

# Fintech Adoption Choices of Small Businesses: A Technology Organization Environment (TOE) Framework Study

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## Abstract

Financial technology or “fintech” is an amalgam of the use of technology for financial transactions and processes. Fintech adoption for business processes by small businesses largely remains unexplored in the context of emerging markets. This study was conducted during 2018 using a sample of 117 owner and managers of small businesses in India, for exploring the fintech adoption through the Technology Organization Environment (TOE) framework. The method applied for data analysis was partial least squares structural equation modeling (PLS-SEM). It was found that perceived direct benefits of fintech had a significant effect on fintech adoption. Counter-intuitively, the perceived cost of fintech adoption was not a significant factor in fintech adoption. These results have significant managerial and academic relevance for understanding fintech adoption agenda of small businesses in the emerging markets.

**Keywords:** fintech, TOE framework, PLS-SEM, emerging markets

## 1. Introduction

As per Arner, Barberis, & Buckley, (2015), financial technology or “fintech” refers to technology-enabled financial solutions. Fintech requires the extensive use of information technology solutions for offering and executing financial services. Fintech when broadly defined includes the use of digital payments, mobile banking, internet banking, the use of block chain technology, cryptocurrency etc. In the emerging markets, where the business eco system is very fluid, both multi-national firms and startups are engaged in creating breakthrough customized and innovative solutions in the fintech space. The innovations also bring with themselves a risk of failure. All these factors in the business eco system can make the use of fintech, a key distinguishing factor for business survival and growth.

The Technology Organization Environment (TOE) framework is based on the concept that technology, organization, and environment are contextual factors through which firms decide to adopt innovations (Carnaghan & Klassen, 2007). The innovations can have their genesis in multiple technologies which further have their applications in multiple domains. The TOE framework is built on the foundation of a strong theory and has been empirically tested to be valid and relevant (Oliveira & Martins, 2011). The TOE framework (Tornatzky, Fleischer, & Chakrabarti, 1990) has been used in the emerging market context as well. Quite interestingly, the scholars are divided on the application of the other theories of technology adoption as to whether they are suitable at the individual level (such as the Technology Adoption Model (TAM), The Theory of Planned Behavior (TBP), and the Unified Theory of Acceptance and the Use of Technology (UTAUT)) or the firm level (Diffusion of Innovation Theory). The TOE framework is used extensively in information technology and commerce (Lin & Lin, 2008) and is a largely a firm level theory (Baker, 2012). Hence the choice of TOE framework for this study was appropriate.

This study aims to address a significant knowledge gap by finding the precise reasons as to why certain firms adopt fintech whereas others do not adopt. Also this has not been significantly studied through the lens of a TOE framework. It is understood that in the global knowledge economy, Fintech is the way forward for conducting business. It is also well established that the small businesses are the backbone of an emerging economy (Kuan & Chau, 2001), such as India where traditionally business transactions have been conducted on cash basis. Thus the choice of fintech adoption parameters by small business is of great consequence for any countries sustainable and balanced economic development. The emerging economies have transactions where the end customer may not have expertise in navigating apps, or have a smartphone. The present study is an attempt in appreciating the unique setting of fintech adoption in the emerging markets as well. It was found that perceived direct benefits of fintech had a

significant effect on fintech adoption. Counter-intuitively, the perceived cost of fintech adoption was not a significant factor in fintech adoption.

## 2. Conceptual Development and Hypothesis

As per Baker (2012), “technology context” of the TOE framework includes the present and future technologies which are relevant to the business. The role of technology is to enable the firm to evolve and grow. Baker (2012) further suggests that the “organizational context” refers to the firm-specific resources, authority responsibility relationships, firm size, etc. These factors have a bearing on technology adoption as they influence both the operational and strategic choices. Finally, Baker suggests that the “environmental context” includes the larger competitive landscape and the business eco-system which among other things includes the industry structure, the regulatory framework, etc. Baker (2012) thus provides detailed insights on the three primary context of the TOE framework.

The TOE framework has been used extensively to study the adoption of e-business (Zhu, Kraemer, & Xu, 2003), electronic data interchange (EDI) (Kuan & Chau, 2001) and information system (IS) application (Thong, 1999). Thus the TOE framework has been contextually appropriate to study the adoption of innovative technologies in the past. Perhaps one of the most remarkable features is the amenability of the TOE framework to be used with different factors for each of the three major themes viz. technological, organizational and environmental context. This is a major advantage of this theory as generally each new technology also has its own unique set of factors which may be different from other previous technologies. Thus the TOE framework can be customized for each new technology and its adoption process. Thus the preference for TOE framework over the other theories for the fintech adoption choices of small business in India.

The small businesses are the backbone of the economy (Kuan & Chau, 2001), and these small businesses are not a simple scale down version of the large business (Raymond, 1985). The small businesses are unique in their own right and are extremely significant for the growth of an emerging economy like India. For these reasons, the small business demand an independent and contextually specific probe regarding the factors affecting their fintech adoption choices. India is an emerging market as per the geographic definition of the emerging markets (Burgess & Steenkamp, 2006). Fintech is also expected to manage risk, provide speed and delivery at a time and place where the customer wants.

The World Trade Organization (WTO) does not define developed or developing countries and chooses to classify its members by self-selection. There are various constraints of financial resources and human capital which cause the small business to fall behind in the race for the adoption of new technology (Welsh, 1981). Prior studies in the emerging markets have shown various interesting developments. For instance, in the emerging markets like India, the management accountants use big data (Varma, 2018a), entrepreneurs use mobile banking (Varma, 2018b) and the stakeholders at large are influenced by social media (Varma, 2018c) such as Twitter. More evidence is found as per Varma and Sahoo (2018) in the emerging markets, wherein they discover that the management accountants use professional networking services for their growth and through Varma, Bhalotia, & Gambhir, (2018) which suggest that the managers in the emerging markets meander through rigid organizational controls to regularly innovate for generating competitive advantage for their firms. Also as per Varma (2019), cooptation mediates the relationship between cultural intelligence and knowledge sharing in the emerging market context. Thus the emerging markets are quite dynamic and open to new technological developments. The emerging markets are unique and have their own characteristics some of which may be similar to the developed markets and some of the characteristics may be totally different from the phenomenon observed in the developed markets. The present study builds on the TOE framework applied by Kuan and Chau (2001) for electronic data interchange adoption (EDI) by small businesses and adds fresh contemporary insights to the same. The larger research question was to probe which specific factors of the TOE framework lead to fintech adoption in the emerging market context.

The perceived direct benefits such as those by operational savings due to internal efficiency would promote fintech adoption (Kuan & Chau, 2001). The small businesses, however, are not expected to judge perceived indirect benefits such as a long term advantage, as has been observed by prior studies such as those by Kuan and Chau (2001). A typical small business is expected to shy away from the governmental pressure in the emerging economies and may also have a lack of concern for the industry pressure. This could be because most peer small businesses may themselves not be pioneers in using technology and hence no overall urgency to adopt by most of the firms. Technical competence (Cragg & King, 1993) was a major factor that hindered the growth of information technology in small businesses. The perceived cost, however, would have a significant bearing on the fintech adoption choices

of business (Kwon & Zmud, 1987). Prior studies have also concluded that complexity negatively affects the adoption of technology (Ahuja, Jain, Sawhney, & Arif, 2016). The above discussion leads to the following hypothesis:

- H1:** Perceived direct benefits have a positive and significant effect on fintech adoption.  
**H2:** Perceived government pressure has a negative and significant effect on fintech adoption.  
**H3:** Perceived indirect benefits does not have a significant effect on fintech adoption.  
**H4:** Perceived industry pressure does not have a significant effect on fintech adoption.  
**H5:** Perceived technical competence does not have a significant effect on fintech adoption.  
**H6:** Perceived cost has a negative and significant effect on fintech adoption.

### 3. Methods

#### 3.1 Data Collection, Research Setting, and Sample

The small businesses have the owner and the top manager as the same person (Kuon & Chau, 2001). As per Igbaria, Zinatelli, Cragg, & Cavaye, (1997), the small business was defined as firms with not more than one hundred employees. This definition has been used for the purpose of the study. The data was collected from the owner / senior managers only and not from any other person, and the final sample was 117 small business respondents from in and around Delhi, India. The National Capital Region (NCR) is home to numerous small businesses engaged in different products and has a cosmopolitan firm ownership pattern. As illustrated by Fowler (2013) an attempt was made in this study to allocate the limited research resources to increase the response rate rather than by focusing on increase the sample size.

A pretested questionnaire (Chin 1998) using a seven-point Likert scale was administered to the respondents. The questionnaire was pre-tested (De Vellis, 2016). The questionnaire was sent to 250 small business firms, and a final usable sample of 117 was obtained which meant a response rate of 46.8 %. One reason for this high response rate was the access to the contact details of the local businesses from their industry association. Generally, the survey response rates are around 20% (Lambert & Harrington, 1990). All the suggestions of Edwards et al., (2002) such as keeping the questionnaire short, sending out reminders, etc were followed. The face validity of the questionnaire was ascertained by taking the inputs from two professors who were subject experts and two small business experts with varied and rich experience. Table 1 has the details of the respondents.

Common method variance concern was handled by assuring the respondents of complete anonymity and secrecy of their identity (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The author also assured the respondents that the data collected would be used only for academic research and not for any other purpose so that the respondents gave honest and genuine responses. The respondents were also pre-informed that there was no right or wrong answer to the questions and that their details will never be shared with another party for any reason whatsoever.

Table 1. Description of Sample,  $n = 117$

Variable	Values	%
Respondent category	Owner / Promoter	68.37%
	Senior Manager	31.623%
Nature of Business	Manufacturing-oriented	76.92%
	Trading oriented	23.07%
Number of Employees	Up to 50 regular employees	83.76%
	More than 50 but up to 100	16.23%

#### 3.2 Statistical Analysis

Anderson and Widener (2006) opined that the use of numeric data and quantitative analysis benefits all form of field research. Thus the analysis of the data was done using a partial least square structured equation modeling (PLS-SEM) method which being a non-parametric method does not take any assumption regarding the distribution of data. Also, the focus of the study was on exploration and prediction for which PLS-SEM is a better choice than co-variance based SEM (CB-SEM). Finally, the sample size was relatively small and thus due all these reasons, PLS-SEM was the appropriate choice. The Smart PLS version 3.2.8 (Ringle, Wende, & Becker, 2015) was used for running the PLS algorithm. PLS-SEM algorithms are being used by scholars around the world for exploring new phenomenon of interest and for theory development purposes.

### *3.3 Measurement Variables*

All the scales for operationalizing the constructs were taken from Kuon and Chau (2001). The items were suitably modified for the context of the study. All the items were asked on a well-labeled 7 point Likert scale (where 1= strongly disagree, and 7 = strongly agree). Kuon and Chau (2001) had adopted the items from Iacovou, Benbasat, & Dexter, (1995), Arunachalam (1995) and Drury & Farooqamond's (1996) works. The items were suitably reworded to make the questions understandable to the target audience of the small business firms.

## **4. Results**

The results of the study were studied by the assessment of first the measurement model and then the structural model (Hair, Black, Babin, Anderson, & Tatham, 2006).

### *4.1 Evaluation of the Measurement Model*

The evaluation parameters for the reliability and validity of the measurement model are given in Table 2. The composite reliability (CR) was more than 0.7 for all the reflective constructs. The value of Cronbach alpha (Nunnally, 1978) was more than 0.7 for all the constructs except for perceived cost and perceived technical competence construct. In prior works in the emerging markets, authors such as Deshpande and Farley (1999) had advocated the acceptance of lower reliabilities than those acceptable for developed markets. The outer loadings of the construct were found to be more than the acceptable threshold and also significant. The item with low loadings was deleted from the final model. The average variance extracted (AVE) was ascertained to measure the convergent validity which was found to be greater than 0.5 except for the perceived indirect benefit construct for which it was close to 0.5. The HTMT ratio ( Henseler, Ringle, & Sarstedt, 2015) was used to find the discriminant validity, and it was well below 0.85 which establishes the discriminant validity (Table 3). The HTMT criteria are stricter than Fornell and Larcker (1981) criteria. Hence the constructs were all well measured, and the overall structural model could be ascertained subsequently.

Table 2. Reliability and Validity

<b>Construct</b>	<b>Items</b>	<b>Factor Loadings</b>	<b>CR</b>	<b>Cronbach Alpha</b>	<b>AVE</b>
<b>Perceived Cost</b>			0.817	0.553	0.691
	PCOST1	0.821			
	PCOST2	0.841			
<b>Fintech</b>	FINTECH	1	1	1	1
<b>Perceived Government Pressure</b>	PGOV1	1	1	1	1
<b>Perceived Direct Benefit</b>			0.787	0.657	0.564
	PDB3	0.498			
	PDB4	0.824			
	PDB5	0.875			
<b>Perceived Indirect Benefit</b>			0.783	0.684	0.480
	PIB1	0.703			
	PIB2	0.620			
	PIB3	0.564			
	PIB4	0.851			
<b>Perceived Industry Pressure</b>			0.867	0.800	0.622
	PIND1	0.712			
	PIND2	0.883			
	PIND3	0.787			
	PIND6	0.763			
<b>Perceived Technical Competence</b>			0.764	0.572	0.636
	PTECH1	0.547			
	PTECH2	0.986			

CR = composite reliability; Ave = average variance extracted.

Table 3. Results of Heterotrait Monotrait Ratio (HTMT) Analysis

HTMT	FINTECH	PERCEIVED COST	PERCEIVED DIRECTED BENEFITS	PERCEIVED GOVT. PRESSURE	PERCEIVED INDIRECT BENEFITS	PERCEIVED INDUSTRY PRESSURE	PERCEIVED TECHNICAL COMPETENCE
<b>FINTECH</b>							
<b>PERCEIVED COST</b>	0.040						
<b>PERCEIVED DIRECTED BENEFITS</b>	0.205	0.307					
<b>PERCEIVED GOVT. PRESSURE</b>	0.188	0.266	0.152				
<b>PERCEIVED INDIRECT BENEFITS</b>	0.187	0.131	0.438	0.068			
<b>PERCEIVED INDUSTRY PRESSURE</b>	0.085	0.144	0.488	0.185	0.457		
<b>PERCEIVED TECHNICAL COMPETENCE</b>	0.145	0.246	0.186	0.186	0.482	0.370	

Table 4. Outer VIF values

Outer VIF	VIF
FINTECH	1.000
PCOST1	1.171
PCOST2	1.171
PDB3	1.432
PDB4	1.807
PDB5	1.317
PGOV1	1.000
PIB1	1.176
PIB2	1.345
PIB3	1.413
PIB4	1.370
PIND1	1.652
PIND2	2.433
PIND3	1.986
PIND6	1.450
PTECH1	1.191
PTECH2	1.191

Table 5. Inner VIF values

Inner VIF	FINTECH	PERCEIVED COST	PERCEIVED DIRECTED BENEFITS	PERCEIVED GOVT. PRESSURE	PERCEIVED INDIRECT BENEFITS	PERCEIVED INDUSTRY PRESSURE	PERCEIVED TECHNICAL COMPETENCE
<b>FINTECH</b>							
PERCEIVED COST	1.067						
PERCEIVED DIRECTED BENEFITS	1.135						
PERCEIVED GOVT. PRESSURE	1.101						
PERCEIVED INDIRECT BENEFITS	1.181						
PERCEIVED INDUSTRY PRESSURE	1.234						
PERCEIVED TECHNICAL COMPETENCE	1.130						

#### 4.2 Evaluation of the Structural Model

Before the structural model could be ascertained, it was necessary to check for collinearity (Sarstedt, Ringle, Smith, Reams & Hair, 2014), and it was found that there is no collinearity in the data (Table 4 and Table 5). Figure 1 shows the bootstrapped path coefficients and their respective T values. The PLS Algorithm rejected a set of path based null hypothesis of no effect, and it converged after iterations. The R square (Table 5) was 0.135, and it was contextually significant with suitable explanatory power. As per Table 6, the construct perceived direct benefits ( $\beta = 0.172^*$ ,  $t = 1.839$ ) which supports hypothesis 1. The effect size is the quantum of the variance in the dependent variable (fintech adoption) that is accounted for by the independent variables. Effect sizes are domain and context specific and often linked to past empirical findings. Lodish et al. (1995) suggested the use of  $p < 0.2$  as a significance criterion in the emerging market context for decisions of managerial relevance moreover, it got a validation from Burgess and Steenkamp (2006) who advocate a more liberal significance criterion for emerging markets (e.g.  $p < 0.2$ ) so as to advance science in the emerging markets. The study also found support for hypothesis 2, 3, 4 and 5. Counter-intuitively, the study did not find support for hypothesis 6 which suggested that the perceived cost have a negative and significant effect on fintech adoption.

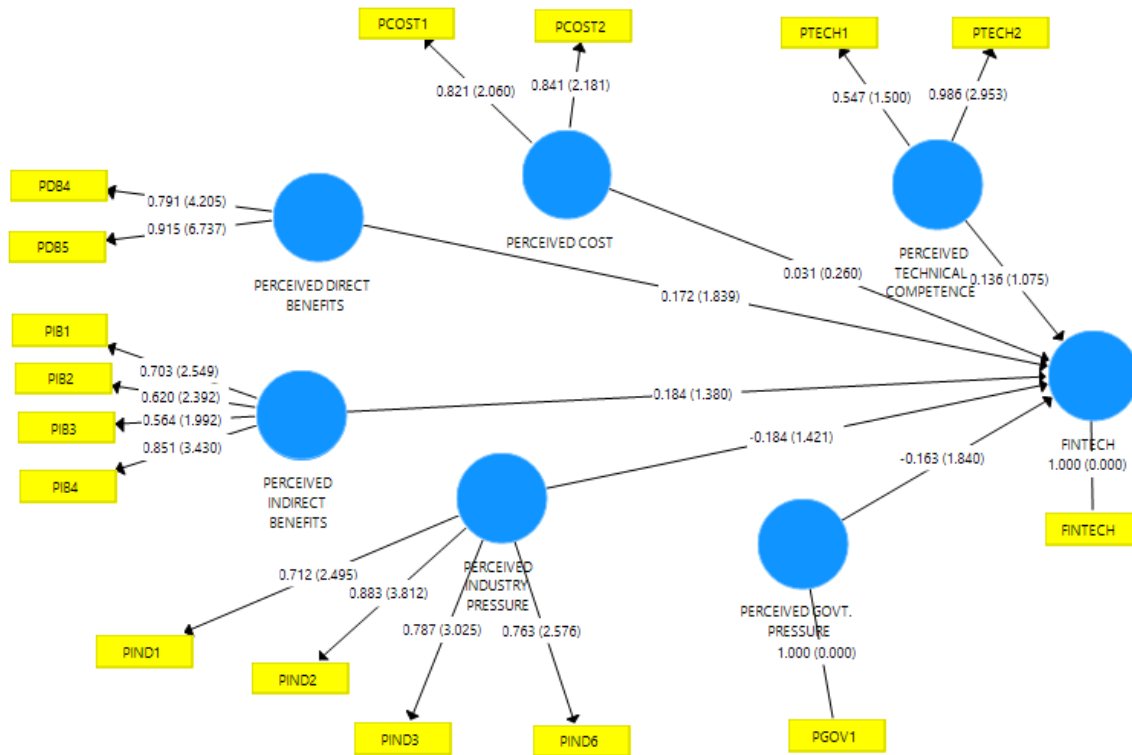


Figure 2. The conceptual model and the bootstrapping results.

Table 6. Significant Individual Path Coefficients in the Structural Model

Structural Path	Path Coefficient	T values	Effect size (f square)	Conclusion
PERCEIVED DIRECT BENEFITS -> FINTECH	0.172*	1.839	0.031	Hypothesis is supported.
PERCEIVED GOVT. PRESSURE -> FINTECH	-0.163*	1.840	0.030	Hypothesis is supported.
PERCEIVED INDIRECT BENEFITS -> FINTECH	0.184 n.s.	1.380	0.031	Hypothesis is supported.
PERCEIVED INDUSTRY PRESSURE -> FINTECH	-0.184 n.s.	1.421	0.034	Hypothesis is supported.
PERCEIVED TECHNICAL COMPETENCE -> FINTECH	0.136 n.s.	1.075	0.020	Hypothesis is supported.
PERCEIVED COST -> FINTECH	0.031 n.s.	0.260	0.001	Hypothesis is not supported.

n.s. not-significant; \*  $|t| \geq 1.65$  at  $p = 0.10$  level; \*\*  $|t| \geq 1.96$  at  $p = 0.05$  level; \*\*\*  $|t| \geq 2.58$  at  $p = 0.01$  level; \*\*\*\*  $|t| \geq 3.29$  at  $p = 0.001$  level.

Table 7. R square

R square	Original (O)	Sample Mean (M)	Standard Deviation (STDEV)	T ((O/STDEV))	Statistics
<b>FINTECH</b>	0.135	0.215	0.058	2.314	

n.s. not-significant; \*  $|t| \geq 1.65$  at  $p = 0.10$  level; \*\*  $|t| \geq 1.96$  at  $p = 0.05$  level; \*\*\*  $|t| \geq 2.58$  at  $p = 0.01$  level; \*\*\*\*  $|t| \geq 3.29$  at  $p = 0.001$  level.



#### 4.3 Test for the Goodness of Fit

The standardized root mean square residual (SRMR) (Henseler & Sarstedt, 2013) measure of the goodness of fit was calculated (Table 8). The value was below the threshold of 0.14, and hence the model was a good fit.

Table 8. SRMR

SRMR	Original Sample (O)
Saturated Model	0.093
Estimated Model	0.093

#### 4.4 Predictive Relevance

The degree of the predictive relevance of the exogenous construct was ascertained with the Q square value which was calculated with the blindfolding procedure (Sarstedt et al., 2014) and the Q square was found to be more than 0 (Table 9) and hence predictive relevance was established for all the constructs (except for perceived technical competence).

Table 9. Construct Cross validated communality

CONSTRUCT COMMUNALITY	CROSSVALIDATED	SSO	SSE	Q <sup>2</sup> (=1-SSE/SSO)
FINTECH		117.000		1.000
PERCEIVED COST		234.000	234.000	0.000
PERCEIVED DIRECT BENEFITS		234.000	184.013	0.214
PERCEIVED GOVT. PRESSURE		117.000		1.000
PERCEIVED INDIRECT BENEFITS		468.000	392.860	0.161
PERCEIVED INDUSTRY PRESSURE		468.000	329.980	0.295
PERCEIVED TECHNICAL COMPETENCE		234.000	278.745	-0.191

#### 4.5 IPMA

The performance of the construct “perceived cost” was the lowest at 64.255 (Table 11). This is theoretically relevant and also leads to the managerial conclusion that there is a maximum scope to do better in this domain. However, the impact of the construct perceived cost is low at 0.031. Hence it is more advisable to focus on the construct “perceived indirect benefits” which has a performance of 78.916 and has the highest effect of 0.184 (Table 10). This can be followed by a focus on “perceived costs” construct as the next priority (Figure 2).

Table 10. Construct Total Effects

Construct Total Effects for [FINTECH]	FINTECH
PERCEIVED COST	0.031
PERCEIVED DIRECT BENEFITS	0.172
PERCEIVED GOVT. PRESSURE	-0.163
PERCEIVED INDIRECT BENEFITS	0.184
PERCEIVED INDUSTRY PRESSURE	-0.184
PERCEIVED TECHNICAL COMPETENCE	0.136

Table 11. Construct Performance

Construct Performances for [FINTECH]	Performances
PERCEIVED COST	64.255
PERCEIVED DIRECT BENEFITS	81.437
PERCEIVED GOVT. PRESSURE	67.949
PERCEIVED INDIRECT BENEFITS	78.916
PERCEIVED INDUSTRY PRESSURE	72.894
PERCEIVED TECHNICAL COMPETENCE	73.164

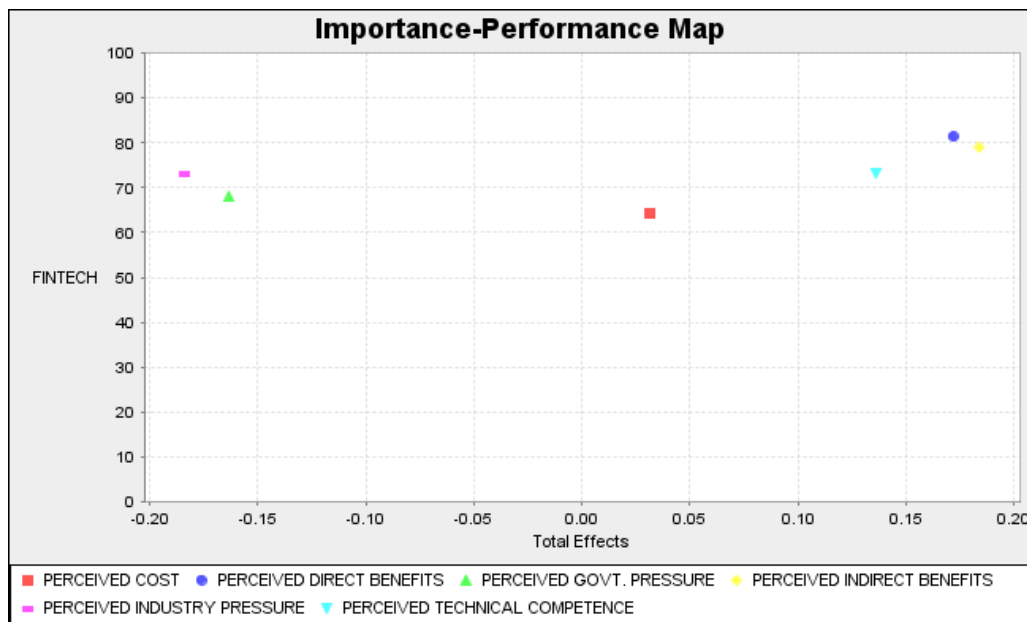


Figure 2. IPMA chart

**5. Discussion**

The study came up with some interesting results which need to be contextually appreciated. The fintech adoption decision by small businesses is primarily based on the benefits of adoption (Kuan & Chau, 2001), which this study also confirms empirically. One possible reason for this line of action by small businesses could be the lower profits due to the use of technology for the business processes. The governmental pressure on the small business to adopt new technology was generally delayed until the time line permitted thereby making the governmental pressure, a non-consequential factor in the fintech adoption process.

Small business do not generally have many similar peers who champion the technology adoption phenomenon, and hence they do not feel the industry pressure to adopt new technology which may have significant ramifications. Finally, some small businesses would choose to do as per the minimum legal requirement of the government which also made legal mandates less effective for technology adoption. Thus the TOE framework has certain themes which are relevant and certain themes which are irrelevant for the fintech adoption choices of small businesses.

The findings of this study are in agreement to those of Kuan and Chau (2001) who found that direct benefits are perceived to be higher by adopter firms and that perceived indirect benefits were not found to be significant. Kuan and Chau (2001) also suggested that rather than the actual cost, it was the perceived cost of adoption that was considered very high. As Jackson (2011) quite correctly opined that while perceptions may or may not be real, the perception is sometimes as powerful as reality because people act on their perceptions.

A limitation of the study is the modest sample of 117 small business and the cluster in and around Delhi, India. The second limitation is that the author could not collect a sample pan India. However, since Delhi represents a large business hub and has both manufacturing firms and trading firms, the sample was largely a representative of the

small business eco system in India as an emerging market. Future studies can be built on a larger sample and also be designed with mixed methods if the resources of the authors so permit. This study will encourage emerging market researchers to investigate further into the nature and characterizes of direct benefits which are likely to affect technology adoption.

The study makes two key contributions. First, it highlights that benefits are the key driving force for fintech adoption and not the costs involved. Second, the other factors of the TOE framework are not significant as perceived by the small business. Thus this study is a precursor to more studies in the process of understanding the larger use of technology by small businesses. These findings also suggest that the noncoercive strategies are relevant (Kuan & Chou, 2001) and may be contextually more impactful than governmental pressure in fintech adoption by small business in emerging markets.

## 6. Conclusion

The application of the TOE framework in this study found that perceived direct benefits of fintech had a significant effect on fintech adoption. Counter-intuitively, the perceived cost of fintech adoption was not a significant factor in fintech adoption. These results have significant managerial and academic relevance for understanding fintech adoption agenda of small businesses in the emerging markets.

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