

# ACTIVITY-BASED COSTING DIFFUSION, STRATEGY AND ORGANIZATIONAL PERFORMANCE: EVIDENCE FROM IRAN

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## Abstract

While management accounting literature has shown substantial evidence on ABC adoption and implementation within the Western context, this study attempted to provide some insight into the ABC diffusion stages within the Iranian context. Using a revised four-stage model in measuring activity-based costing (ABC) diffusion, this study examines the performance consequence of ABC diffusion together with its relationship with Miles and Snow (1978) strategic types. From purposeful sampling of manufacturing companies listed in the Tehran Stock Exchange, a total of 400 survey questionnaires sent to these companies where 300 usable completed questionnaires were returned and analysed. Hypotheses were tested using ordinal logistic regression and ANOVA analyses. The results showed that firms at higher ABC diffusion stages have better levels of organizational performance than firms at the lower ABC diffusion stages. In addition, the analyzer strategy was a significant factor in determining a firm's decision to go to higher ABC diffusion stages.

**Keywords:** Activity-Based Costing; Innovation; Strategy; Performance  
**JEL classification:** M41

## 1. Introduction

Cost accounting measures the cost of products or services for management accounting purposes in the financial reporting process as well as sell or buy decisions, transfer pricing, value inventory, cost control, and performance determination (Johnson and Kaplan, 1987). Traditional costing systems which designed for manufacturing environments typically have direct costs which are larger in percentages than the total costs. However, in the past three decades, overhead cost has increased impressively and became the dominant cost component of many products. The published ABC literature shows that overheads are becoming a progressively larger component of product cost (e.g. Ahmadzadeh et al., 2011; Drury and Tayles, 2005). During the same time period, many scholars criticise that traditional cost accounting does not provide

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an accurate model for the allocation of overheads. Thus, it fails to produce accurate information for improving management decisions (e.g. Krumwiede, 1998; Cooper and Kaplan, 1991). To overcome the weakness of traditional cost accounting, ABC was introduced during the 1980s and 1990s. According to Askarany et al. (2007), ABC is one of the main cost and management accounting innovation systems in the 20<sup>th</sup> Century. Krumwiede (1998) believes that changes introduced by ABC provide a transparent process cost description and reveal profitability based on objectives.

Previous studies provide a general conclusion that there is a positive relationship between ABC diffusion and organizational performance (e.g. Askarany and Yazdifar, 2012; Banker et al., 2008; Abernethy and Bouwens, 2005; Hughes, 2005; Kennedy and Affleck-Graves, 2001; Mia and Clarke, 1999). Cooper et al. (1992) argue that the goal of ABC is to increase profits, and not to obtain more accurate costs. ABC researchers discovered many benefits of ABC diffusion. These include better measurements of cost, product costing and performance (Khalid, 2005); better understanding of cost reduction opportunities, managerial decision improvement, and cost control (Moll, 2005); and the improvement in business cost-efficiency (Innes and Mitchell, 1995). Despite the stated benefits, limited knowledge is available on the performance consequence of ABC, particularly in the Iranian context. Therefore, it is of interest to explore the implementation of ABC among the Iranian manufacturing companies and to discover its diffusion stages on organizational performance.

Moreover, management accounting literature highlights that firms place more emphasis on particular accounting techniques or information depending on their adopted strategy. In addition, several researchers found evidence supporting those particular types of innovation belonging to a specific business strategy (e.g. Jusoh et al., 2006; Bhimani et al., 2005). However, in the Iranian context, empirical evidence on how a particular strategy deployment influences ABC diffusion process remains limited. Therefore, the relevance and importance of business strategy to ABC implementation lend strong support for this study to examine the relationship between business strategy and ABC diffusion stages. More specifically, this paper highlights (1) how prospector and defender strategic types relate to ABC diffusion stages, and (2) how organizational performance differs at different ABC diffusion stages.

## 2. Literature Review and Hypothesis Development

### 2.1. ABC diffusion

Rogers (2003, p. 5) defines diffusion as “the process which an innovation communicated through certain channels over the time among the members of social system”. He highlighted four elements of diffusion process which include: “1) an innovation, 2) communicated through certain channels, 3) over the time, and 4) among the members of social system”.

Meanwhile, Bjørnenak (1997, p. 4) defines “an innovation” as a successful introduction of new ideas among the social system. Likewise, Damanpour (1987, p. 676) defines innovation as an idea, a system which is new to the firms at the time of adopting it. In line with the innovation definition, several researchers considered ABC as an innovation in cost accounting systems (e.g. Al-Omiri and Drury, 2007; Brown et al., 2004; Gosselin, 1997; Anderson, 1995; Innes and Mitchell, 1995).

Second element of diffusion process is “communication through certain channels”. Rogers (2003, p. 18) believes that “communication is a process” of sharing information for understanding of innovation and it causes potential adopters become responsive of the innovation. For innovation diffusion to occur successfully in the organizations, their employees must be aware of the innovation. To create employee awareness of ABC diffusion, communication can be done through various channels such as workshops, trainings, meetings or conferences, magazines, and membership journals (Bjørnenak, 1997). Several researchers believed that if employees do not recognize why or how ABC works they cannot complete the diffusion process (e.g. Shields and McEwen, 1996).

Time is the third element of diffusion process which measures temporal range in completing the task. Time refers to number of years since ABC was adopted (Krumwiede, 1998). He finds that realization of the advantages of ABC occurs when its diffusion completed and this process normally takes time. Many researchers (see Table 1) suggest the stages models for describing ABC diffusion because they can carefully capture the variations due to timing issues. In line with these researchers, the current study considers diffusion as stage models and conceptualizes diffusion as a series of stages that unfold over time in which later stages cannot be undertaken unless earlier stages completed. Table 1 summarizes various ABC Diffusion Stage Models adopted by previous ABC studies.

The last Rogers’s (2003) diffusion element is “members of social system”. Rogers (2003) explains that these members may be individual, informal groups, sub-systems, and organizations. The current study considers manufacturing companies as members of social system.

**Table 1: Diffusion Stages Models**

<b>Research</b>	<b>Stages of Diffusion</b>
Ahmadzadeh et al. (2011)	1) Reject, 2) Non-Consider, 3) Consider, 4) Under Implementation, 5) Implementation compete
Cohen et al. (2005)	1) ABC unawares, 2) ABC deniers, 3) ABC supporters, 4) ABC adopters
Kiani & Sangeladji (2003)	1) I am not sure, 2) Never seriously considered, 2) Considering, 3) Considered, but rejected it, 4) Considering using, but have not made a decision, 5) Attempted, but rejected it, 6) Planning to implement in the future, 7) Recently have started to implement, but have not fully implemented it yet, 8) ABC is a well-established in our company.
Clarke & Mullins (2001)	1) Reject ABC system 2) Have not considered ABC 3) Not using ABC but may consider it in future 4) Assessing ABC, 5) Adopted ABC
Krumwiede Roth (1997)	1) Initiation, 2) Adoption, 3) Analysis 4) Action, 5) Activity Based Management.
Clarke et al. (1999)	1) No consideration of ABC, 2) Rejected ABC 3) Assessing ABC, 4) Implemented ABC
Krumwiede (1998)	1) Not considered, 2) Considering, 3) Considered, then rejected, 4) Evaluated and approved for analysis, 5) Analysis, 6) Gaining acceptance 7) Implemented then abandoned, 8) A acceptance, 9) Routine system, 10) Integrated system
Anderson (1995)	1) Initiation, 2) Adoption, 3) Adaptation, 4) Acceptance
Innes & Mitchell (1995)	1) No consideration of ABC, 2) Rejected ABC after assessment 3) Currently considering ABC, 4) Currently using ABC

As shown in Table 1, stage models are considered useful from both research and practice perspectives. In most ABC empirical studies, ABC is looked at as a multiple diffusion stage mode (e.g. Al-Omir and Drury, 2007; Maelah and Ibrahim, 2006; Brown et al., 2004; Innes et al., 2000; Krumwiede and Roth, 1999; Krumwiede, 1998b; Anderson, 1995; Innes and Mitchell, 1995). Stage models may better show the degree of usage of ABC systems by highlighting the stage of an occupant. Brown et al. (2004) explained that ABC diffusion relates to the process of carrying out ABC adoption decisions and should be considered as stages. Bjørnenak (1997) described that the model of ABC diffusion is at the shortening stage of the process. He believes that the stage models are based on an elaborate set of assumptions and that the stages mark the diffusion mechanism. Innes et al. (2000) described that the stage as the level of use has been able to identify how an organization promotes ABC usage.

Wolfe (1994) found that the direction of the influence of some factors on innovation is dependent upon the stage being considered. Cooper and Zmud (1990) was one of the empirical studies that investigated whether certain factors affect diffusion stages differently. They applied a six-stage model developed by Kwon and Zmud (1987) to study the diffusion of material requirements planning (MRP) systems. They used adoption and infusion stages for analysis. They

found that some factors are significant in explaining MRP Adoption, but that they are not significant in explaining MRP Infusion.

Anderson (1995) developed ABC diffusion research. She suggested a theory that in the association with diffusion stages of ABC, many factors vary by stage. These variations concern the characteristics of direction and/or level of importance in the relationships. She found evidence supporting this theory. In her study, organizational factors, such as top management support and training, affect the various stages in different ways. Likewise, environmental factors, such as competition, vary in their impact among the diffusion stages. Some ABC researchers who tested this theory with different stage models and different factors also found evidence supporting this theory (e.g. Krumwiede, 1998; Gosselin, 1997; Brown et al., 2004).

## **2.2. Strategy and ABC Diffusion**

Many researchers consider business strategy as an environmental factor (e.g. Brown et al., 2004; Gosselin, 1997). Galbreath (2009, page 110) proposed six dimensions of business strategy which include: 1) Mission: What is a firm trying to accomplish in the long-term?, 2) Strategic issue: What internal and external issue effect on the firm's capability to achieve its mission?, 3) Market: Which market should a firm compete in?, 4) Customer needs: What product/services are needed to offer customers in chosen market?, 5) Resources: What resources (facilities, assess, skills, tools, finance, and relationships) are necessary in order to compete?, 6) Competitive advantage: How can a firm achieve better than competitors? Further, Croteau and Bergeron (2001) argued that business strategy is an action that managers take for achieving organization's goals with respect to the internal structure/processes, and external environment.

They are two schools of strategy typologies widely used in most business research. The typologies were developed by Miles and Snow (1978) and Porter (1987). Miles and Snow (1978) suggest four types of strategy. These are prospector, defender, analyzer, and reactor strategies. later, Porter (1987) developed three generic strategies through which an organization can gain a sustainable competitive advantage. Porter's (1987) strategies are cost leadership, product differentiation, and focus. Since Gosselin (1997) believes that Miles and Snow's typology is more suitable to examine the concern of an innovation in management accounting systems such as ABC, this study adopted the same strategy typology.

Based on Miles and Snow's (1978) typology, prospectors have enthusiasm in searching market opportunities. They invest large financial resources for research and development and teamwork improvement. Defenders strategize the absolutely opposite to prospectors. They have low product diversity and high production volume. Defenders participate aggressively in quality, customer service, and price. Analyzers share characteristics of both prospectors and defenders and stand in between these two groups. The fourth strategy is reactors, which does not follow an appraised strategy (Miles and Snow 1978). The principle of the Miles and Snow typology is that defender, analyzer and prospector strategies, if appropriately implemented, can lead to effective performance (Gosselin, 1997).

Several studies claimed that there is a link between ABC diffusion and business strategy (e.g. Gosselin, 1997; Al-Omiri and Drury, 2007). However, such claim is still inconclusive with respect to strategic types. For example, Al-Omiri and Drury (2007) and Bhimani et al. (2005) compared two types of Miles and Snow typologies and found evidence that ABC diffusion is higher for defenders than for prospectors. Furthermore, Gosselin (1997) compared all types of Miles and Snow typologies and found evidence indicating that prospectors are more likely to diffuse ABC than analyzers and defenders. Meanwhile, Alcouffe (2002) found that the proportion of firms pursuing prospector and analyzer strategies among the French companies adopting ABC is greater than those found among businesses not adopting the method. Moreover, a study by Collins et al. (1997) could lend some support for strategy-ABC relationship when they conducted a survey to identify the effect of business strategy on adoption of management accounting systems (MAS) in terms of budgetary adoption. The only significant relationship that they found is between prospector and MAS adoption. So far, none of Iranian studies mentioned any particular types of innovation belonging to a specific business strategy. Thus, the foregoing arguments lead to the following hypothesis:

*H1: Prospectors are more likely to be at higher stages of ABC diffusion than defenders and analyzers.*

### **2.3. ABC diffusion and Organizational Performance**

Damanpour (1987) believes that managers involved in the issue of improving their organizational performance by adopting innovations. ABC analysis, according to Cooper and Kaplan (1991), allows managers to recognize the sources and their cost drivers and enables them to reduce the demands on their organizational resources. Further, there are evidences indicating a positive relationship between ABC diffusion and organizational performance (e.g.

Askarany and Yazdifar, 2012; Banker et al., 2008; Abernethy and Bouwens, 2005; Hughes, 2005; Kennedy and Affleck-Graves, 2001; Mia and Clarke, 1999).

Banker et al. (2008) revealed that ABC has a positive impact on plant performance, while Cagwin and Bouwman (2002) found evidence that ABC diffusion relates positively to firms' return on investment (ROI). Gering (1999) argued that firms with diffused ABC may improve performance by focusing on which customer or product that is profitable. In addition, Innes and Mitchell (1995) asserted that the key areas of ABC advantages are improving business cost-efficiency by reducing costs as well as developing product costing to improve product profitability. However, the existing literature shows that despite the claimed benefits of using activity-based costing; the level of diffusion of this system is still lower than the traditional one. Gosselin (1997) describes this fact as the "ABC paradox". He asserted that it seems a gap exists between the great interest of management accountants in using ABC and the number of organizations that have actually adopted and diffused it. Rios-Manriquez et al. (2014) found that the ABC users were only 7.22% in Mexican SMEs. Among the reasons why Mexican SMEs did not use the ABC include: high costs involved in implementing ABC; problems in adapting to the firm's information system: and accounting problems with the general accounting system. In order to solve the ABC paradox and provide additional empirical evidence on performance consequences of ABC within Iranian context, the following hypothesis was formulated:

*H2: Firms with higher ABC diffusion stages have higher levels of organizational performance than firms with lower ABC diffusion stages*

### **3. Research Methodology**

#### **3.1. Research Design and Sample**

The study employed a mail survey to collect data. The Tehran Stock Exchange (TSE) served as the sampling frame of the study with a population of 451 companies. As the study focuses only on manufacturing firms, 51 non-manufacturing companies were excluded from the sampling frame. Researchers mailed 400 questionnaires to the chief financial officers (CFO) of manufacturing companies selected. CFOs selected are expected to understand the cost accounting systems and are key persons responsible for the ABC implementation.

Consistent with previous studies, researchers carried out two rounds of mailings. During the first round, 400 questionnaires were sent to selected companies for the attention of the CFO. Researchers mailed follow up reminders

a month later which could improve the response rate. A total of 300 questionnaires were returned, of which 188 are usable, yielding a response rate of 47%.

### **3.2. Variable Measurement**

*Strategy:* The present study examined the degree to which firms emphasize each of the business strategy types proposed by Miles and Snow (1978). This typology identifies four strategic types. These are prospectors, defenders, analyzers, and reactors. The survey questions with regard to business strategy were adopted from Jusoh and Parnell (2008). There were twelve questions and each question consists of four item statements which measure each type of business strategy (48 items in total) as depicted in Appendix 1. The respondents were asked to indicate agreement or disagreement with each statement concerning their organization by using a five-point Likert scale including: 1=strongly disagree, 2=disagree, 3=somewhat agree, 4=agree, 5=strongly agree. Business strategy was operated by taking the mean score across the twelve items in four strategic types. Then, for each firm the degree of the mean value which was classified into four strategic types was compared. The highest value indicated which firm emphasizes a given strategy. As a result, the firm strategy was treated as a nominal variable.

*ABC Diffusion:* ABC diffusion stages were assessed using the measurement adopted from Krumwiede and Suessmair (2005) which was developed based on Krumwiede's (1998) and Krumwiede and Roth (1997) studies. The respondents were asked to mark the description that best describes the current situation of their company according to the seven diffusion stages. The measurement uses seven diffusion stages: ABC not considered, ABC considered then rejected, ABC considering, ABC implemented then abandoned, ABC used occasionally, ABC used frequently, and ABC used extensively. The level of usage is measured by ordinal scale (see Appendix 2). *Organizational Performance:* A multidimensional performance measurement was used in measuring the level of organizational performance. The instrument was adopted from Moll (2005) who used a self-rating scale developed by Govindarajan and Gupta (1985). Two questions were used to measure the level of organizational performance. The first question measures the value for the performance importance of 16 performance dimensions where the respondents were asked to rate the importance from "Not Important" (1) to "Extremely Important" (5) for each of the 16 performance aspects (see Appendix 3). The second question measures the value for the performance achievement of the same 16 performance dimensions where respondents were asked to rate their perceptions of company performance



achievement relative to that of their competitors using a five-point Likert-type scale ranging from “Strongly below the Average” (1) to “Strongly above the Average” (5). A weighted average performance index was calculated for each firm by multiplying each performance importance item by its relevant performance achievement item. This lets for the establishment of a performance index that acknowledges the differing performance purposes of firms. This approach is similar to that used by Govindarajan and Gupta (1985) and Abernethy and Bouwens (2005).

## 4. Results

Table 2 shows the number of responding firms and their respective industries. The majority of the firms were in the ore and mining products (10.6%), followed by chemicals and petroleum products (9.6%), and non-sugar products, metals products, and textiles products (8.5%).

**Table 2:** Sample Industries Group

	<b>Industries</b>	<b>Number</b>	<b>Percentage</b>
1	Electric Machinery & Apparatus	7	3.72
2	Wood, Publishing, and Printing Products	9	4.79
3	Medical products	13	6.91
4	Cement, Lime, and Gypsum Products	11	5.85
5	Chemicals and Petroleum Products	18	9.57
6	Non-sugar Products	16	8.51
7	Metals Products	16	8.51
8	Sugar Products	9	4.79
9	Non-metallic Products	9	4.79
10	Furniture, Computer Products	11	5.85
11	Machinery Equipment Products	11	5.85
12	Ores Mining Products	20	10.64
13	Textiles Products	16	8.51
14	Motor Vehicles and Auto Parts products	15	7.98
15	Other Products	7	3.72
	Total	188	100.00

### 4.1 Factor Analysis and Reliability

A principal component analysis (PCA) with varimax rotation was performed for the 16 items of the performance index. Following factor loading results, five items (competitor monitoring, profile with the community, cost, customer monitoring, and employee safety) were deleted from the analysis for their low factor loading (less than 0.50) and cross-loadings. As shown in Table 3, two component factors were extracted, accounting for a total of 55.71% of the variance with eigenvalues exceeding 1.0. Factor 1 consists of six items (on time

delivery, customer satisfaction, productivity of labour, time to process activities, product quality, and new product introduction) that explains 30.75% of the variance. This factor was named “non-financial performance”. Factor 2 was named as “financial performance” and consists of five items (cash flow, cost reduction, return on investment, market share, and sales volume) explaining 24.96% of the variance.

**Table 3:** Results of the Principal Component Factor Analysis for Performance Measures

Component	Items	Factor Loadings	Eigenvalue	Percentage of Variance Explained
1	On time delivery	.776	3.38	30.75
	Customer satisfaction	.775		
	Productivity of labour	.770		
	Time to process activities	.748		
	Products quality	.640		
2	New product introduction	.589	2.75	24.96
	Cash flow	.730		
	Cost reduction	.700		
	Return on investment	.692		
	Market share	.674		
	Sales volume	.670		

Table 4 presents Cronbach’s alpha coefficients which indicate the reliability for multi-item variables in this study. All the Cronbach’s alpha coefficients exceed 0.70 indicating good reliability as suggested by Sekaran et al. (2000).

**Table 4:** Reliability of the Multi-Items

Variables	Cronbach Alpha
Business strategy-Prospector	0.88
Business strategy-Defender	0.81
Business strategy-Analyzer	0.85
Business strategy-Reactor	0.80
Performance-Financial	0.78
Performance-Non-financial	0.85

## 4.2 Descriptive Statistics

Table 5 contains the descriptive statistics for the variables. The majority of the firms adopt reactor strategy (32.5%), followed by defender strategy (27.1%), analyzer strategy (21.3%) and prospector strategy (19.1%). Initially, the current study proposed a seven-stage model for measuring ABC diffusion. However, the data revealed that there are no firms in three of the stages (Stage 2: Evaluated then rejected, Stage 4: Implemented then abandoned, and Stage 6: Used frequently). As the data only captured responding firms in four stages, a four-stage model was then used in the data analysis. This model represents: Stage 1-

ABC Not considered (n=112), followed by Stage 3-ABC Considering (n=43), Stage 5-Used occasionally (n=20), and Stage 7-Used extensively (n=13). This model is considered a continuous and complete diffusion model which was also proposed earlier by other researchers (e.g. Innes et al., 2000; Clarke et al., 1999; Gosselin, 1997; Anderson, 1995). This four-stage model is sufficient to do further analyses on the relative importance of strategy variable and performance consequences at different stages of ABC diffusion.

**Table 5:** Descriptive Statistics

<b>Business Strategy</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Cumulative %</b>
Analyzers	40	21.28	21.28
Defenders	51	27.13	48.41
Prospectors	36	19.14	67.55
Reactors	61	32.45	100.00
<b>ABC Diffusion Stages</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Cumulative %</b>
Stage one-Not considered	112	59.58	59.58
Stage Two-Evaluated then rejected	0	0.00	59.58
Stage Three-Considering to ABC	43	22.87	82.45
Stage Four –Implemented then abandoned	0	0.00	82.45
Stage Five –Used occasionally	20	10.64	93.09
Stage Six –Used frequently	0	0.00	93.09
Stage Seven –Used extensively	13	6.91	100.00

A preliminary review of the cross-tabulation results helps explaining the relationships between ABC diffusion and business strategy (see Table 6). Most firms in Stage 5 and Stage 7 followed analyzer strategy. Based on these preliminary results, it seems that hypothesis 1 is not supported.

**Table 6:** Cross-tabulation Result of ABC Diffusion Stages and Strategy

	<b>ABC Diffusion Stage</b>				<b>Total</b>
	<b>Stage 1</b>	<b>Stage 3</b>	<b>Stage 5</b>	<b>Stage 7</b>	
Strategy-Analyzer	14	10	10	6	40
Strategy-Defender	31	15	3	2	51
Strategy-Prospector	27	2	4	3	36
Strategy-Reactor	40	16	3	2	61
Total	112	43	20	13	188

### 4.3 Ordinal Logistic Regression – Business Strategy and ABC Diffusion

To test for H1 that states that prospector strategy is at higher stages of ABC diffusion, an ordinal logistic regression was performed. ABC diffusion stage is a dependent and ordinal variable with four stages (Stage 1, Stage 3, Stage 5 and Stage 7) while business strategy is an independent and nominal variable which includes four business strategy types: prospector, defender, analyzer, and reactor. In the analysis, prospector, defender, and analyzer strategies were

considered as dummy variables while reactor strategy was considered as the reference group.

Referring to Table 7, the results show a model fit. The -2 log likelihood for the final model is equal to 50.47 and chi-square equals to 17.43 with p-value > 0.01. As shown in Table 7, the p-value for both Strategy-Defender and Strategy-Prospector are not significant (p-value > 0.10) indicating the absence of both strategies' effect on ABC diffusion stages when compared with Strategy-Reactors. On the other hand, Strategy-Analyzer is significant at  $p < 0.01$ , indicating that the Strategy-Analyzer influenced ABC diffusion stages more than Strategy-Reactors. The b parameter shows positive effect (+ 1.426) for Strategy-Analyzer indicating that the probability of accessing the higher ABC diffusion stages in firms which used Strategy-Analyzer is 1.426 times higher than firms with Strategy- Reactors. The result results show that firms with analyzer strategy are more motivated to be in higher ABC diffusion stages compared to other strategies. This result is contrary to expectation, thus, H1 is not supported.

**Table 7: Ordinal Logistic Results: ABC Implementation Model**

Predictor	Parameter Estimate	Std.Error	Wald Chi Square	df	p-value
Strategy-Analyzer	1.426	0.398	12.855	1	0.001
Strategy-Defender	0.189	0.388	0.238	1	0.626
Strategy-Prospector	-0.229	0.453	0.254	1	0.614
Test			Wald Chi Square	df	p-value
Overall model fitting evaluation			17.43	3	0.01

Note: -2 log likelihood=50.474, Cox and Snell R<sup>2</sup>=0.098, Nagelkerke R<sup>2</sup>=0.100

### 4.3 ANOVA Test – ABC Diffusion and Organizational Performance

To test H2, ANOVA tests were conducted. Table 8 presents the ANOVA results for the difference in financial performance among the ABC diffusion stages. The result provides evidence ( $p < .001$ ) that the level of financial performance differs from the lower stage to the higher stages of ABC diffusion. To determine which specific stages differ significantly, Multiple Comparisons tests using the Tukey post-hoc method was applied. As shown in Table, 9, the Multiple Comparisons table shows that stages 7-1, stages 7-3 and stages 7-5 differences are significant. Further, as shown in Table 10, the mean values of firms' financial performance in higher ABC diffusion stages are higher than those in the lower stages.

**Table 8:** ANOVA Result, ABC Diffusion and Financial Performance

Financial Performance	Sum of Squares	df	Mean square	F	p-value
Between Groups	562.762	3	187.587	13.663	.001
Within Groups	2526.317	184	13.730		
Total	3089.079	187			

**Table 9:** Multiple Comparisons, ABC Diffusion and Financial Performance (Post Hoc Tests)

(I) ABC Diffusion	(J) ABC Diffusion	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	3	-1.22662	0.66475	0.256	-2.9501	0.4969
	5	-2.71964*	0.89949	0.015	-5.0517	-0.3876
	7	-6.47349*	1.0857	0	-9.2883	-3.6586
3	1	1.22662	0.66475	0.256	-0.4969	2.9501
	5	-1.49302	1.0029	0.446	-4.0932	1.1071
	7	-5.24687*	1.1728	0	-8.2875	-2.2062
5	1	2.71964*	0.89949	0.015	0.3876	5.0517
	3	1.49302	1.0029	0.446	-1.1071	4.0932
	7	-3.75385*	1.3201	0.025	-7.1764	-0.3313
7	1	6.47349*	1.0857	0	3.6586	9.2883
	3	5.24687*	1.1728	0	2.2062	8.2875
	5	3.75385*	1.3201	0.025	0.3313	7.1764

\*. The mean difference is significant at the 0.05 level.

**Table 10:** Descriptive statistics, ABC Diffusion and Financial Performance

	Low	High	Mean	Standard deviation
Stage one (N=112)	2.40	20.20	11.08	3.742
Stage three (N=43)	2.40	21.20	12.30	3.693
Stage five (N=20)	8.40	20.40	13.80	3.785
Stage seven (N=13)	11.80	22.00	17.55	3.248

Further, ANOVA results in Tables 11 show that the level of non-financial performance differs significantly from the lower stage to the higher stages of ABC diffusion. As shown in Table, 12, the Multiple Comparisons table shows that stages 7-1, stages 7-3, and stages 7-5 differences are significant. It further indicates that (see Table 13) the mean values of the firms' non-financial performance in higher ABC diffusion stages are higher than those in the lower stages.

**Table 11:** ANOVA Result, ABC Diffusion and Non-Financial Performance

Non-Financial Performance	Sum of Squares	df	Mean square	F	p-value
Between Groups	457.29	3	152.430	10.032	.001
Within Groups	2795.63	184	15.194		
Total	3252.92	187			

**Table 12:** Multiple Comparisons, ABC Diffusion and Non- Financial Performance (Post Hoc Tests)

(I) ABC Diffusion	(J) ABC Diffusion	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	3	-0.163	0.69928	0.996	-1.976	1.65
	5	-0.66009	0.94622	0.898	-3.1133	1.7932
	7	-6.21201*	1.1421	0	-9.1731	-3.2509
3	1	0.163	0.69928	0.996	-1.65	1.976
	5	-0.49709	1.055	0.965	-3.2323	2.2382
	7	-6.04902*	1.23373	0	-9.2477	-2.8504
5	1	0.66009	0.94622	0.898	-1.7932	3.1133
	3	0.49709	1.055	0.965	-2.2382	3.2323
	7	-5.55192*	1.38868	0.001	-9.1523	-1.9516
7	1	6.21201*	1.1421	0	3.2509	9.1731
	3	6.04902*	1.23373	0	2.8504	9.2477
	5	5.55192*	1.38868	0.001	1.9516	9.1523

\*. The mean difference is significant at the 0.05 level.

**Table 13:** Descriptive statistics, ABC Diffusion and Non-Financial Performance

	Low	High	Mean	Standard deviation
Stage one (N=112)	1.67	22.50	11.41	3.795
Stage three (N=43)	4.67	19.50	11.57	4.224
Stage five (N=20)	3.00	19.50	12.07	4.162
Stage seven (N=13)	10.83	21.83	17.62	3.133

Therefore, the results support H2 which states that firms which are in higher ABC diffusion stages have a greater level of both financial and non-financial organizational performance.

## 5. Discussions

The accounting literature suggests that firms diffuse a particular accounting system depending on which strategy they adopt. The study does not find support for H1 which states that prospector are more likely to be at higher stages of ABC diffusion. Instead, the results show that analyser strategy, which shares the advantages of both prospector and defender strategies, is the best type of strategy to go to higher ABC diffusion stages. A number of researchers found evidence that uncertainty in Iran is very high (Samimi and Motameni, 2009). More recently, Charkhide and Tajik, (2012) asserted that there are several instability in Iran due to exchange rate, the inflation, financing sources, interest rate, political, and economical instabilities. A high environmental uncertainty in Iran may explain why the ABC adoption is rather low among the Iranian manufacturing companies. When an environment is perceived as uncertain, information on customers, suppliers, competitors and economics can be unpredictable or

difficult to predict. Hence, it is unlikely that companies would consider the adoption of a new system such as ABC in such condition. Besides, environments that are highly uncertain will tend to generate a lack of confidence on the part of managers. This will likely be viewed as contexts in which erroneous decisions could result in trouble, and will possibly delay decision-making. Under such conditions, the main reason for delaying adopting an innovation is the time needed for innovation adopters to think, to reflect, and to digest ideas.

It seems that in the uncertain environment that the Iranian firms face now, analyzer firms have more tolerance and are able to predict the necessary elements leading to higher ABC diffusion stages. Thus, the result may cause the analyzer companies to get involved in ABC as beneficial tool for increasing the value of their cost accounting methods. This significant finding is rather consistent with a study conducted by Bhimani et al. (2005) where they found that strategy influences the decision to experience ABC and that strategy influences the success of ABC diffusion. A quite similar finding was also found by Croteau and Bergeron (2001) who revealed that analyzers have a significant impact on technological deployment diffusion.

Hypothesis 2 states that firms which are at higher ABC diffusion stages have greater levels of firm performance, is fully supported. The results show firms that are in higher ABC diffusion stages have greater levels of both financial and non-financial financial performance than firms that are in the lower stages. This significant finding is consistent with a study conducted by Kennedy and Affleck-Graves (2001) in which they found that the ABC adoption significantly improves organizational performance, both financial and non-financial performance. Evidences from other studies such as Banker et al. (2008), Abernethy and Bouwens (2005), Hughes (2005) also seem consistent with the findings. Furthermore, Cooper et al. (1992) argued that the goal of using ABC is not only to obtain more accurate costs, but also to increase performance, which is empirically supported by this study.

## **6. Implications and Limitations**

The study provides some theoretical and practical implications. From the theoretical perspective, the study contributes to the strategic management and ABC literatures by providing some evidence concerning the effects of business strategy on ABC diffusion. In contrast with the existing literature, the findings reveal that, instead of prospector strategy, it is the analyzer strategy that represents the best strategy to go to higher ABC diffusion stage. The findings add more empirical evidences to the ABC literature with respect to the relationships between ABC diffusion stages and firms' financial and non-

financial performance where firms which are at higher ABC diffusion stages tend to have greater levels of organizational performance than those in lower ABC diffusion stages.

From the practical perspective, the findings are vital to the top level managers who are responsible for strategy formulation to decide on the appropriate strategic types. This is because strategy plays a key role in the diffusion process of an innovation such as ABC. Besides, companies tend to place more emphasis on particular accounting techniques depending on which strategy they adopt. The findings also suggest that diffusing the ABC system improves both financial and non-financial organizational performance. Such findings could be important for non-ABC diffusing firms to consider to diffuse ABC to improve their organizational performance and achieve their final goal. Companies may be more motivated to adopt ABC until the infusion stage in order to realize the benefit from the ABC implementation.

Some limitations of the study are worth to mention as to allow some cautions in interpreting the results. First, a small number of companies that actually adopting ABC might undermine the reliability of the results. However, this can be acceptable as this study is an exploratory study which intended to lay the groundwork for ABC studies in Iran. Second, this study covers only manufacturing sector companies selected from the Tehran Stock Exchange. Therefore, any generalizations of the results to other sectors (e.g. distribution, retail, services, and transportation) should be treated with caution. In this case, future research should consider other sectors such as the services and non-profit sectors, and government organizations in order to get a better understanding of the ABC system and its application. Further, a survey approach may reduce some costs and enhance the external validity of the findings, but for further improvement, it would have been better to conduct a mixed-method approach in gathering data such as conducting follow-up interviews and using some secondary data.

## **7. Conclusion**

While management accounting literature has shown substantial evidence on ABC adoption and implementation within the Western context, this study attempted to provide some insight into the ABC diffusion stages within the Iranian context. The findings suggest that type of business strategy depends on the ABC diffusion stages while firm performance varies according to the ABC diffusion stages. The results show that firms tend to follow analyzer strategy and have higher performance when they are at higher stage of ABC diffusion process.



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**Appendix 1: Survey Questions for Business Strategy**

The following questions relate to the **business strategy** your organization is pursuing. Each of these twelve questions containing four statements where each statement represents a particular strategy pursued. Please indicate to what extent you agree or disagree with each of the statement using the five-point below. Please circle only one of the numbers.

The level of agreement Statements	Strongly Disagree	Disagree	Some what Agree	Agree	Strongly Agree
Considering our products, we					
F1) primarily seek to provide our products at the lowest possible price;	1	2	3	4	5
F2) Primarily seek to differentiate our products from those of our competitors;	1	2	3	4	5
F3) Tend to emphasize one or more factors such as quality, price or uniqueness for a while, and later emphasize other factors;	1	2	3	4	5
F4) Primarily seek to provide products most consistent with consumer demands;	1	2	3	4	5
In the future we plan to position our company in the marketplace as:					
F5) One that does the best job meeting consumers demands;	1	2	3	4	5
F6) One that does whatever that generates the greater return at that time;	1	2	3	4	5
F7) One that satisfies the demands of a particular group of consumers exceptionally well;	1 1	2 2	3 3	4 4	5 5
F8) One that leads the way in new products;					
If asked about our company, most current and prospective customers would:					
F9) Consider us to be an efficient producer of goods;	1	2	3	4	5
F10) Consider us to be highly innovative;	1	2	3	4	5
F11) Feel as if we understand them well as consumers;	1	2	3	4	5
F12) Identify us with no particular area of distinctive competence;	1	2	3	4	5
How does your company view change in the marketplace or your external environment?					
F13) We usually try to initiate change;	1	2	3	4	5
F14) We do not think much about change;	1	2	3	4	5
F15) We usually try to adopt to change;	1	2	3	4	5
F16) We usually try to resist change;	1	2	3	4	5
Most current and prospective costumers probably:					
F17) See our products as among the lowest priced available;	1	2	3	4	5
F18) See our products to be the most in-tune with customer demands;	1 1	2 2	3 3	4 4	5 5
F19) Consider our products among the most unique;	1	2	3	3	5
F20) See different attributes in our products;					

Relative to our competition, we:					
F21) Generate more than our share of our new products;	1	2	3	4	5
F22) Do something well for a while, and then concentrate on other areas;	1	2	3	4	5
F23) Are the most competent marketers in the industry;	1	2	3	4	5
F24) Provide products primarily to a well-defined customer group;	1	2	3	4	5
In the future we primarily plan to:					
F25) Do lots of things, nothing in particular;	1	2	3	4	5
F26) Focus on high innovation;	1	2	3	4	5
F27) Learn more about our customers;	1	2	3	4	5
F28) Improve our efficiencies;	1	2	3	4	5
Current and prospective customers probably:					
F29) See us as adapting well to the changes in the market;	1	2	3	4	5
F30) Are unclear about the way we modify our products over time;	1	2	3	4	5
F31) View our products as stable and traditional;	1	2	3	4	5
F32) See us as a leader in the industry;	1	2	3	4	5
One of our goals for future is to offer products that:					
F33) Are easily differentiated from those of our competitors;	1	2	3	4	5
F34) Contribute to profits, regardless of what we sell;	1	2	3	4	5
F35) Are similar to those of our competitors, but at a lower cost;	1	2	3	4	5
F36) Meet specific consumer demands;	1	2	3	4	5
If you were to ask our potential customers, most would say:					
F37) Different things about our organization;	1	2	3	4	5
F38) That we market our products exceptionally well;	1	2	3	4	5
F39) That we respond to the needs of our customers very quickly and effectively;	1	2	3	4	5
F40) That we dominate one segment of the market, but are weak in most others;	1	2	3	4	5
Our company concentrates most on:					
F41) Different areas that constantly change;	1	2	3	4	5
F42) High efficiency;	1	2	3	4	5
F43) Innovation;	1	2	3	4	5
F44) Understanding our customers;	1	2	3	4	5
We plan to:					
F45) Remain steadfast and consistent, regardless of changes and trends in the marketplace;	1	2	3	4	5
F46) Modify our products as necessary in order to meet changes in the marketplace;	1	2	3	4	5
F47) Re-define our industry;	1	2	3	4	5
F48) Make major changes to our strategy as dictated by the marketplace and our competitors;	1	2	3	4	5

**Appendix 2: Survey Questions for ABC Diffusion**

K. Regarding activity or process based costing (ABC); please put X in the ONE of the following stages that best describe your company current situation:

- K1) Not considered:  
ABC has not been seriously considered. We use either single or departmental/multiple plant-wide allocation methods only.
- K2) Evaluated then rejected:  
ABC has been evaluated (but not implemented) and was later rejected as a cost assignment/management method.
- K3) Initiation/evaluating:  
ABC is being evaluated and implementation is possible, but implementation has not yet been approved.
- K4) Implemented then abandoned:  
ABC was previously implemented but is not currently being used.
- K5) Used occasionally:  
Occasionally used by non-accounting management or departments for decision making.
- K6) Used frequently:  
Frequently used for management decision making; considered normal part of information system.
- K7) Used extensively:  
Used extensively for management decision making; clear benefits of ABC can be identified.


**Appendix 3: Survey Questions for Organizational Performance**

J1. How important does your companies rate the following **measures of performance**? Please indicate by circling the most appropriate level of importance below:

The level of Importance	Not important	Little important	Medium important	Very Important	Critically important
Measurements					
J1-1) Sales volume	1	2	3	4	5
J1-2) On time delivery	1	2	3	4	5
J1-3) Cash flow	1	2	3	4	5
J1-4) Competitor monitoring	1	2	3	4	5
J1-5) Market share	1	2	3	4	5
J1-6) Return on investment	1	2	3	4	5
J1-7) New product introduction	1	2	3	4	5
J1-8) Time to process activities	1	2	3	4	5
J1-9) Customer satisfaction	1	2	3	4	5
J1-10) Productivity of labour	1	2	3	4	5
J1-11) Profile with the community	1	2	3	4	5
J1-12) Cost reduction	1	2	3	4	5
J1-13) Cost	1	2	3	4	5
J1-14) Customer monitoring	1	2	3	4	5
J1-15) Employee safety	1	2	3	4	5
J1-16) Products quality	1	2	3	4	5

J2. How well do you believe your organization has currently performed compared to your competitors with respect to the following performance indicators?

The level of Performance Indicators	Strongly Below the Average	Below the Average	Average	Above Average	Strongly Above Average
J2-1) Sales volume	1	2	3	4	5
J2-2) On time delivery	1	2	3	4	5
J2-3) Cash flow	1	2	3	4	5
J2-4) Competitor monitoring	1	2	3	4	5
J2-5) Market share	1	2	3	4	5
J2-6) Return on investment	1	2	3	4	5
J2-7) New product introduction	1	2	3	4	5
J2-8) Time to process activities	1	2	3	4	5
J2-9) Customer satisfaction	1	2	3	4	5
J2-10) Productivity of labour	1	2	3	4	5
J2-11) Profile with the community	1	2	3	4	5
J2-12) Cost reduction	1	2	3	4	5
J2-13) Cost	1	2	3	4	5
J2-14) Customer monitoring	1	2	3	4	5
J2-15) Employee safety	1	2	3	4	5
J2-16) Products quality	1	2	3	4	5