

Information Technology Investment, Environmental Hostility, and Firm Performance: The Role of Family Ownership in an Emerging Economy

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Abstract

This study examines the influence of family ownership on information technology (IT) investment and its impact on the moderating effect of environmental hostility on the relationship between a firm's IT investment and its performance in an emerging economy context. We theorize that the roles of family ownership can be bi-directional under varying contingencies; thus comprehensive studies on family ownership are much needed. This study aims to address this research gap. A panel dataset of more than 3,000 large Indian publicly traded firms is used to test our theory. The results suggest that on the one hand, family ownership has a negative effect on IT investment, and on the other hand, when the external environment is hostile, family ownership can help to reduce the negative moderating impact of environmental hostility on the IT investment-firm performance relationship. Contributions and implications of our research are discussed.

1. Introduction

The impact of firm ownership on the firm's IT investment decision needs further investigation as family firms continue to contribute about 70% to 90% of the global GDP [22]. IT investment refers to the total IT expenditure of a firm on both hardware and software. Although family-based businesses are prevalent in many countries, Indian family business firms are unique owing to their very high average level of equity ownership and management.

With this background, the motivations of this paper are two-fold. First, we explore the relationship between IT investment and firm performance as well as the role of family ownership as an antecedent of IT investment. Second, we investigate the influence of family ownership in the emerging economy context as the next billion users on the internet are going to be from the emerging economies.

Leaders and chief executive officers (CEOs) have been shaping firms' strategies keeping IT investment and subsequent aligned business models in view [14]. For instance, more than 80% of executives ascribe strategic importance to IT investments, with 86% of CEOs foreseeing a strong connection between digital investments and business objectives. Sixty one percentage of CEOs are shaping their business strategies enabled by digital changes [34]; highlighting IT investment decisions as a central point in investor calls [18]. IT investments, both in the short term and long term perspectives, are quite risky. Firms that are not able to align their digital strategies and business models are losing money; for example, Nike lost twenty percent of its stock market value due to IT failure [4]. Thus, this study asks the first research question: how does family ownership affect IT investment?

From the resource-based view, IT investment is one type of resource used to achieve competitive advantage and improve firm performance. Studies on the direct effect of IT investment on firm performance suggest a positive relationship [42]. Other factors such as IS strategic alignment can influence the positive direct effect of IT investment and firm performance. Additionally, firms should develop dynamic capabilities to respond to the shifting environment [1, 47]. Scholars have revealed the negative influence of turbulence in the form of environmental complexity, environmental dynamism [28], environmental hostility [7], environmental volatility [46], environmental uncertainty [33], and volatility [43] on the relationship between digitally enabled strategies and firm performance.

In the emerging economy context, it is important to empirically examine the effect of external environmental characteristics on the relationship between IT investment and firm performance. This is the second research question of this study: how does family ownership affect the moderating effect of environmental hostility on the linkage between IT investment and firm performance?

Prior research reveals that family ownership is negatively related to R&D investments [8]. However, what is the role of family ownership on the connection between IT investment and firm performance in a hostile external environment. In particular, this study also aims to explore the role of family ownership in such a context. To test our theory, we use a large panel dataset of more than 3,000 Indian firms from 2006 to 2018 for the empirical investigation. We examine both direct and interaction effects in multiple models by using random effect OLS method. We then applied the instrument variable method to address the potential endogeneity issues for models with IT investment as an independent variable.

The results of our study suggest a mixed effect of family ownership. On the one hand, it has a direct negative effect on IT investment. On the other hand, we find a mitigating role of family ownership on the negative moderating effect of a hostile environment on the IT investment and firm performance relationship. Research implications and contributions are discussed.

2. Theoretical Framework

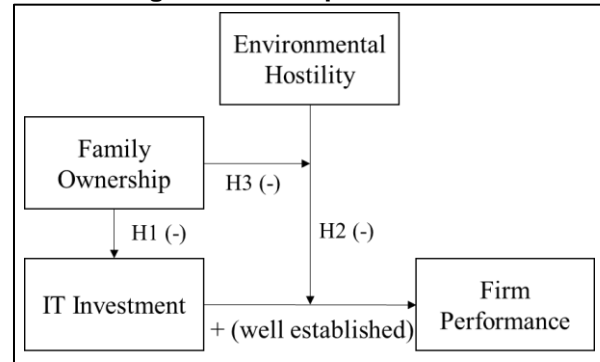
Management literature has witnessed a recent focus on microfoundations-based theories. Such theories comprise locating the cause of a phenomenon at a level lower than the phenomenon itself [17]. As such, microfoundations-based theories include all multilevel theorizing [15] and offer alternatives to macrolevel theories [16]. Microfoundations-based research explores how heterogeneity amongst individuals in the top management drives strategic decisions and outcomes [2]. Prior research in IS also focusses on microfoundations-level heterogeneity to explain the antecedents of IT investment. The nature of firm ownership (i.e., owner managers) is a key source of heterogeneity amongst top managers.

To achieve long-term firm performance, firms should be able to respond to the changing external environment. Dynamic capability literature suggests that external environment traits such as environmental hostility have an effect on the relationship between IT and firm performance [7]. Recent IS literature also emphasizes the study of environmental factors on IT related decision made by managers and organizations [24, 28, 42, 45].

Family ownership contributes to the success of family firms. But prior research is also critical regarding the negative effect of family ownership. How to strategically leverage the benefits of family ownership for firm performance is thus an essential topic of enquiry for management studies. Integrating the theoret-

ical perspectives discussed above, we formulate a conceptual model (See Figure 1) to explore family ownership as an antecedent to IT investment and its role in the firm performance implications of IT investment under conditions of environmental hostility.

Figure 1. Conceptual Model



2.1. Family Ownership and IT Investment

The extent of family ownership is a source of heterogeneity [9], which influences the firms' strategies [11]. We theorize that higher the level of family ownership, greater the family owners' *desire* to influence strategic decisions, i.e., a firm's IT investment.

High family ownership discourages or negatively influences the adoption of a risky strategy such as high investment in IT because the family owners often bear the overall burden of risky investments and its detrimental impact on their reputation (in case of failure of risky investments). Family ownership deters risky investments primarily because families are often motivated by not just by economic factors [50], but by broader socio-economic factors such as preservation of the long term societal reputation [20, 21].

Family owners are particularly reluctant to invest in IT because of their preference for information asymmetry. Family owners prefer to operate by keeping information compartmentalized within silos. This minimizes the risk of proprietary information falling into the hands of competitors and thus harming the socioemotional wealth of the family. Furthermore, the socioemotional wealth of the family is derived from not only the reputation of the firm but also by developing relational capital by utilizing the influence of the firm (e.g., by conferring favors). The presence of IT-driven business processes enhances transparency and thereby constrains family owners from leveraging the influence of the firm for their benefit.

Further, family owners' unwillingness to pursue risky strategies depends on their ownership stake [19] such that higher the stake, the lower the willingness to

undertake risky investment in IT and consequently forgoing some financially lucrative entrepreneurial opportunities. In summary, family owners are not only concerned with the financial consequences of their investments, but they also tend to prioritize the objective of preservation of socioemotional wealth as a criterion for decision-making [3]. Thus, family owners are less likely to invest in IT.

H1: Family Ownership is negatively associated with IT investment.

2.2. IT Investment, Hostile Environment, and Firm Performance

The resource-based view (RBV) of the firm is used to explain the relationship between IT and competitive advantage [5, 35]. RBV argues that firms possess resources such as heterogeneous strategic assets to achieve competitive advantage and long-term performance [49]. Digital strategy is one type of resource, and the decision of shared resources and nonshared resources also affects a firm's competitive advantage [31, 37]. In the IS domain, IT investment is considered as a key resource for the firm to achieve competitive advantage and improve profitability and service management performance through better decision making [6, 36, 38-40].

Competitive advantage is different from long-term performance. There are four types of competitive advantages: temporal competitive advantage, sustained competitive advantage, average competitive advantage, and disadvantage [35, 49]. Because of the shifting environment, dynamic capabilities are suggested to be critical for a firm's long-term performance [1, 47]. Environmental volatility, environmental hostility, environmental complexity, and other such factors are proposed as key moderators [7, 33, 43, 46].

In an emerging economy context, environmental hostility is a key factor that may adversely affect all dimensions of firm performance [7]. Factors such as scarcity of supply and tough competition were also considered. Recent IS researchers have alternatively theorized the role of environmental hostility [42]. Environmental munificence is considered as the extent to which a firm's environment supports sustained growth and a less munificent environment is conceptualized as a hostile environment.

To sum up, when the environment is hostile, firms may lack the ability to leverage IT investment for better firm performance.

H2: Environment hostility has a negative moderating effect on the relationship between IT investment and firm performance.

2.3. The Mitigating Role of Family Ownership in Hostile Environments

In a hostile environment, tough competition and scarcity of supplies negatively affects firm performance [7]. Firms that maintain a close connection between business and IT executives could better leverage resources they have in order to cope with environmental hostility. Family firms that have high family ownership could easily take advantage of the family connection. Such inherent strategic business-IT alignment allows firms that have high family ownership to better leverage IT investment [42] by enabling them to make better decisions under duress [12, 23, 25]. In this way, family ownership can mitigate the negative moderating effect of environment hostility.

Also, when the family ownership is high, the family firm managers will have more flexibility and independence to swiftly adjust their strategies to avoid the ineffectiveness of IT investment under hostile environment [44]. As a result, family ownership could help to reduce the negative moderating effect of environmental hostility on the relationship between IT investment and firm performance. Even in the hostile environment, firms with high family ownership can especially leverage IT investment well to create financial value [13].

H3: Higher family ownership reduces the negative moderating effect of environmental hostility on the linkage between IT investment and firm performance.

3. Methodology

A large proprietary database on the financial performance of Indian companies, which has been used in prior research [30], is analyzed to test our theory. We use India as our context due to two reasons. First, India is one of the most important emerging economies in the world. Second, there are a large number of family firms in India - in fact, India has the world's second largest number of family-owned firms. As a result, a sample of Indian firms will offer a better understanding of the IT management practices in family firms. Our dataset includes all companies listed as publicly traded firms. The panel dataset we laboriously collected covers firm-level IT financial, ownership, and identity data from 2006 to 2018 of more than 3,000 firms.

Table 1 presents the variables used in this study. We measure IT investment as the dependent variable. Besides the total IT investment, we also calculate the separate IT investment on hardware and software. We use firm revenue to measure firm performance. The family ownership is measured by the proportion of shares held by Indian individuals and undivided Hindu

families as promoters [41]. Previous research applied the concept of environmental munificence, which “refers to the extent to which a firm’s environment supports sustained growth” in research on IT investment and firm performance [42]. This study measures the environmental hostility as the reciprocal of environmental munificence in line with previous literature [6].

We also consider several control variables. Firm age is the number of years of operation since the firm’s incorporation year. Firm size is calculated by the log value of a firm’s sales. We also include a firm’s liability and expenditure on R&D. We expect that more spending on R&D will improve a firm’s ability to leverage IT investment for better firm performance. Market share is the share of a firm in a certain industry based on the frequency of NIC (National Indian Classification) code. We also control the year dummies and industries dummies. Based on a firm’s industry, we categorized eight industry groups: agriculture, commerce, energy, finance, IT, manufacturing, service, and transport.

Table 2 shows the descriptive statistics of these

Table 1. Description of Key Variables

Variable	Description and Operationalization	Refs.
IT Investment (ITInvest)	A firm’s total IT expenditures on software development charges, IT-enabled service charges, telephone, web-hosting, satellite, internet, computer and IT systems, and software. (log)	[32]
Hardware Investment (HWInvest)	A firm’s IT expenditures on telephone, web-hosting, and satellite. (log)	[32]
Revenue	A firm’s total income. (log)	[32]
Family Ownership (FamOwn)	The proportion of shares held by Indian individuals and undivided Hindu families as promoters (0-100%).	[41]
Environmental Hostility (EnvHos)	Measured as the reciprocal of environmental munificence (refers to the extent to which a firm’s environment supports sustained growth).	[42]
Firm Age	A number of years of operation since the firm’s incorporation year.	[48]
Size	A firm’s sales. (log)	[48]
Liability (Liab)	A firm’s liability. (log)	[48]
RnD	A firm’s R&D expenditure. (log)	[10]
MarketShare	The share of a firm in a certain industry based on the frequency of NIC (National Indian Classification) code.	[27]
Year Dummies	The year 2006-2018	[42]
Industry Dummies	Coded based on industry groups: agriculture, commerce, energy, finance, IT, manufacturing, service, transport.	[42]

variables. In our sample, the mean value of family ownership is about 23%, indicating the importance to study family ownership.

For the baseline model estimation, we use a random effect ordinary least square (OLS) estimation for panel data, specified as:

$$y_{it} = \alpha_i + \mathbf{X}'_{it}\boldsymbol{\beta} + \varepsilon_{it}$$

Where y is the dependent variable, \mathbf{x} is a vector of independent variables, i and t are indices for individuals (firms) and time (year). $\boldsymbol{\beta}$ is a vector of parameters, α_i is the individual-specific effect that varies over i , and ε_{it} is the error term. The reason we use random effect OLS model is that family ownership does not change frequently and if we use the fixed effect model, this variable will be omitted. In other words, random effect models could address the constant unobserved heterogeneity issues.

First, for the direct effect of family ownership on IT investment, the estimation model is specified as:

$$\ln(ITInvest_{it}) = \alpha_i + \beta FamOwn_{it} + \gamma Controls_{it} + \varepsilon_{it} \quad (1)$$

To test the two-way and three-way moderating effect of environmental hostility and family ownership, we use the following empirical specification to examine hypotheses H2 and H3:

$$\begin{aligned} \ln(Revenue_{it}) = & \alpha_i + \beta_1 FamOwn_{it} + \beta_2 ITInvest_{it} + \beta_3 \\ & EnvHos_{it} + \beta_4 ITInvest_{it} \times EnvHos_{it} + \beta_5 ITInvest_{it} \times EnvHos_{it} \times FamOwn_{it} + \gamma Controls_{it} + \varepsilon_{it} \quad (2) \end{aligned}$$

4. Results

We present our results in Table 3. Referring to column 1 in Table 3, we find a significant and negative direct effect of family ownership on IT investment ($\beta = -0.004, p < 0.01$). This result suggests when the family ownership of a firm increases one percent, the IT investment of that firm will reduce 0.4%. Thus H1 is supported. Table 3 column 2 confirms the positive relationship between IT investment and Firm Performance in this study context ($\beta = 0.087, p < 0.01$). Column 3 of Table 3 reports the result of the two-way interaction of IT investment and Environmental Hostility on revenue. It indicates the negative moderating effect of the hostile environment on the relationship between IT investment and revenue ($\beta = -0.030, p < 0.01$). Therefore, H2 is supported. The result in column 4 of Table 3 presents the significant and negative ($\beta = -0.029, p < 0.01$) three-way interaction of IT investment, environmental hostility, and family ownership when the dependent variable is revenue. This finding supports H3 and reveals that family ownership mitigates the negative effect of environmental hostility on the relationship between IT investment and firm performance.

Regarding the control variables, we also have some interesting findings. For example, the significant and positive relationships between age and IT investment as well as revenue indicate that the old firms tend to investment more on IT and gain more revenues. This may explain the long-term success of these firms.

Table 2. Descriptive Statistics

	ITInvest	HWInvest	Revenue	FamOwn	EnvHos	Firm Age	Size	Liab	RnD	MarketShare
Observations	14,620	11,202	17,651	18,026	18,014	18,014	18,026	18,026	18,026	18,014
Mean	-2.58	-3.32	2.40	23.31	8.46	35.57	2.68	3.439	0.139	0.028
Std.Dev.	2.39	2.11	3.11	23.03	2.15	19.49	2.23	2.200	0.514	0.063
Minimum	-6.50	-6.50	-6.50	0.00	-6.50	1.00	0.00	-0.779	0	0.001
Maximum	7.30	4.89	11.40	100.00	13.69	155.00	11.32	13.18	5.862	1.00

Table 3. Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>H1</i>	<i>Confirmation</i>	<i>H2</i>	<i>H3</i>	<i>H2</i>	<i>H3</i>
	<i>Direct Effects</i>		<i>Two-Way</i>	<i>Three-Way</i>	<i>Two-Way</i>	<i>Three-Way</i>
	<i>RE OLS</i>		<i>RE OLS</i>	<i>RE OLS</i>	<i>Xtivreg</i>	<i>Xtivreg</i>
VARIABLES	ITInvest	Revenue	Revenue	Revenue	Revenue	Revenue
FamOwn	-0.004*** (0.001)			0.002** (0.001)		-0.002* (0.001)
ITInvest		0.087*** (0.010)	0.346*** (0.037)	0.348*** (0.037)	0.549*** (0.028)	0.551*** (0.028)
EnvHos			-0.145*** (0.016)	-0.148*** (0.016)	-0.130*** (0.014)	-0.142*** (0.014)
ITInvest×EnvHos			-0.030*** (0.004)	-0.029*** (0.004)	-0.028*** (0.003)	-0.024*** (0.003)
ITInvest×EnvHos×FamOwn				-0.00006* (0.00003)		-0.0002*** (0.00003)
Age	0.009*** (0.002)	0.002 (0.001)	0.002** (0.001)	0.003*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
Size	0.607*** (0.021)	0.783*** (0.023)	0.791*** (0.023)	0.787*** (0.023)	0.676*** (0.011)	0.674*** (0.011)
Liab	0.129*** (0.034)	0.504*** (0.024)	0.507*** (0.023)	0.521*** (0.024)	0.407*** (0.014)	0.419*** (0.014)
RnD	0.480*** (0.055)	-0.270*** (0.023)	-0.224*** (0.021)	-0.224*** (0.021)	-0.335*** (0.029)	-0.335*** (0.029)
MarketShare	0.567** (0.252)	0.281* (0.166)	-0.256 (0.209)	-0.270 (0.204)	-0.147 (0.261)	-0.164 (0.258)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-5.711*** (0.182)	-0.783*** (0.106)	0.458** (0.182)	0.341* (0.186)	1.614*** (0.222)	1.654*** (0.226)
Observations	14,611	14,519	14,518	14,518	11,118	11,118
Number of firms	3,926	3,905	3,904	3,904	3,136	3,136
χ^2	3397.02	18866.77	21640.37	22203.3	29642.8	30320.05

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; RE OLS refers to random effect ordinary least squares.

Similarly, we find a similar influence of firm size. Interestingly, we find that leverage also has significantly positive impact on IT investment and revenue. But this is understandable since firms with higher liability are bold to invest and create revenue. Unlike our initial assumption that more R&D investment will bring more revenue, we find a significant and negative relationship between R&D and revenue. One possible reason may be that R&D investment reduces short-term revenue and our model did not reflect the long-term effect of R&D investment on value creation.

So far, IT investment is considered as exogenous in the economic model and to account for the potential endogeneity of IT investment, we follow the methods discussed in previous literature [32]. An instrumental variable approach is used to endogenize IT investment and to use two-stage least-squares (2SLS) for panel

data estimation. Hardware investment is used as instrument variable for IT investment. The rationale is that there is a high correlation between hardware investment and overall IT investment (the correlation is 0.931), but hardware investment does not influence revenue. This consideration meets the requirement of a good instrument variable, that should be highly correlated with the endogenous independent variable but has no significant correlation with the error term in the estimation model. Furthermore, we should recalculate the interaction terms to avoid potential bias due to the endogenous independent variable. More specifically, we multiplied the HWInvest and EnvHos as the two-way interaction and multiplied the HWInvest, EnvHos, and FamOwn for the new three-way interaction.

Column 5 and 6 of Table 3 present the estimation results with instrument variable (i.e., hardware investment) of IT investment.

The instrumented two-way interaction between IT investment and environmental hostility still has a significant and negative impact ($\beta = -0.028$, $p < 0.01$) on revenue. This result is consistent with the RE OLS estimation result shown in column 2 and supports H2.

Similarly, we find the largely consistent result in column 6 for the three-way interaction effect. The result again is significant and negative ($\beta = -0.024$, $p < 0.01$). This result is corresponding to the findings in column 4, and together, they support H3.

5. Discussion

Considering the importance of family firms for our society and their contributions to the emerging economy, it's essential to have a better understanding of the role of family ownership. This study aims to explore the direct effect of family ownership on firms' IT investment, as well as its interaction effect, considering the moderating effect of environment hostility on the relationship between IT investment and firm performance. Our research model takes a big step forward by suggesting the dual effects of family ownership in the IT investment context. With a large panel dataset of more than 3,000 Indian firms from 2006-2018, we comprehensively test our theory. We find a negative impact of family ownership on a firm's IT investment. The findings suggest that every percent increase in family ownership will lead a 0.4% decrease in IT investment in a firm. However, family ownership can play a mitigation role in reducing the negative moderating effect of a hostile environment. In other words, family ownership has bi-directional effects.

The findings suggest that higher family ownership may hinder IT investment. We explain this finding from the socioemotional wealth perspective. The preservation of socioemotional wealth is the primary strategy of family firms, which is reflected in their decisions [3]. Compared to financial performance, family firm managers are more value-oriented and try to establish personal pride and self-identification for the firm. In this sense, IT systems that increase information symmetry are against the desires of owners of family firms. However, IT investment is critical for modern companies to be successful. Firms that have high family ownership should find a solution to address the negative impacts due to high family ownership. More education of family members or hiring professional managers could be some such solutions.

On the other hand, we find that family ownership also plays a mitigating role in reducing the negative effects of the hostile environment on the linkage of IT

investment and firm performance. This is because of the inherent family connection of family firm managers and the independence and power of family owners. These findings suggest that firms can gain benefits if they match the family ownership characteristics with specific task requirements.

This study contributes to both theory and practice. It provides several theoretical implications. First, we incorporate ownership and management control as two sources of microfoundations-level heterogeneity among firms to explore the reason for IT investment. Thus, we contribute to microfoundations-based management research. Next, we discuss the ownership from socio-emotional wealth perspective and explain why there is a difference between strategic behaviors among family-owned firms and non-family firms. This perspective provides new avenues for researchers to understand the noneconomic motivation for the strategic behavior of family firms. Furthermore, we explore the negative effect of environmental hostility and the corresponding mitigating role of family ownership. It is important to study the relationship between IT investment and firm performance, especially in the emerging economy context; therefore, this study contributes to the line of research on IT-driven business strategies. India especially has become a rich context for research in IS and other fields of management [26-30]; this study thus contributes to our growing collective understand of management practice in this important economy.

This study also has practical implications. First, it shows the different impacts of family ownership on IT investment and the negative effect of a hostile environment. In the modern competitive business environment, it is critical for firms to secure IT investment and maintain a competitive advantage. Therefore, if possible, a firm should find solutions by enhancing family members education level to mitigate the negative effects of family ownership. Second, the mitigation role of family ownership found in our study enables firms to cope the environmental changes.

There are some limitations to this study. For example, this study was in the context of India, considering India is an important representative of emerging economies. Replication research is necessary to generalize our findings and to have a better understanding of the influence of family ownership. Next, we applied the RBV perspective in our theory to discuss the role of hostile environment. But we did not include organizational capabilities such as agility or flexibility in the current study. Finally, there are many other factors such as IT training and IT use that can influence the hypothesized relationship in the current research. These factors could be examined in future research.

To conclude, we used a large panel dataset of Indian firms to study the different roles of family ownership. The main findings are, on one hand, family ownership has negative impacts on IT investment, but on the other hand, higher family ownership can reduce the negative impact of the hostile environment.

6. References

- [1] Agarwal, R., and Selen, W. Dynamic capability building in service value networks for achieving service innovation. *Decision sciences*, 40, 3 (2009), 431-475.
- [2] Barney, J., and Felin, T. What are microfoundations? *Academy of Management Perspectives*, 27, 2 (2013), 138-155.
- [3] Berrone, P., Cruz, C., and Gomez-Mejia, L.R. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family Business Review*, 25, 3 (2012), 258-279.
- [4] Bharadwaj, A., Keil, M., and Mähring, M. Effects of information technology failures on the market value of firms. *Journal of Strategic Information Systems*, 18, 2 (2009), 66-79.
- [5] Bharadwaj, A.S. A resource-based perspective on information technology capability and firm performance: an empirical investigation. *MIS Quarterly* (2000), 169-196.
- [6] Bhatt, G.D., and Grover, V. Types of information technology capabilities and their role in competitive advantage: An empirical study. *Journal of management information systems*, 22, 2 (2005), 253-277.
- [7] Chen, Y., Wang, Y., Nevo, S., Jin, J., Wang, L., and Chow, W.S. IT capability and organizational performance: the roles of business process agility and environmental factors. *European Journal of Information Systems*, 23, 3 (2014), 326-342.
- [8] Choi, Y.R., Zahra, S.A., Yoshikawa, T., and Han, B.H. Family ownership and R&D investment: The role of growth opportunities and business group membership. *Journal of Business Research*, 68, 5 (2015), 1053-1061.
- [9] Chrisman, J.J., Chua, J.H., and Sharma, P. Trends and directions in the development of a strategic management theory of the family firm. *Entrepreneurship theory and practice*, 29, 5 (2005), 555-575.
- [10] Chrisman, J.J., Fang, H., Kotlar, J., and De Massis, A. A note on family influence and the adoption of discontinuous technologies in family firms. *Journal of Product Innovation Management*, 32, 3 (2015), 384-388.
- [11] Chua, J.H., Chrisman, J.J., and Sharma, P. Defining the family business by behavior. *Entrepreneurship theory and practice*, 23, 4 (1999), 19-39.
- [12] Dong, J.Q., He, J., and Karhade, P.P. The Penrose Effect In Resource Investment For Innovation: Evidence From Information Technology And Human Capital. *ECIS*, 2013, 1-12.
- [13] Dyer Jr, W.G., and Panicheva Mortensen, S. Entrepreneurship and family business in a hostile environment: The case of Lithuania. *Family Business Review*, 18, 3 (2005), 247-258.
- [14] Favaro, K. Don't Draft a Digital Strategy Just Because Everyone Else Is. *Harvard Business Review*, Bronxville, New York: Harvard Business Press, 2016.
- [15] Felin, T., Foss, N.J., Heimeriks, K.H., and Madsen, T.L. Microfoundations of routines and capabilities: Individuals, processes, and structure. *Journal of Management Studies*, 49, 8 (2012), 1351-1374.
- [16] Foss, N.J. Invited editorial: Why micro-foundations for resource-based theory are needed and what they may look like. *Journal of Management*, 37, 5 (2011), 1413-1428.
- [17] Foss, N.J., and Pedersen, T. Microfoundations in strategy research. *Strategic Management Journal*, 37, 13 (2016), E22-E34.
- [18] Gartner. Gartner CEO and Senior Business Executive Survey Shows that Growth Dominates Key Business Priorities in 2014. 2016.
- [19] George, G., Wiklund, J., and Zahra, S.A. Ownership and the internationalization of small firms. *Journal of Management*, 31, 2 (2005), 210-233.
- [20] Gomez-Mejia, L.R., Cruz, C., Berrone, P., and De Castro, J. The bind that ties: Socioemotional wealth preservation in family firms. *Academy of Management Annals*, 5, 1 (2011), 653-707.
- [21] Gomez-Mejia, L.R., Haynes, K.T., Núñez-Nickel, M., Jacobson, K.J., and Moyano-Fuentes, J. Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative science quarterly*, 52, 1 (2007), 106-137.
- [22] Hegde, S.P., Seth, R., and Ramanna, V. Are Shareholders of Family Firms Really Better Off? (2016).
- [23] Karhade, P., and Shaw, M. Rejection and selection decisions in the IT portfolio composition process: An enterprise risk management based perspective. *Americas Conference on Information Systems*, 2007, 221.

- [24] Karhade, P., Shaw, M.J., and Subramanyam, R. Patterns in Information Systems Portfolio Prioritization: Evidence from Decision Tree Induction. *MIS Quarterly*, 39, 2 (2015), 413-433.
- [25] Karhade, P.P., Shaw, M.J., and Subramanyam, R. Evaluation of decision rules used for IT portfolio management: an inductive approach. *Americas Conference on Information Systems*, 2009, 154.
- [26] Kathuria, A., and Karhade, P.P. You Are Not You When You Are Hungry: Machine Learning Investigation of Impact of Ratings on Ratee Decision Making. *Workshop on E-Business: Springer*, 2018, 151-161.
- [27] Kathuria, A., Mann, A., Khuntia, J., Saldanha, T.J., and Kauffman, R.J. A Strategic Value Appropriation Path for Cloud Computing. *Journal of management information systems*, 35, 3 (2018), 740-775.
- [28] Kathuria, A., Saldanha, T.J.V., Khuntia, J., and Andrade Rojas, M.G. How Information Management Capability Affects Innovation Capability and Firm Performance under Turbulence: Evidence from India. *Proceedings of the Thirty Seventh International Conference on Information Systems*, Dublin, 2016.
- [29] Kathuria, R., Kathuria, N.N., and Kathuria, A. Mutually supportive or trade-offs: An analysis of competitive priorities in the emerging economy of India. *The Journal of High Technology Management Research*, 29, 2 (2018), 227-236.
- [30] Khuntia, J., Kathuria, A., Saldanha, T.J., and Konsynski, B.R. Benefits of IT-Enabled Flexibilities for Foreign versus Local Firms in Emerging Economies. *Journal of management information systems*, 36, 3 (2019), 855-892.
- [31] Lavie, D. The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of management review*, 31, 3 (2006), 638-658.
- [32] Lee, D., and Mithas, S. IT investments, alignment and firm performance: evidence from an emerging economy. (2014).
- [33] Li, S., and Lin, B. Accessing information sharing and information quality in supply chain management. *Decision support systems*, 42, 3 (2006), 1641-1656.
- [34] Mark, R. The 2014 Gartner CEO and Senior Executive Survey: 'Risk-On' Attitudes Will Accelerate Digital Business. Gartner, Inc., 2014.
- [35] Mata, F.J., Fuerst, W.L., and Barney, J.B. Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly* (1995), 487-505.
- [36] Mithas, S., Tafti, A., Bardhan, I., and Goh, J.M. Information technology and firm profitability: mechanisms and empirical evidence. *MIS Quarterly* (2012), 205-224.
- [37] Oestreicher-Singer, G., and Zalmanson, L. Content or community? A digital business strategy for content providers in the social age. (2012).
- [38] Ramakrishnan, T., Khuntia, J., Kathuria, A., and Saldanha, T. Business Intelligence Capabilities and Effectiveness: An Integrative Model. *2016 49th Hawaii International Conference on System Sciences (HICSS)*, 2016, 5022-5031.
- [39] Ramakrishnan, T., Khuntia, J., Kathuria, A., and Saldanha, T.J.V. Business Intelligence Capabilities. In, Deokar, A.V., Gupta, A., Iyer, L.S., and Jones, M.C., (eds.), *Analytics and Data Science: Advances in Research and Pedagogy*, Cham: Springer International Publishing, 2018, 15-27.
- [40] Ray, G., Muhanna, W.A., and Barney, J.B. Information technology and the performance of the customer service process: A resource-based analysis. *MIS Quarterly* (2005), 625-652.
- [41] Ray, S., Mondal, A., and Ramachandran, K. How does family involvement affect a firm's internationalization? An investigation of Indian family firms. *Global Strategy Journal*, 8, 1 (2018), 73-105.
- [42] Sabherwal, R., Sabherwal, S., Havakhor, T., and Steelman, Z. How Does Strategic Alignment Affect Firm Performance? The Roles of Information Technology Investment and Environmental Uncertainty. *MIS Quarterly*, 43, 2 (2019), 453-474.
- [43] Saldanha, T.J., Melville, N.P., Ramirez, R., and Richardson, V.J. Information systems for collaborating versus transacting: Impact on manufacturing plant performance in the presence of demand volatility. *Journal of operations Management*, 31, 6 (2013), 313-329.
- [44] Setia-Atmaja, L., Haman, J., and Tanewski, G. The role of board independence in mitigating agency problem II in Australian family firms. *The British Accounting Review*, 43, 3 (2011), 230-246.
- [45] Susarla, A., Subramanyam, R., and Karhade, P. Contractual Provisions to Mitigate Holdup: Evidence from Information Technology Outsourcing. *Information Systems Research*, 21, 1 (2010), 37-55.
- [46] Tallon, P.P., and Pinsonneault, A. Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model. *MIS Quarterly* (2011), 463-486.

[47] Teece, D., and Pisano, G. The dynamic capabilities of firms: an introduction. *Industrial and corporate change*, 3, 3 (1994), 537-556.

[48] Teo, T.S., Nishant, R., and Goh, M. Do Shareholders Value Green Information Technology Announcements? *Journal of the Association for Information Systems*, 18, 8 (2017), 542.

[49] Wade, M., and Hulland, J. The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly*, 28, 1 (2004), 107-142.

[50] Wright, P., Ferris, S.P., Sarin, A., and Awasthi, V. Impact of corporate insider, blockholder, and institutional equity ownership on firm risk taking. *Academy of Management Journal*, 39, 2 (1996), 441-458.