decision making. This can be an important factor in the performance of new product development (Hidayatul et al., 2021). There are 2 measurements of new product development performance that are often used, namely product costs and product features

(Booker et al., 2007a). In this study, researchers used product cost in measuring the performance of new product development. During the new product development process, product costs are determined. Therefore, product cost is measured as the sum of the costs specified in each individual design. There are factors that can affect the performance of new product development, the first is good decision making Rahatulain et al., (2021) in decision making there is information in the form of cost information that can facilitate new product development, besides that there is a potential influence from ego depletion which can reduce the quality of decision making and the performance of an individual in the context of an audit by Mursita et al., (2019). Meanwhile, ego depletion has not been tested in new product development, so in this study researchers are interested in testing the types of cost information and the role of ego depletion in new product development.

Hypothesis Formulation

The Effect of Cost Information Type on Product Cost in New Product Development

The Cost information can play an important role in developing new products from this information can make decisions, such as research by Rahatulain et al., (2021) that decision making is a factor in the new product development process. Users of cost information certainly choose the right and accurate cost information, therefore in developing new products they must understand the concept of cost is a demand in order to be able to make good decisions and strategies. Related to contingency theory in management accounting depends on the specific circumstances in which an organization is located. Therefore contingency theory must identify information in certain aspects. Lathifah (2014) in this information can be in the form of cost information for developing new products.

Previous research conducted by Jatiningsih and Sholihin (2015) found that cost information has advantages that benefit organizations in saving production costs. However, the weakness of cost information can be detrimental if you only look at it from cost considerations and not from other aspects. According to Booker et al., (2007) the effect of precise cost information in new product development shows that specific cost information improves the cost focus of management leading to more cost-effective designs.

The Effect of Ego Depletion on Product Cost in New Product Development

In developing a new product, do not only determine cost information, as well as whether the product costs have advantages or disadvantages. In addition, the challenge in new product development is not only in terms of pursuing an organizational structure unilaterally, a progressive management style as a delicate balance between control, freedom, accuracy, and teamwork (Davila, 2000). Individuals who face work pressure or environmental demands and various other aspects of new product development can potentially experience ego depletion. The theory that discusses ego depletion is the power of self-control theory. According to Baumeister et al., (2007) self-control as part of intentional self-regulation. Self-control makes individuals hold one response, so that a different response appears. Self-control is very important, therefore if there is no self-control it will cause behavioral problems and ego depletion. The side effects of ego depletion are reduced willpower and increased likelihood of engaging in risky behavior and can have an impact on decreasing the quality of decision making (Gao et al., 2019). There for, in the context of new product development, the potential for ego depletion in individuals who design products may influence the performance of new product development.

METHOD

The participants in this study were students as a substitute for professionals or practitioners in developing new products, students who were taken as participants came from the Accounting Study Program at the Muhammadiyah University of Yogyakarta. The reason for choosing students as participants is because students can follow the work in this experiment as long as the researcher can adjust the complexity of the task (Elliott et al., 2007). Even this research does not require professional experience because in this experiment the tasks given are not complex so that students can become substitute designers in this research. This study uses quantitative data with primary data types. The method used is the experimental method.

The researcher chose the experimental method using a 2x2 factorial design. With a 2x2 inter-subject design, 4 groups were formed. Researchers use this design to examine the effect of Types of Cost Information and Ego Depletion on New Product Development and are expected to provide differences in two or more variables at the same time. This study tested 2 independent variables and then examined the effect of each variable on the dependent variable.

		Ego Depletion	
		Experience	**Not Experience**
ost Information	**Specific**	Sel 1	Sel 3
	Relative	Sel 2	Sel 4

Based on this matrix, participants will be given 4 different treatment combinations. The following is an explanation of the table in this study:

Cell 1: Participants who experience ego depletion with specific types of cost information.
Cell 2: Participants who experience ego depletion with relative cost information types.
Cell 3: Participants who do not experience ego depletion with specific types of cost information.
Cell 4: Participants who do not experience ego depletion with relative cost information types.

Hypothesis 1 will be supported if the type of cost information affects the development of new products, namely cell 3 and cell 4. Hypothesis 2 will be supported if ego depletion affects product cost in new product development through the type of cost information, namely cell 1 and cell.

Case

Participants are assigned to design or develop a new product. Participants were randomly assigned to one experimental condition from two types of cost information namely specific or relative. Then participants were given prior information that they were designers of a new product (doll house).The main objective of this research is to examine which can save more production costs from the type of cost information, namely specific or relative and examine whether the two types of cost information have the potential to experience ego depletion or not. All participants will get a set of blocks, manuals and data about product specifications on the worksheets given in designing new products. Before the participants worked on the case, a short training session was held and they had to fill out a questionnaire explaining their data information to measure how creative they were.

Manipulation Check

Checking manipulation in this study was carried out by distributing 5 questions to test participants' understanding of the manipulation given. To ensure that the experimental treatment (manipulation) was understood by the participants correctly and adequately, manipulation checks were carried out by providing several questions that verified whether the participants understood correctly that they were given specific or relative cost information and the participants correctly understood that there were differences in design choices. will result in different product costs and different features.

RESULT AND DISSCUSION

There were 97 participants who had participated in an experimental simulation that played the role of a dollhouse designer.

Table 1. Demographic Data

Description		Total	Percentage
Gender	Participation Total	**97**	**100%**
	Male	**34**	**35%**
	Female	**63**	**65%**
Batch Year	Participation Total	**97**	**100%**
	2019	**1**	**1%**
	2020	**87**	**90%**
	2021	**9**	**9%**
Study Program	Participation Total	**97**	**100%**
	Accounting	**97**	**100%**

The characteristics of the participants who took part in this experiment were 97 students of the UMY Accounting study program or 100%. 63 female participants, while 34 male participants. This shows that there are more female participants with a percentage of 65% compared to male participants

Table 2. Statictic Descriptive

		Participant who experience ego depletion	**Participant who doesn't experience ego depletion**	**TOTAL**
Cost Information Type	**Specific**	**1** Mean : 2,13 SD : 0,63 N : 29	**3** Mean :2,00 SD : 0,74 N : 19	Mean : 2,08 SD : 0,67 N : 48
	Relative	**2** Mean :2,59 SD : 0,63 N : 27	**4** Mean :2,36 SD : 0,65 N : 22	Mean : 2,48 SD : 0,73 N : 49
	Total	Mean : 2,35 SD : 0,74 N : 56	Mean : 2,19 SD : 0,71 N : 41	

The average product cost for the type of cost information relative to participants who experience ego depletion has the highest mean (mean) value of 2.59 with a standard deviation of 0.63 and a total of 27 (N) data. Meanwhile, the average product cost for the specific cost information type has the lowest mean value, namely 2.00 with a standard deviation of 0.74 and a total of 19 (N) data. the lower the average value indicates the highest and best performance because it has lower and cheaper costs to develop new products and does not experience ego depletion, this indicates that there is no distraction and optimal conditions for designers who develop new products

Table 3. homogeneity test

F	df1	df2	Sig
0,662	3	93	0,577

A significant value of 0.577 was obtained, which means greater than 0.05 so it can be concluded that the variance of the data group in this study is the same or homogeneity

Table 4. Anova test

Source	Type III Sum Of Squares	Df	Mean Square	F	Sig.
Corrected Model	4,860	3	1,620	3,201	0,027
Intercept	487,623	1	487,623	963,688	0,000
Information Type	3,948	1	3,948	7,803	0,006
evel Of Ego depletion	0,794	1	0,794	1,568	0,214
Cost Information Type*Tingkat *Ego Depletion*	0,049	1	0,049	0,097	0,757
Error	47,058	93	0,506		
Total	560,000	97			
Corrected Total	51,918	96			

Hypothesis test was carried out using ANOVA (Univariate analysis of variance) with a significant value of 0.05. Based on the results obtained, it is known that the type of cost information has a significant value of 0.006 <0.05, so there is an effect of the type of information on product cost in new product development. The significant value at the ego depletion level is 0.214 > 0.05 so that there is no effect of the ego depletion level on product costs in new product development. Researchers conducted additional analysis using multiple average ANOVA testing between cells to see differences in the average product cost for each experimental condition.

Table 5. Inter-cell anova test

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	-0,37481	0,19736	0,364	-,9069	0,1572
	3,00	0,23280	0,20688	1,000	-,3249	0,7905
	4,00	-0,23148	0,19948	1,000	-,7692	0,3063
2,00	1,00	0,37481	0,19736	0,364	-,1572	0,9069
	3,00	0,60762*	0,21047	0,029	0,0402	1,1750
	4,00	0,14333	0,20320	1,000	-0,4045	0,6911
3,00	1,00	-0,23280	0,20688	1,000	-0,7905	0,3249
	2,00	-0,60762*	0,21047	0,029	-1,1750	-,0402
	4,00	-0,46429	0,21247	0,188	-1,0371	0,1085
4,00	1,00	0,23148	0,19948	1,000	-0,3063	0,7692
	2,00	-0,14333	0,20320	1,000	-0,6911	0,4045
	3,00	0,46429	0,21247	0,188	-0,1085	1,0371

Table 6. Descriptive

	N	Mean	Std. Deviation	Std. Error	95% Confidence		nimu m	ximu m
					Lower Bound	Upper Bound		
1,00	27	2.1852	.62247	.11979	1.9389	2.4314	1.00	3.00
2,00	25	2.5600	.82057	.16411	2.2213	2.8987	1.00	5.00
3,00	21	1.9524	.74001	.16148	1.6155	2.2892	1.00	3.00
4,00	24	2.4167	.65386	.13347	2.1406	2.6928	1.00	3.00
Total	97	2.2887	.73540	.07467	2.1404	2.4369	1.00	5.00

The results of the multiple mean test between cells in table 5 show that of the four cells there is a significant difference in performance between cells 2 and 3, which means that there is influence between the two cells. Cell 2 is the participant who experiences ego depletion with the type of relative cost information while cell 3 is the participant who does not experience ego depletion with the type of specific cost information. The difference between the two cells is in the type of cost information and ego depletion. In table 6 cell 2 has an average (mean) value of 2.5600 while cell 3 has a lower mean (mean) value of 1.9524, indicating that cell 3 has the best cost effectiveness because it has a specific type of cost information, which gives a price which is cheaper than using the relative cost information type, and does not experience ego depletion, which shows no distraction and optimal conditions for designers in new product development

Table 7. Average Product Cost Against Types of Cost Information

Cost Information Type	Mean	Std. Error	Confidence Interval	
			Lower Bound	Upper Bound
Specific	2,069	0,105	1,861	2,277
Relative	2,478	0,102	2,275	2,681

Table 7 shows that the type of specific cost information has a low cost, the lower the product cost, the better the performance. This means that participants who are facilitated by the type of specific cost information have better performance. on the results of the ANOVA test explained that the type of cost information affects the product cost in new product development. This is shown in the F value of 7.803 with a significant value of 0.006 <0.05. Judging from the supported H_1 and analyzed statistically significant, it can be concluded that H_1 is accepted

Table 8. Average Product Cost Against Ego Depletion

Llevel Of Ego Depletion	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
perience Ego Depletion	2,365	0,95	2,176	2,554
ot Experience Ego Depletion	2,182	0,111	1,961	2,403

Table 8 shows that participants who experience ego depletion affect product costs in new product development which in the new product development process will affect the performance of designers in developing new products. the results of the ANOVA test explain that ego depletion has no effect on product costs in new product development. This is shown in the F value of 1.568 with a significant value of 0.214 > 0.05. The mean results show that ego depletion affects product costs in new product development, so that (H_2) is supported. However, when statistically analyzed, the results were not significant, so it can be concluded that H_2 declined.

DISCUSSION

The Effect of Cost Information Type on Product Cost in New Product Development

The organization not only develops resources, but also develops interesting strategies and innovations (McAdam et al., 2019). Like contingency theory in management accounting must identify information (Lathifah, 2014). There needs to be important information in developing new product innovation Cost information can be an important factor in developing new products, from this information one can make decisions, decision making is a factor in the process of developing new products (Rahatulain et al., 2021). Therefore there is a need for this type of cost information in research This is for new product development. This implies that the provision of information, will determine performance. Management can design the information obtained in the development of new products. In this study, using specific cost information types and relative cost information types. Specific cost information types provide designers exact amount of charge for options in a certain category, for example, option 1 costs Rp. 2,000,000 and option 2 costs Rp. 1,000,000 while the specific type of cost information gives designers a comparison of options in certain categories, for example, option 1 is more expensive than option 2 (Booker et al., 2007). Based on the results of the ANOVA test, the type of cost information has an effect on product cost in new product development. It can be seen from the significant value in Table 4 of sig 0.006 <0.05. It can also be seen in Table 2 where the type of specific cost information has the lowest average (mean) value of 2.00 with a standard deviation of 0.74 with a total of 19 (N) data, a low average (mean) value indicates the highest and best performance because it has lower costs and it is cheaper to develop new products.

The Effect of Ego Depletion on Product Cost in New Product Development

Ego depletion is a temporary condition that reduces the resources of each individual's self-control, where the willingness to engage in subsequent self-control actions decreases (Hurley, 2019). The side effects of ego depletion itself are reduced willpower, and an increased likelihood of engaging in risky behavior and can impact the quality of decision making (Gao et al., 2019). In the context of new product development, there is the potential for ego depletion in individuals who design products. However, based on the results of the ANOVA test, ego depletion has no effect on product cost in new product development. It can be seen that the significant value in Table 4 is 0.214 > 0.05. This, maybe it could have happened due to the first several factors, in this study the participants were students, where students did not have many demands in carrying out this experiment and there was no need for professional experience. So it can be concluded that H_2 which states that the effect of ego depletion on product costs in new product development is rejected. the second factor, the participants are relatively homogeneous, the condition of ego depletion does not significantly affect the participant's performance.

IMPLICATIONS

The results of this study, theoretically can be used as a source of reference and contribution to the management accounting literature, especially in developing new products.

Practice

The results of this study can practically be used as information material for management in managing designing cost information and developing new products.

CONCLUSION

Based on the results of the analysis and hypothesis testing on the effect of the type of cost information and ego depletion on product costs in new product development, it can be concluded that:

There is a significant effect of the type of cost information on product cost in new product development. The type of specific cost information has a low average value, which shows the highest and best performance because it has a lower cost to develop new products. There is no effect of ego depletion on product costs in new product development. Designers who do not experience ego depletion tend to be better at developing new products, because there are no distractions and designers experience optimal conditions.

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