



Do Teaching Prepares Students for Rational Decision Making? A Case of Relevant Costing

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Abstract- Standard teaching practice emphasizes on practical learning, where students are taught standard tools and principles for rational decision making. This study explores the significance of these sophisticated tools available for rational decision making and investigates that whether students educated to make rational decisions able to make rational judgments for real time situations. A short case was developed to assess ability of senior students to identify relevant costs. Sample consists of 398 randomly selected students from two educational institutions who had studied this concept in the course of management accounting were asked to identify the relevant costs. The results provide a dismal scene. Most students almost 97% were unable to identify all relevant costs in the case. Only 5% identified the right opportunity cost. However, 82% were able to identify the correct sunk cost. On the whole we found a below average understanding of the most of the students for the tool of relevant costing. This research put forwards the question of use fullness for application of the tools and techniques which are devised to teach people about how to make rational decisions.

KEY WORDS: Rational Decision Making, Relevant Costing, Knowledge and Application.

I. INTRODUCTION

Relevant cost analysis is very much popular measure to determine the viability of an option in the short run. Relevant costing considers only the costs which arise due to pursuance of a particular course of action. It is use full in decisions like resource allocation, outsourcing and viability analysis. This tool has been widely used in various real life business situations. All students pursuing businesses studies are taught economics, financial management, and accounting. Tools of rational decision making are taught and used in all of these courses. Economics, mother of social sciences, studies problem of resource scarcity and optimal utilization of resources. Standard economic theory highlights basic principles like opportunity costs and sunk costs (McAfee et al., 2010). While teaching financial management, these principles are applied to calculate viability of the project. Both sunk cost and opportunity costs along with incremental cash flow concept is used to calculate cash flow of a project to decide whether an investment opportunity is viable or not. Same in managerial accounting as well, these concepts are used to evaluate various alternatives like in make or buy decision and differential analysis. Thus, opportunity cost, sunk cost, and marginal or incremental cost/cash flow are primary concepts that form the paradigm of rational decision making.

We have used relevant costing as a tool to investigate whether students understand applications of basic concepts and tools of rational decision making or not. Relevant costing tool incorporate all three basic principles i.e. opportunity cost, sunk cost, and marginal cost. The conceptualization of relevant costing argues

that only those future costs and revenues that would be affected by a decision would be relevant as far as that decision is concerned. Therefore, only the future cash flows arising to pursue a particular decision are to be considered for decision making purpose. Past costs which are already incurred are sunk costs and could not be altered by choosing a decision so they are not relevant to decide about an option. Introductory economics textbooks provide this fundamental principle of sunk costs as the star guideline for rational decision making. If decision making process is affected by sunk costs, the people considering the sunk cost while deciding the viability of an option, are said to be indulged in 'sunk cost fallacy'. Jay (2004) stated that irrelevant costs include fixed overhead because these costs we would have to bear for sure, notional costs as these costs do not involve any kind real cash flow, sunk costs for they are the past costs and are not affected by the likely decision and the book values which are the past prices for stock already paid thus, are sunk costs. Theoretical considerations on these concepts and tools have highlighted that these concepts and tools are very useful in practical decision making (Karanfil & Pierru, 2021; Kehily & Underwood, 2017; Haita-Falah et al., 2017; Mickiewicz et al., 2017; Zhong et al., 2019).

There is a long debate on practical application and understanding of the knowledge processed and obtained by the individuals on their way through formal education. Relevant costing technique no doubt is useful in its own way but what if the individuals fail to apply the concepts of relevant costing in real time situations? We propose that if a person has a better understanding of the opportunity cost and sunk cost concepts of relevant costing, he would probably be in a position to grasp the phenomenon in real sense and if he could identify these costs with regard to a situation. It would be more likely that he would act according to the principles of rationality. This study tries to explore the understanding of the core relevant costing concepts of sunk costs and opportunity costs by the senior students who are future managers of Pakistan and their perceptions regarding the use of relevant costing.

II. LITERATURE REVIEW

It has been argued that academic studies are an important source of knowledge diffusion among students, whereby such knowledge could also be transferred to practical business world (Tho, 2017). However, there has been a long debate on the effectiveness of business education. Staring from Livingston (1971), who criticized management education and argued that theoretical underpinning of management knowledge has lower applicability. Subsequently, Behrman and Levin (1984) objected that business schools do not pay attention to the needs of practical world. This irrelevance of theoretical knowledge for practical world has been consistent over time (Ghoshal, 2005). Thus, managers criticize educators for providing students with irrelevant knowledge that is not consistent with the practical realities of modern world (Benjamin & O'Reilly, 2011). This gives rise to the need of practical education in the field of business and management. In Pakistan as well, Ahmad et al. (2019) argued that business education must reflect practical realities of professional world.

Despite the long standing controversy on relevance of practice based education, business education does provide certain tools and concepts that enable a learner to make rational decisions. Concept of opportunity cost and sunk cost are fundamental principles that are applied frequently for rational decision making. However, there is evidence that even senior students lack the ability to effectively use these concepts and tools for practical issues. Certain studies also document that students also lack knowledge pertaining to the practical subjects of investment, finance, and accounting. Further, there is general acceptance that people are unable to recognize sunk costs and indulged in escalation of commitment towards nonviable projects.

Firstly, on account of student knowledge of the practical subjects, various studies have documented that students lack knowledge of practical subjects. Danes and Hira (1987) lamented poor financial knowledge of students, and demonstrated that these students have suboptimal behavior pertaining to practical money management, insurance, and credit card utilization. Vlope et al. (1996) found that college students have lower levels of investment knowledge, while male students with business majors and finance courses had higher levels investment knowledge. Subsequently, Chen and Vlope (1998) found that college students have lower personal finance knowledge, which is reflected in their suboptimal financial decisions. Jorgensen (2007) found that business students have lower level of financial knowledge and their financial behavior is also irrational. However, they found that financial knowledge and behavior of students influences improves over time. Manton et al. (2006) also revealed lower levels of financial knowledge of students. Subsequently, Peng

et al. (2007) highlighted that poor financial knowledge of students can be improved by studying courses on finance. Borden et al. (2008) also demonstrated that practical seminars could be used to improve financial knowledge of the students, which contribute towards their financial decision making. Robb and Woodyard (2011) also believed that financial knowledge has considerable implications for practical financial behavior. Tang et al. (2015) related that financial education helps individuals to build financial knowledge. Clark et al. (2017) found that financial knowledge helps investors to outperform in their investment endeavours. Kim et al., (2019) also complained on the lower levels of financial knowledge of millennials in US, and found that financial knowledge predicted both short run and long run financial behaviors of US citizens. Recent work on financial knowledge exploring global evidence also demonstrate that financial education improves financial knowledge and financial behavior of individuals (Kaiser et al., 2020). Considering Pakistan, Liaqat et al. (2020) demonstrated that students in Pakistan had average levels of financial knowledge, whereby being male and having studied finance were significant predictor of having higher financial literacy.

Almost same results are being consistently repeated regarding the inappropriate understanding and application of the concepts of relational decision making. Interestingly, Ferraro and Taylor (2005) demonstrated that even having a PhD in economics does not guarantee correct identification of opportunity cost – a star principle of rational decision making that is taught in introductory books on economics. These findings were robust for quality education and ranking of institutes awarding degrees. The study clearly demonstrated that there was disparity between knowledge and application of the concept among PhDs. This demonstrated that advanced knowledge in economics focuses more on technique rather than logical reasoning (Colander, 2005). A subsequent evidence on identification of opportunity cost was provided by Wråke et al. (2009), who also demonstrated that students were unable to identify correct opportunity costs. However, their proficiency of correct identification improved with time. However, Potter and Sander (2012) criticized Ferraro and Taylor (2005) and argued that economists in their sample could justify their identified answer on valid grounds and thus had appropriate understanding of the concept. Arce (2016) commented that although standard concept of opportunity cost in economics text book is easy to understand, these textbooks and related helping materials do not focus much on its proper elaboration and exemplifications raising ambiguities. Parkin (2016) also cited a subsequent experiment of Ferraro and Taylor with undergraduate students, who again found dismal level of understanding of the concept of opportunity cost. Basu and Waymire (2019) argued that opportunity cost is studied in cost accounting with more details and historical costs systems and conservatism could help to identify correct opportunity cost. Considering previous studies, it could be argued that students who have studied the concept of opportunity cost are unable to implement it in real life situations.

Apart from the opportunity cost, sunk cost is also an important element of rational decision making. Sunk costs represent past cost, that have been lost and could not be recovered. It is widely argued that irrecoverable costs should not be considered relevant to decision making. However, evidence suggests that people fall prey to escalation of commitment and keep pouring more money on sunk costs. Sunk cost fallacy has been widely tested in the domain of behavioral economics and rational decision making literature. Earlier studies have documented sunk cost behavior of individual investors, particularly for the projects with greater sunk costs (Khan et al., 2000; Staw, 1976, 1981; Whyte, 1993). De Bondt and Makhija (1988) documented sunk cost behavior for investments in nuclear power plants in US, despite the safety and cost concerns. In this regard, Heath (1995) argued that people set and maximum limit for certain expenditure. After that limit, they tend to withhold investment. Subsequent evidence provided by McAfee et al. (2007) contrasted this argument and argued that budget limits actually cause escalation of commitment up to budgeted levels. Arkes and Ayton (1999) found that adults were more prone to sunk cost behavior compared to children as adults follow 'Don't Waste Rule'. Friedman et al. (2004) used experimental design to find support of escalation of commitment, where more sunk costs were involved. An interesting anecdotal elaboration of sunk costs in political and business scenarios was provided by Davis (2005). It was argued that devastating losses follow, if sunk costs are ignored in both political and business scenarios. Starting from defeat of France in World War II, who considered sunk cost of defense fortification as investment, which resulted in their demise. Extra casualties of US in Vietnam and Iraq war also exemplify costly mistakes, where more losses were sustained due to escalation of commitment. In business world, Motorola failed to recognize that its investment in analog technology was sunk cost. Thus, it witnessed a reduction in market share from 60% in 1994 to 13% in 2007. Other firms that failed to recognize sunk cost include McDonald's during 1996-98, General Motors in 1990's, and Westinghouse Credit corporation. Carpenter et al. (2005) found that people were sunk cost sensitive and

highlighted demographical differences in this regard. Further, intermediate level of schooling had negative correlation with sunk cost sensitivity. Despite its irrationality, McAfee et al. (2007) argued that considering sunk cost in decision making is not illogical for many reasons: past decisions and costs might guide future decisions, option values attached with staying in the project or business segment, and reputational considerations. However, in such situations as well identification and recognition of sunk costs represent a conscious choice having alternative benefits than just costs. Strough et al. (2008) found that younger adults were more likely to fall prey to sunk cost fallacy compared to older adults. Putten et al. (2010) highlighted personality differences in escalation of commitment behavior, where action oriented people could easily ignore sunk costs, while over thinkers fell prey to sunk cost fallacy. Yao and Cui (2010) also highlighted that escalation of commitment is higher for projects with higher sunk costs and vice versa. Haita-Falah (2017) also documented the same. Dijkstra and Hong (2019) documented that people under high cognitive load are more prone to sunk cost fallacy. Sirois (2019) used class room experiments to show that student awareness and understanding of sunk cost makes their decision making more rational. Lastly, Meireles et al. (2019) also found evidence that business students who have studied accounting are also susceptible to be influenced by sunk cost fallacy, thereby their ability to report rational information could be compromised.

Overall, literature review demonstrated that business students have lower practical financial knowledge. Further, opportunity cost identification is also tricky for the students who have studied the concept. Lastly, people and students fall prey to sunk cost fallacy. Moreover, it was also recognized by various studies that improvement of knowledge and understanding of these basic concepts improves decision making of the students and people alike. This study uses tool of relevant costing, which incorporates both opportunity cost and sunk cost to assess whether students who have studied these concepts and are at advanced stage of their studies are able to identify and comprehend these concepts in real time scenarios or not?

III. METHODOLOGY

We propose that understanding of the concept is more important and if a manager can understand various costs with regard to the relevant costing, he would be in a better position to apply that knowledge to the situation to reap the fruits of optimality. Besides there can be specific demands of the situation as McAfee et al. (2007) provides that ignoring the sunk costs would always not be the rational decision. So in order to access the understanding of the future managers we choose survey methodology. A short questionnaire was developed asking the respondents about their demographics, their knowledge about whether they understand the sunk cost and opportunity cost concepts with regard to relevant costing technique and a situation was developed to access the understanding of the students in which they were asked to identify the total sunk cost, total opportunity cost and total relevant cost associated with that situation. The situation was presented as follows:

A machine purchased for \$2000 and installed for \$500 for a special order that was never executed. The machine is useless now and has a resale value of \$1,000 only. A special unique order come up for which the machine could be used after overhauling costing \$100. After the usage; the machine would have a resale value of \$200. Identify the following in case the machine is used for order:

- A. Sunk Cost: _____
- B. Opportunity Cost: _____
- C. Total Relevant cost: _____

Basu and Waymire (2019) argued that concepts like opportunity cost are deeply rooted in managerial account, where managers use real world data. Thus, we identify two cohorts that have studied economics, financial management, and managerial accounting to see whether they understand these concepts after receiving formal education or not? These two cohorts were students from M. Com (18 years) and students of ACCA. All the students have studied the relevant costing technique as a part of their course of management accounting. ACCA represent professional account education student cohort, while M. Com (18 years) represent formal degree based education cohort. A total of 500 questionnaires were distributed to the randomly selected students. Only 398 questionnaires generated the valid responses yielding the response rate of 79.6%. We used descriptive statistics to analyze the findings. A student identifying all the three costs would be given 30 marks for the purpose of quantifying the understanding of the concept. The results would also be discussed in the perspective of demographics i.e. gender, job status and teaching experience.

IV. ANALYSIS AND DISCUSSION

Analysis of the study provides demographical description of the sample, which is followed by description of results on correct identification of relevant costs. Lastly, demographical differences in identification of relevant costs are explored and highlighted. Table 1 provides demographical distribution of the sample. Out of total 398 respondents of the study, 232 (58.29%) of the respondents were doing ACCA, while 130 students (32.66%) were doing M. Com (18 years). All of these students were senior students who had studied and passed subjects of economics, financial management, and managerial accounting. Remaining 22 students were studying in other courses, while 14 respondents did not answer this question. Our sample was composed of both male (60.8%) and female (38.69%). Employed respondents had lower count in the sample, only 11.06%, while most of the respondents were unemployed (85.43%). This represented that most of the students were full time students and were not doing any jobs. An overwhelming 94.47% respondents claimed to understand concept of sunk cost, while this ratio was even more higher 96.48% for claim on opportunity cost understanding. These claims indicate that students were overconfident about their ability to utilize possessed knowledge.

Table 1: Demographics

	Count	Percentage
Education		
ACCA	232	58.29%
M. Com (18 Years)	130	32.66%
Others	22	5.53%
No Answer	14	3.52%
Gender		
Male	242	60.80%
Female	154	38.69%
No Answer	2	0.50%
Job Status		
Employed	44	11.06%
Unemployed	340	85.43%
No Answer	14	3.52%
Understanding of sunk cost		
Yes	376	94.47%
No	18	4.52%
No Answer	4	1.01%
Understanding of Opportunity cost		
Yes	384	96.48%
No	10	2.51%
No Answer	4	1.01%

Table 2 accesses the conceptual clarity of the students with regard to the relevant costing concepts. The findings suggest that 81.82% students were able to identify sunk cost correctly indicating good understanding of the students for the concept of sunk cost but for opportunity cost correct identification was quite lower 5.05% students were able to identify right opportunity cost and that is lower than Ferraro and Taylor (2005) who found a 20% valid identification of the opportunity cost the reason might be that the sample they used were PhD economists who are supposed to be much more clever to identify opportunity cost as it is the core concept of the economics and for relevant cost identification we have further more lower percentage of the valid response i.e. 2.63%. Interestingly, findings are consistent with the previous evidence implying that most students are unable to identify correct opportunity cost. Further, tools of rational decision making being taught to students have lower application. Although students have studied these tools and passed their subject examination, they remained oblivious to actual application of these concepts and tools.

Table 2: Assessment of student understanding of concepts

	Mean	Std. Deviation
Identification of Sunk Cost	.8182	.38667
Identification of Opportunity Cost	.0505	.21954
Identification of Total Relevant Cost	.0263	.16050

Previous studies have documented demographical differences with regard to knowledge base, understanding of concepts, and their application. Table 3 to table 5 explore these differences with regard to understanding and application of concepts of rational decision making. Table 3 assesses differences of understanding pertaining to the type of education, where ACCA represents professional accounting qualification, while M. Com represents formal academic accounting education. Interestingly, it was noted that students of ACCA had better understanding of concepts of relevant costing and rational decision making. For sunk cost, about 92% students were able to identify correct sunk cost, while this ratio was only 66% for M. Com. This mean difference 26.02% was also significant ($p < .05$). Although both cohorts of students performed poorly in identification of opportunity cost and total relevant cost, students of ACCA performed better in identification of these two concepts as well, but only mean difference of identification of overall relevant cost was found significant (Mean difference = 0.3231, $p < .05$). This implied that professional degrees do a better job at teaching students on practical tools for rational decision making, while traditional qualifications focus more on the knowledge orientation and are devoid of practical learning.

Table 3: Course/ Degree differences in understanding of concepts

	Degree/ Course	Mean	Std. Deviation	Mean Difference	t
Identification of Sunk Cost	ACCA	.9217	.26976	.26020	4.048*
	M. Com	.6615	.47687		
Identification of Opportunity Cost	ACCA	.0609	.24014	.01472	.412
	M. Com	.0462	.21145		
Identification of Total Relevant Cost	ACCA	.0592	.0000	.03231	2.309*
	M. Com	.0269	.26854		

*Significant at .05 level

Table 4 above provides the mean differences of cost identification with regard to gender categories of male and female. It is found that no significant difference exists between males and females with regard to identification of total sunk cost, opportunity cost and total relevant cost. Thus, we did not find any implications of gender on understanding of practical concepts. Both male and females were equally good in identification of sunk cost, and equally poor in identification of opportunity cost and total relevant cost.

Table 4: Gender differences in understanding concepts

	Gender	Mean	Std. Deviation	Mean Difference	t
Identification of Sunk Cost	Male	.8333	.37424	.02814	.502
	Female	.8052	.39865		
Identification of Opportunity Cost	Male	.0500	.21886	-.00195	-.060
	Female	.0519	.22338		
Identification of Total Relevant Cost	Male	.0265	.16148	.00057	.024
	Female	.0260	.16010		

*Significant at .05 level

Lastly, Table 5 seeks to determine if any difference exist within the categories of job status i.e. employed and unemployed. We find a slight difference for the understanding of the sunk cost concept from employed students, but this difference was insignificant. However, unemployed students seemed to have better

understanding of the concept of opportunity cost (Mean difference = -.059, $p < .05$). Lastly, differences on the identification of total relevant cost were also insignificant. We conclude that there is some influence of job status on identification of opportunity costs, where unemployed students have better understanding of the concept. This is surprising that students having practical exposure have poorer understanding of the concept, while students with only theoretical and class room knowledge have performed better in this regard.

Table 5: Job status differences in understanding concepts

	Job Status	Mean	Std. Deviation	Mean Difference	t
Identification of Sunk Cost	Employed	.8636	.35125	.05299	.602
	Unemployed	.8107	.39295		
Identification of Opportunity Cost	Employed	.0000	.00000	-.05917	-3.251*
	Unemployed	.0592	.23665		
Identification of Total Relevant Cost	Employed	.0952	.30079	.07695	1.158
	Unemployed	.0183	.13442		

*Significant at .05 level

Overall, we have documented that students who have studied principles of rational decision making have poor understanding of these principles. Our results are consistent with the evidence available in past literature (Meireles et al., 2019; Ferraro & Taylor, 2005; Wråke et al., 2009). We also documented that there are some demographical differences in understanding and application of these principles of rational decision making, where students with professional certifications have better understanding of these principles. There is also some evidence that full time students with no employment are relatively better at identification of opportunity costs. This implies that students working in some firm are unable to obtain in-depth understanding of basic principles of rational decision making. In this regard, it is important that these concepts and principles be given appropriate consideration in class room and curriculum development. As recommended by Sirois (2019), scenario based experiments improve understanding of the students and it also enables them to apply these principles more effectively. Arce (2016) also argued that more coverage of material and better in-depth exemplification should be provided in text book to enable students to practice more and grasp proper application of these concepts.

V. CONCLUSION

Assumption of rationality has long been discussed topic in the literature and making rational decisions is thought to be the key to success but what if people could not understand the underlying assumptions of rationality? This is the problem that we addressed in this study and found that students who were taught a tool of rational decision making have lower understanding of basic concepts of rational decision making. Tools and techniques of rational decision making could be very much useful in practical life but if students are unable to understand these concepts in an appropriate way how they can benefit from such tools? This study argues that more focus should be levied on incorporation of practical scenario based material into teaching and curriculum to better facilitate students with practical aspects of their learning. We call for more research in this area to understand why the understanding of the principles of rationality is lacking among the educated ones and what can be done to bridge this gap of conceptual clarity and understanding so that these tools and techniques provide intended results.

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