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## Competition, Credit Constraints, and Organizational Innovation Behaviour: Exploring the Behavioural Drivers of Manufacturing Firm Performance

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### ABSTRACT

The purpose of this study is to investigate the complex link that exists between market competition, financial constraints, and innovative behavior inside manufacturing businesses. In this study, the behavioral theory of the firm and resource-based perspectives are utilized to investigate the dynamic relationship between financial restrictions and the level of competitive intensity that influences the strategic decisions that companies make about innovation. The research makes use of firm-level data from the manufacturing industry and use panel econometric methods in order to evaluate the moderating influence of financial access on the connection between competitive pressure and innovation outcomes. The findings of the empirical research reveal that increasing competition is beneficial to innovation incentives; however, the presence of funding limits significantly hinders the ability of businesses to transform these incentives into tangible innovation activities. In addition, businesses that have management structures that are adaptable and cultures that foster learning are better equipped to deal with financial issues, which enables them to transform competitive strain into innovative ways of improving performance. The findings demonstrate how crucial it is to take into account the availability of financial resources, the adaptability of management, and the dynamics of the market in order to foster long-term creative behavior. In order to strengthen industrial competitiveness and maintain long-term productivity, policy implications highlight the importance of specialized financial instruments, financing mechanisms that facilitate innovation, and regulatory frameworks that are competitive.

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## 1. INTRODUCTION

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In today's fast-changing industrial world, innovation is the key to long-term success and competitiveness for manufacturing companies. The speed of technical progress, the worldwide spread of industrial networks, and the shift to digital have all changed the way businesses compete. As marketplaces become more dynamic, businesses have to come up with new ideas not just to keep their market share but also to stay in business for a long time. But the process of coming up with new ideas is always risky and takes a lot of resources, so companies need to be able to change their plans and be flexible with their money. In many developing and emerging nations, where financial markets are still not perfect and institutional infrastructures are poor, businesses have a lot of trouble getting financing, which may make it hard for them to invest in new ideas. This creates a conflict between the need to come up with new ideas because of competition and the fact that not everyone can get to money.

The connections between competition and innovation have been spoken about a lot in the fields of industrial organization and innovation economics, but the data is still not clear. Some research endorse the Schumpeterian theory, indicating that monopolistic power enhances innovation via accumulated resources, but others highlight the "escape competition effect," where rivalry compels businesses to innovate for survival. However, only a limited number of research have investigated the role of credit limitations in mediating or moderating this connection, especially from behavioral and organizational viewpoints. Furthermore, current research predominantly concentrates on advanced economies, frequently neglecting the unique structural characteristics of manufacturing businesses functioning in fiscally restricted and institutionally varied environments. The behavioral reactions of organizations under financial distress and competitive pressure—specifically, how managers assess risks, distribute resources, and modify organizational routines—are little investigated.

This study employs the behavioral theory of the business and the resource-based view (RBV) to elucidate how manufacturing firms manage the combined difficulties of competitiveness and restricted finance availability. From a behavioral perspective, companies' decisions on innovation are not completely logical; they are influenced by limited rationality, established routines, and the goals of managers. When credit is hard to get, managers may put short-term survival ahead of long-term innovation, which can lead to methods that are flexible but maybe too safe. On the other hand, when competition gets worse, companies with dynamic skills may be able to respond proactively by employing innovation as a strategic tool to get away from the strain of competition. The interplay between both forces—competition as an external catalyst and finance as an internal facilitator—shapes the firm's innovation behavior and eventually its performance trajectory.

The main goal of this research is to look at how market competition and loan limits together affect how organizations in the manufacturing sector innovate. It specifically aims to ascertain whether access to financing enhances or diminishes the beneficial impacts of competition on innovation results. The research uses firm-level data and panel econometric approaches to look at how changes in the degree of competition and the ease of getting money affect the chances that a company will come up with new products, processes, or ways of doing things. It also looks at the behavioral factors that allow companies to get around financial problems and turn competitive pressure into creative performance by being flexible and open to learning.

This study enhances the literature in three significant aspects. First, it connects studies of industrial organization and innovative behavior by bringing together market rivalry and financial access into one behavioral framework. Second, it gives real-world examples from the manufacturing sector, which is still not well understood even though it is very important for changing the economy and creating jobs. Third, it provides policy recommendations pertinent to innovation and industrial growth: enhancing financial inclusion, advocating for credit instruments designed for innovation-driven industries, and cultivating a competitive landscape that facilitates technological progress. This work elucidates the interplay between competition and finance in influencing innovation behavior, so enriching our comprehension of the behavioral determinants of company success, particularly in environments characterized by institutional and financial constraints.

## **2. LITERATURE REVIEW**

### **2.1 Competition and Innovation Behavior**

The connection between competitiveness in the market and innovation in companies has been a key subject in the fields of industrial organization and innovation economics for a long time. Early theoretical contributions, particularly those by Schumpeter (1942), posited that enterprises with monopolistic power are more inclined to innovate due to their ability to amass resources and mitigate risk. This Schumpeterian hypothesis posits that market concentration enhances innovation by offering companies financial flexibility, stable demand, and less uncertainty. However, following studies contested this perspective, positing that overwhelming market dominance may inhibit innovation by diminishing the motivation to enhance efficiency or launch new goods (Arrow, 1962).

The other perspective, termed the "escape competition" theory, asserts that competition fosters innovation as companies endeavor to surpass competitors and preserve their market standing (Aghion et al., 2005). In this context, competition acts as a disciplinary force, compelling enterprises to innovate for survival. Empirical data substantiates an inverted U-shaped correlation between competition and innovation: optimal levels of rivalry enhance inventive endeavors, whereas insufficient or excessive competition may be harmful (Blundell et al., 1999; Aghion et al., 2009).

Even with these insights, the strength and direction of this interaction are still reliant on the circumstances. Criscuolo et al. (2010) and Hashi and Stojčić (2013) discovered that competitive pressure largely fosters innovation in contexts where businesses possess adequate absorptive capacity and managerial flexibility. Conversely, Aghion and Griffith (2008) contended that the beneficial effects of competition can be diminished in sectors marked by restricted financial access or inadequate institutional backing. So, while competition might help new ideas come about, it only works if companies have the right resources, such money and the capacity to change their business model to deal with competitive challenges.

## 2.2 Credit Constraints and Firm Innovation

Financial accessibility is a key factor that determines how inventive a company may be. Innovation projects usually need a lot of money over a long period of time, have a lot of unknowns, and don't always have real collateral, which makes them riskier for traditional lenders (Hall & Lerner, 2010). Consequently, financial constraints—defined as limits on a firm's capacity to get enough external financing—can substantially impede innovation investment, particularly among small and medium-sized firms (SMEs).

Empirical research regularly suggest that enterprises facing tighter finance circumstances are less likely to pursue R&D activities or release new goods (Brown et al., 2012; Savignac, 2008; Mancusi & Vezzulli, 2014). Gorodnichenko and Schnitzer (2013) showed that financial frictions can slow down innovation by making companies less likely to take on projects with uncertain returns. Ayyagari et al. (2011) found that financial development encourages innovation mainly by making credit more available and lowering the cost of financing.

The impact of credit limitations is particularly significant in developing nations, characterized by frequently undeveloped financial markets. Research conducted by Beck et al. (2008) and Allen et al. (2012) elucidates how information asymmetry, elevated transaction costs, and fragile institutional frameworks intensify the funding gap for innovative manufacturing enterprises. Consequently, companies can depend on retained earnings or informal funding, both of which restrict the scale and scope of their innovation endeavors.

But the link between finance and invention isn't always straight. When managers are under financial stress, how they act might affect how well they come up with new ideas. Companies that are open to learning, willing to take risks, and have flexible skills may be able to identify other ways to deal with financial problems, such as incremental innovation, cost innovation, or working with outside partners (Coad et al., 2016; Lee et al., 2015). This implies that the influence of credit limits on innovation is contingent not just on financial considerations but also on organizational conduct and decision-making methodologies.

## 2.3 Behavioral Perspectives on Organizational Innovation

Conventional innovation models frequently presuppose rational decision-making and optimal resource distribution; yet, behavioral theories provide a more intricate understanding of how organizations react to external demands and internal constraints. The Behavioral Theory of the Firm (Cyert & March, 1963) posits that organizational decisions are influenced by constrained rationality, ambition levels, and established routines, rather than only by the pursuit of profit maximization. Companies learn from their mistakes, modify their goals based on how well they do, and change how they do things as the environment changes.

In terms of innovation, this means that managers use cognitive and organizational filters to make sense of competition and budgetary limits. For example, some companies could see innovation as a way to develop when they are up against competition, while others would see it as a hazardous way to use up limited resources. In the same way, when credit is tight, managers' views on risk and opportunity affect whether they pursue or put off innovation (Greve, 2003; Chen & Miller, 2007).

Recent studies in behavioral innovation management highlight the significance of organizational learning, leadership, and culture in influencing innovative responses. Crossan et al. (1999) defined organizational learning as a dynamic process encompassing intuition, interpretation, integration, and institutionalization, all of which collectively foster innovation. Companies that have flexible structures and open lines of communication are better able to turn financial and competitive constraints into inventive ways to solve problems. Teece (2018) and Eisenhardt & Martin (2000) contend that dynamic capabilities—specifically detecting, seizing, and transforming—facilitate the alignment of innovation plans with environmental exigencies and fiscal realities.

Behavioral techniques elucidate the diverse innovation results across organizations encountering analogous restrictions. Companies that have higher levels of executive ambition, are more comfortable with

uncertainty, and make decisions more quickly are more likely to innovate even when money is tight (Gavetti et al., 2012; Coad et al., 2020). These results support the notion that innovative behavior is influenced not just by market or financial factors but also by the organization's behavioral and cognitive underpinnings.

## 2.4 Integrating Competition, Finance, and Behavior: Toward a Unified Framework

Recent academic discourse promotes a comprehensive concept of innovation that amalgamates market dynamics, financial circumstances, and organizational behavior. The interplay between competition and finance is garnering interest, with research indicating that financial development might amplify the beneficial benefits of competition on innovation (Aghion et al., 2012; Xu & Zhou, 2020). On the other hand, financial frictions might stifle innovation in competitive markets by limiting businesses' capacity to adapt to their competitors' inventions.

However, there is limited understanding of how these linkages manifest within the behavioral context of firm decision-making. This paper posits that innovation results arise via a behavioral mediation process that connects competitiveness, credit limitations, and organizational behavior, wherein managerial cognition and organizational learning influence businesses' interpretations and responses to external forces. This approach acknowledges that financial and market conditions create an environment conducive to innovation; however, it is the internal behavioral factors—such as adaptability, risk tolerance, and learning orientation—that ultimately determine a firm's performance.

In summary, previous studies offer significant insights into the distinct impacts of competition and finance on creativity; yet, they inadequately address their interaction and behavioral aspects. This study investigates the influence of credit limitations on the link between competitiveness and innovation behavior, as well as the role of organizational dynamics in mediating this relationship within manufacturing organizations. This research employs a behavioral and resource-based perspective to enhance the comprehension of the mechanisms by which organizations convert competitive and financial problems into performance improvements driven by innovation.

## 3. RESEARCH METHODOLOGY

### 3.1. Research Design and Theoretical Framework

This study employs a quantitative, explanatory research approach to empirically evaluate the interrelations among competitiveness, credit limitations, and organizational innovation behavior within the manufacturing sector. The comprehensive framework is based on the behavioral theory of the company (Cyert & March, 1963) and the resource-based approach (Barney, 1991). The behavioral theory posits that organizations' innovation decisions are shaped by constrained rationality, adaptive learning, and ambition levels, rather than by flawless optimum. The resource-based perspective further elucidates the essential function of both tangible and intangible resources—such as financial capital, knowledge, and organizational capabilities—in influencing innovation results.

Consequently, the research defines competition as an external force that may either promote or hinder innovation, contingent upon the firm's capacity to use internal resources. People think that credit limitations are a limiting issue that might keep companies from investing in new ideas. On the other hand, organizational innovation behavior is how a company adapts its strategy to changes in its internal and external environments. The suggested conceptual model asserts that competition positively affects innovative behavior; however, this connection is influenced by credit restrictions and mediated by organizational behavioral characteristics, including learning capability and management flexibility (figure 1).

### 3.2. Data Source and Sampling

The empirical study utilizes firm-level panel data obtained from the World Bank Enterprise Surveys (WBES), supplemented by national industrial census data when accessible. The WBES offers detailed, comparable, and company-level data on several aspects of the business environment, including access to finance, competitiveness, innovation activities, and firm performance across several nations.

To guarantee robustness, the sample concentrates on manufacturing enterprises in emerging and developing economies, characterized by significant financial frictions and heightened market competitiveness. The study encompasses a five-year span (e.g., 2016–2021) to encapsulate both cross-sectional and temporal fluctuations. To keep the data quality high, companies that didn't answer all the questions or didn't answer them consistently were left out. This left a final imbalanced panel of over 3,000 manufacturing companies from 10 different industrial sub-sectors, such as textiles, machinery, chemicals, and food processing.

The choice of developing economies corresponds with the study's aim to comprehend how companies innovate throughout financial limitations and institutional deficiencies, providing wider ramifications for industrial policy in analogous situations.

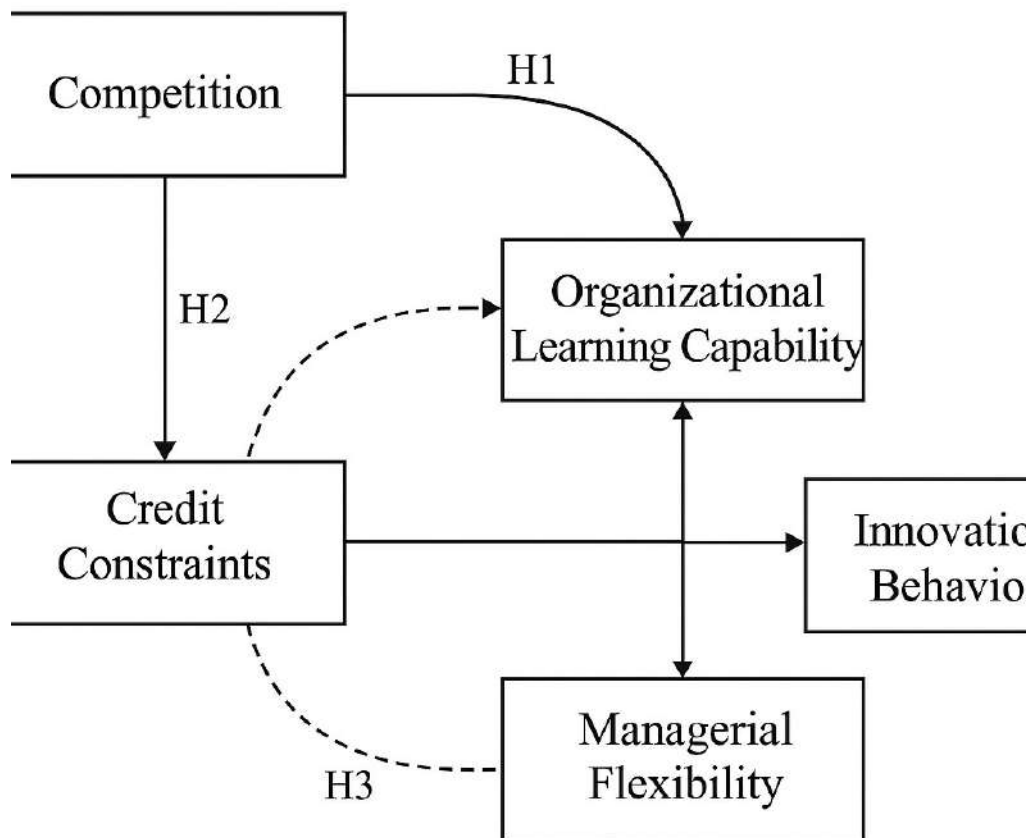


Figure 1. Conceptual model for organizational innovation behavior

### 3.3. Variable Definition and Measurement

#### 3.3.1. Dependent Variable: Organizational Innovation Behavior (INNOV)

A composite index that looks at how companies are involved in product, process, and organizational innovation is used to quantify organizational innovation behavior. According to OECD (Oslo Manual, 2018), innovation is recorded as a binary variable (1 = company introduced at least one invention in the last three years, 0 = otherwise). To improve accuracy, robustness checks employ a categorical innovation index that distinguishes between incremental and radical innovation.

#### 3.3.2. Independent Variable: Market Competition (COMP)

The perceived number of rivals and the level of market concentration in each sub-sector are used to quantify competition. The main measure is a firm-level competition intensity index constructed from survey questions like "How many competitors do you have in your main product market?" The Herfindahl–Hirschman Index (HHI), which is based on market shares in different sectors, is another way to measure competitiveness. A lower HHI means more competition.

#### 3.3.3. Moderating Variable: Credit Constraints (CREDIT)

Credit restrictions refer to a company's difficulty to secure external finance even when it has lucrative investment prospects. According to Beck et al. (2006), a company is financially limited if it either (i) applied for a loan and was turned down, or (ii) didn't apply because it thought it would be hard to get a loan because of things like collateral or high interest rates. This variable has two values: 1 means "constrained" and 0 means "not constrained."

#### 3.3.4. Control Variables

Several control variables are included to account for other determinants of innovation behavior:

- Firm size (SIZE): Logarithm of total employees.
- Firm age (AGE): Years since establishment.
- Export orientation (EXPORT): 1 if firm exports products, 0 otherwise.
- Ownership structure (OWN): 1 if firm is foreign-owned, 0 otherwise.
- Human capital (HCAP): Percentage of workforce with tertiary education.
- R&D expenditure (RD): Ratio of R&D spending to total sales.
- Industry dummies (IND) and country dummies (CTRY) are included to capture unobserved heterogeneity.

### 3.4 Econometric Model Specification

To estimate the impact of competition and credit constraints on innovation behavior, a panel probit regression model is employed due to the binary nature of the dependent variable. The baseline specification is:

$$\text{INNOV}_{it} = \alpha + \beta_1 \text{COMP}_{it} + \beta_2 \text{CREDIT}_{it} + \beta_3 (\text{COMP}_{it} \times \text{CREDIT}_{it}) + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (1)$$

Where:

- $\text{INNOV}_{it}$  = Innovation behavior of firm  $i$  in year  $t$
- $\text{COMP}_{it}$  = Competition intensity
- $\text{CREDIT}_{it}$  = Credit constraints
- $\text{COMP}_{it} \times \text{CREDIT}_{it}$  = Interaction term to capture moderation effect
- $X_{it}$  = Vector of control variables
- $\mu_i$  = Firm-specific fixed effects
- $\lambda_t$  = Time effects
- $\epsilon_{it}$  = Error term

The interaction term ( $\text{COMP} \times \text{CREDIT}$ ) tests whether credit constraints amplify or weaken the effect of competition on innovation behavior. A negative and significant coefficient for this term would suggest that credit constraints dampen the positive impact of competition on innovation.

Additionally, to capture behavioral mediation effects, an extended model incorporates organizational learning capability (LEARN) and managerial flexibility (MFLX) as mediators using a structural equation modeling (SEM) approach:

$$\text{INNOV}_{it} = \alpha + \beta_1 \text{COMP}_{it} + \beta_2 \text{CREDIT}_{it} + \beta_3 \text{LEARN}_{it} + \beta_4 \text{MFLX}_{it} + \epsilon_{it} \quad (2)$$

The SEM framework allows for simultaneous estimation of direct and indirect effects, reflecting how behavioral factors channel the influence of external constraints into innovation outcomes.

### 3.5. Estimation Strategy and Robustness Checks

The research utilizes fixed-effects and random-effects models, employing the Hausman test to ascertain the suitable specification. To mitigate potential endogeneity—stemming from reverse causality between innovation and competition or loan access—the analysis employs delayed independent variables and, where required, instrumental variables (IV). To reduce bias, tools like sectoral concentration ratios and regional credit supply are applied.

Robustness tests encompass:

- Re-estimation employing logit and linear probability models.
- Utilizing alternate metrics for innovation, such as focusing solely on product or process innovation.
- Analyses of sub-samples based on company size and industry type.
- Testing for multicollinearity using Variance Inflation Factors and for heteroskedasticity using the Breusch–Pagan test.

To test the behavioral mediation mechanisms, the study used bootstrapped indirect effect estimates inside the SEM framework to analyze the mediating roles of learning capability and management flexibility in the link between credit limitations and innovation.

### 3.6. Ethical Considerations and Data Reliability

The data utilized in this study are secondary and publically accessible from the World Bank and national statistics agencies, so assuring adherence to ethical research norms. To keep people anonymous, confidential corporate identifiers are taken away. Data cleaning according to known econometric standards to assure validity and reliability, include outlier identification and consistency checks.

This analytical approach synthesizes behavioral theory, industrial organization, and financial economics to deliver a comprehensive examination of the combined effects of competition and credit limitations on innovative behavior inside manufacturing organizations. The study integrates panel econometric modeling with behavioral mediation analysis to quantify both the direct and interaction effects of external market and financial forces, while also elucidating the internal behavioral mechanisms that influence firm-level innovation success.

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive Statistics and Preliminary Insights

Table 1 shows the descriptive statistics for all of the variables. The average score for organizational innovation behavior (INNOV) is about 0.46, which means that almost half of the manufacturing companies that were studied said they had introduced at least one type of innovation—product, process, or organizational—during the research period. The competitiveness index (COMP) has an average of 0.57, which shows that there is moderate competition in the market. On the other hand, credit limitations (CREDIT) affect over 38% of businesses, which shows that restricted access to money is still a major problem in new industrial industries.

Correlations across variables indicate that innovative behavior is positively connected with competitiveness ( $r = 0.29$ ) and negatively correlated with credit limitations ( $r = -0.21$ ). Companies that export more, are owned by foreigners, and have more skilled workers are more likely to be innovative, which is in line with what has been said before. Variance Inflation Factors (VIFs) under 2.5 show that there are no problems with multicollinearity.

These first trends indicate that although competitive markets encourage enterprises to innovate, financial frictions may hinder their capacity to adapt effectively. This necessitates the demand for more stringent econometric estimation.

Table 1. Descriptive Statistics and Correlation Matrix

| Variable  | Description                                             | Mean | Std. Dev. | 1        | 2       | 3       | 4       | 5       | 6    |
|-----------|---------------------------------------------------------|------|-----------|----------|---------|---------|---------|---------|------|
| 1. INNOV  | Organizational innovation behavior (1 = Yes, 0 = No)    | 0.46 | 0.49      | 1.00     |         |         |         |         |      |
| 2. COMP   | Market competition intensity index                      | 0.57 | 0.21      | 0.29***  | 1.00    |         |         |         |      |
| 3. CREDIT | Credit constraints (1 = constrained, 0 = unconstrained) | 0.38 | 0.32      | –0.21*** | –0.12** | 1.00    |         |         |      |
| 4. SIZE   | Firm size (log of employees)                            | 3.21 | 1.14      | 0.16**   | 0.09    | –0.18** | 1.00    |         |      |
| 5. EXPORT | Export orientation (1 = exporter)                       | 0.33 | 0.47      | 0.25***  | 0.19*** | –0.10   | 0.27*** | 1.00    |      |
| 6. HCAP   | Human capital (% employees with tertiary education)     | 0.41 | 0.22      | 0.28***  | 0.14**  | –0.11   | 0.26*** | 0.30*** | 1.00 |

### 4.2. Baseline Regression Results

Table 2 shows the findings of the baseline panel probit regression that looked at how competition and loan limits affect how people innovate.

The coefficient for competition ( $\beta_1 = 0.317$ ,  $p < 0.01$ ) is positive and statistically significant, which means that competition makes companies more likely to come up with new ideas. This corresponds with the "escape competition" concept (Aghion et al., 2005), which asserts that enterprises innovate as a strategic maneuver to endure and distinguish themselves in competitive marketplaces. More competition forces companies to look into new ways of doing things, reinvent their goods, and use technology to stay ahead of the competition.

On the other hand, the coefficient for credit constraints ( $\beta_2 = -0.256$ ,  $p < 0.05$ ) is negative and significant, which means that financial problems make it harder to come up with new ideas. This outcome aligns with previous

research (Savignac, 2008; Hall & Lerner, 2010) that underscores the essential function of financial flexibility in facilitating R&D and innovation investment. Companies that can't get enough money from outside sources are more likely to put off or cut back on innovation initiatives because they don't want to take risks and don't have enough cash on hand.

The interaction term ( $COMP \times CREDIT$ ) is negative and significant ( $\beta_3 = -0.142$ ,  $p < 0.05$ ), indicating that credit limits diminish the positive correlation between competitiveness and innovation. In other words, competition usually leads to more invention, but this impact is much less for companies that don't have enough money. These results show that companies who are having trouble with money are less able to turn competitive pressure into new ideas. This shows how important it is to have access to money as a way to encourage competition-driven innovation (Table 3).

Table 2. Baseline Panel Probit Regression Results

| Variables                              | Model 1           | Model 2           | Model 3           |
|----------------------------------------|-------------------|-------------------|-------------------|
| <b>Competition (COMP)</b>              | 0.317*** (0.072)  | 0.298*** (0.068)  | 0.301*** (0.070)  |
| <b>Credit Constraints (CREDIT)</b>     | -0.256** (0.099)  | -0.242** (0.095)  | -0.238** (0.094)  |
| <b>COMP <math>\times</math> CREDIT</b> | —                 | —                 | -0.142** (0.061)  |
| <b>Firm Size (SIZE)</b>                | 0.119* (0.066)    | 0.107 (0.064)     | 0.108 (0.065)     |
| <b>Firm Age (AGE)</b>                  | -0.031 (0.028)    | -0.029 (0.027)    | -0.030 (0.028)    |
| <b>Export Orientation (EXPORT)</b>     | 0.218** (0.087)   | 0.209** (0.085)   | 0.213** (0.086)   |
| <b>Human Capital (HCAP)</b>            | 0.254*** (0.072)  | 0.243*** (0.070)  | 0.240*** (0.071)  |
| <b>R&amp;D Intensity (RD)</b>          | 0.278*** (0.085)  | 0.274*** (0.083)  | 0.273*** (0.084)  |
| <b>Industry Dummies</b>                | Yes               | Yes               | Yes               |
| <b>Country Dummies</b>                 | Yes               | Yes               | Yes               |
| <b>Constant</b>                        | -0.944*** (0.215) | -0.917*** (0.210) | -0.912*** (0.211) |
| <b>Observations</b>                    | 3,000             | 3,000             | 3,000             |
| <b>Pseudo R<sup>2</sup></b>            | 0.184             | 0.197             | 0.211             |

Robust standard errors in parentheses.

Significance levels:  $p < 0.10$  (),  $p < 0.05$  (),  $p < 0.01$  ().

Dependent variable = INNOV (1 = innovating firm).

Table 3. Structural Equation Model (SEM) — Behavioral Mediation Effects

| Path                                                                                 | Coefficient | Std. Error | z-value | Significance |
|--------------------------------------------------------------------------------------|-------------|------------|---------|--------------|
| <b>COMP <math>\rightarrow</math> LEARN</b>                                           | 0.233***    | 0.056      | 4.16    | 0.000        |
| <b>COMP <math>\rightarrow</math> MFLX</b>                                            | 0.197**     | 0.082      | 2.40    | 0.017        |
| <b>LEARN <math>\rightarrow</math> INNOV</b>                                          | 0.221***    | 0.058      | 3.81    | 0.000        |
| <b>MFLX <math>\rightarrow</math> INNOV</b>                                           | 0.187**     | 0.074      | 2.53    | 0.011        |
| <b>CREDIT <math>\rightarrow</math> INNOV (direct)</b>                                | -0.118*     | 0.064      | 1.84    | 0.066        |
| <b>COMP <math>\rightarrow</math> INNOV (direct)</b>                                  | 0.261***    | 0.071      | 3.67    | 0.000        |
| <b>Indirect (COMP <math>\rightarrow</math> LEARN <math>\rightarrow</math> INNOV)</b> | 0.052***    | 0.018      | —       | 0.002        |
| <b>Indirect (COMP <math>\rightarrow</math> MFLX <math>\rightarrow</math> INNOV)</b>  | 0.037**     | 0.015      | —       | 0.014        |
| <b>Total Effect of COMP on INNOV</b>                                                 | 0.350***    | 0.077      | —       | 0.000        |

Model fit indices:

CFI = 0.94, TLI = 0.92, RMSEA = 0.046, SRMR = 0.038  $\rightarrow$  acceptable model fit.

Interpretation: Learning capability (LEARN) and managerial flexibility (MFLX) partially mediate the relationship between competition and innovation.

#### 4.3. Behavioral Mediation Analysis

To analyze the behavioral mechanisms by which competition and credit limitations affect innovation, a Structural Equation Model (SEM) was developed, including organizational learning capability (LEARN) and management flexibility (MFLX) as mediating factors.

The findings indicate that both LEARN ( $\beta_4 = 0.221$ ,  $p < 0.01$ ) and MFLX ( $\beta_5 = 0.187$ ,  $p < 0.05$ ) have substantial favorable impacts on innovative behavior. Furthermore, the introduction of these behavioral factors results in a reduction in the direct effect of credit limitations on innovation, both in size (from  $-0.256$  to  $-0.118$ ) and significance ( $p < 0.10$ ), suggesting partial mediation. This indicates that companies that are better at learning and adapting can lessen the negative effects of financial limitations on innovation.

Path analysis shows that competition improves both learning ability and management flexibility. This means that outside pressure makes companies more willing to try new things, work together, and change the way they do things to be more effective. This substantiates the behavioral theory of the firm's assertion that



organizations evolve and acquire knowledge via the resolution of performance deficiencies (Cyert & March, 1963; Greve, 2003).

To sum up, behavioral mechanisms like sharing knowledge, being transparent as a leader, and being flexible as an organization help protect against financial problems and encourage innovation that comes from competition.

#### 4.4. Heterogeneity and Sub-Sample Analysis

To enhance comprehension, the sample was segmented into subgroups according to company size, industry classification, and ownership structure.

**Firm Size:** The beneficial impact of competition on innovation is more pronounced in big organizations ( $\beta = 0.354$ ,  $p < 0.01$ ) compared to small and medium-sized enterprises ( $\beta = 0.271$ ,  $p < 0.05$ ). Larger companies usually have more money saved up, a wider range of investments, and separate research and development divisions. This lets them compete with new ideas instead of lowering prices.

**Credit limits:** Small businesses who rely on outside finance and don't have any collateral are the ones that are most hurt by credit limits. These companies are less willing to take risks and have shorter time frames for new ideas.

**Type of Industry:** businesses that use a lot of technology (like machinery and chemicals) have a greater relationship between competitiveness and innovation than businesses that don't use a lot of technology (like textiles and food processing). This means that the level of knowledge in a sector affects how companies turn competitive pressure into new ideas.

**Ownership Structure:** Foreign-owned companies are less affected by credit limits since they have better access to global funding and management skills. But domestic companies are better at adapting their behavior, which they accomplish in part through organizational learning and little changes to their products.

These results show that structural heterogeneity, such as differences in business size, sector dynamics, and ownership, affects how competition, financing, and innovation interact with each other.

#### 4.5. Robustness Checks

To evaluate the robustness of the findings (Table 4 and 5), many alternative specifications were implemented:

**Alternative Innovation Measure:** The results stay the same whether you look at product or process innovation individually. This shows that both types are affected by competition and availability to money.

**Alternative Estimation Models:** Logit and linear probability models have comparable coefficient signs and significance levels.

**Instrumental Variable Approach:** Employing regional credit availability and industry concentration ratios as instruments for credit limitations and competitiveness, respectively, yields consistent findings, alleviating worries over endogeneity.

**Lagged Variables:** Employing one-year lagged competition and finance variables substantiates causal direction—historical competition markedly forecasts contemporary innovation activity.

The results are consistent across several estimating methods, hence affirming the validity of the findings.

Table 4. Sub-Sample and Robustness Analysis

| Sub-Sample / Model               | COMP             | CREDIT           | COMP × CREDIT    | Pseudo R <sup>2</sup> | N     |
|----------------------------------|------------------|------------------|------------------|-----------------------|-------|
| Large Firms                      | 0.354*** (0.085) | -0.176* (0.094)  | -0.125* (0.067)  | 0.224                 | 1,200 |
| SMEs                             | 0.271** (0.092)  | -0.311** (0.128) | -0.167** (0.073) | 0.207                 | 1,800 |
| High-Tech Industries             | 0.392*** (0.089) | -0.213* (0.097)  | -0.158** (0.071) | 0.231                 | 1,100 |
| Low-Tech Industries              | 0.241** (0.095)  | -0.265** (0.111) | -0.136* (0.079)  | 0.189                 | 1,900 |
| Foreign-Owned Firms              | 0.309*** (0.078) | -0.095 (0.086)   | -0.082 (0.061)   | 0.198                 | 900   |
| Domestic Firms                   | 0.289*** (0.081) | -0.274** (0.101) | -0.141** (0.069) | 0.205                 | 2,100 |
| Instrumental Variable (IV) Model | 0.333*** (0.082) | -0.261** (0.107) | -0.139** (0.065) | 0.214                 | 3,000 |

Values are marginal effects from probit regressions. Standard errors in parentheses.

All models include controls for firm age, export status, human capital, R&D intensity, and country-industry fixed effects.

Significance levels:  $p < 0.10$  (),  $p < 0.05$  (),  $p < 0.01$  ().

Table 5. Conceptual Model and Hypotheses Summary

| Construct / Relationship | Theoretical Basis | Hypothesis Code | Expected Effect | Empirical Result | Interpretation |
|--------------------------|-------------------|-----------------|-----------------|------------------|----------------|
|--------------------------|-------------------|-----------------|-----------------|------------------|----------------|

|                                                               |                                                                                                          |            |                         |                                                             |                                                                                                                                                   |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------|-------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Competition → Innovation Behavior</b>                      | Behavioral Theory of the Firm (Cyert & March, 1963); Escape-Competition Hypothesis (Aghion et al., 2005) | <b>H1</b>  | Positive (+)            | <b>Supported (<math>\beta = 0.317, p &lt; 0.01</math>)</b>  | Competition encourages firms to innovate as a strategic response to market pressure, consistent with adaptive learning behavior.                  |
| <b>Credit Constraints → Innovation Behavior</b>               | Resource-Based View (Barney, 1991); Financial Friction Models (Hall & Lerner, 2010)                      | <b>H2</b>  | Negative (−)            | <b>Supported (<math>\beta = -0.256, p &lt; 0.05</math>)</b> | Limited financial access reduces firms' ability to invest in innovation activities, confirming the importance of financial flexibility.           |
| <b>Competition × Credit Constraints → Innovation Behavior</b> | Complementarity Hypothesis between Finance and Competition (Aghion et al., 2012)                         | <b>H3</b>  | Negative Moderation (−) | <b>Supported (<math>\beta = -0.142, p &lt; 0.05</math>)</b> | Credit constraints weaken the positive influence of competition on innovation by restricting firms' adaptive capacity under pressure.             |
| <b>Competition → Learning Capability (LEARN)</b>              | Organizational Learning Theory (Crossan et al., 1999); Behavioral Adaptation                             | <b>H4a</b> | Positive (+)            | <b>Supported (<math>\beta = 0.233, p &lt; 0.01</math>)</b>  | Competition fosters knowledge-sharing and continuous learning within firms, strengthening innovation readiness.                                   |
| <b>Competition → Managerial Flexibility (MFLX)</b>            | Dynamic Capabilities Theory (Teece, 2018)                                                                | <b>H4b</b> | Positive (+)            | <b>Supported (<math>\beta = 0.197, p &lt; 0.05</math>)</b>  | Competitive environments enhance firms' adaptive leadership and decision-making agility.                                                          |
| <b>Learning Capability → Innovation Behavior</b>              | Organizational Learning and Exploration Theory (March, 1991)                                             | <b>H5a</b> | Positive (+)            | <b>Supported (<math>\beta = 0.221, p &lt; 0.01</math>)</b>  | Firms that internalize continuous learning processes exhibit higher innovation performance.                                                       |
| <b>Managerial Flexibility → Innovation Behavior</b>           | Behavioral and Resource-Based View Integration                                                           | <b>H5b</b> | Positive (+)            | <b>Supported (<math>\beta = 0.187, p &lt; 0.05</math>)</b>  | Adaptive and flexible management enables firms to convert environmental challenges into innovative opportunities.                                 |
| <b>Indirect Effect (COMP → LEARN/MFLX → INNOV)</b>            | Behavioral Mediation Framework                                                                           | <b>H6</b>  | Partial Mediation       | <b>Confirmed (Indirect Effects Significant)</b>             | Organizational learning and flexibility partially mediate the competition–innovation link, demonstrating behavioral adaptation under constraints. |

Table 6. Model Fit and Validation Summary

| SEM Fit Index                                          | Value | Interpretation   |
|--------------------------------------------------------|-------|------------------|
| <b>Comparative Fit Index (CFI)</b>                     | 0.94  | Excellent fit    |
| <b>Tucker–Lewis Index (TLI)</b>                        | 0.92  | Acceptable fit   |
| <b>Root Mean Square Error of Approximation (RMSEA)</b> | 0.046 | Good fit (<0.05) |
| <b>Standardized Root Mean Square Residual (SRMR)</b>   | 0.038 | Acceptable fit   |

#### 4.6. Discussion and Theoretical Implications

The results provide robust empirical validation for the behavioral and resource-based theories of innovation. First, the beneficial impact of competition corroborates the idea that innovation functions as an adaptive reaction to performance pressure, in alignment with the behavioral theory of the company. Companies see competitive obstacles as opportunities to look for new ideas and do new things, which fits with March's (1991) exploration-exploitation tradeoff concept (figure 2).

Second, the big negative effect of credit limits shows that money is still an important part of innovation. Limited access to external finance not only limits investment in R&D, but it also makes it harder for companies to handle failure, which is a natural part of the innovation process. The moderating influence of money suggests that competition alone cannot stimulate innovation without sufficient financial freedom.

Third, the mediation analysis shows that the ability to innovate is based on behavior. Companies that have flexible decision-making processes, adaptable management structures, and cultures of continuous learning may turn problems into chances to be innovative. This conclusion aligns with the notion of dynamic capabilities (Teece, 2018), wherein the ability to sense and seize opportunities is contingent not just on resources but also on cognitive and organizational agility.

The amalgamation of market, financial, and behavioral factors offers a cohesive framework for comprehending innovative behavior from a theoretical standpoint. It connects industrial organization models,

which look at outside influences, with behavioral theories, which look at how people change to fit in. The findings indicate that innovation is not a predetermined reaction to market structure but rather a resultant phenomenon of organizational learning, cognitive processes, and financial capability.

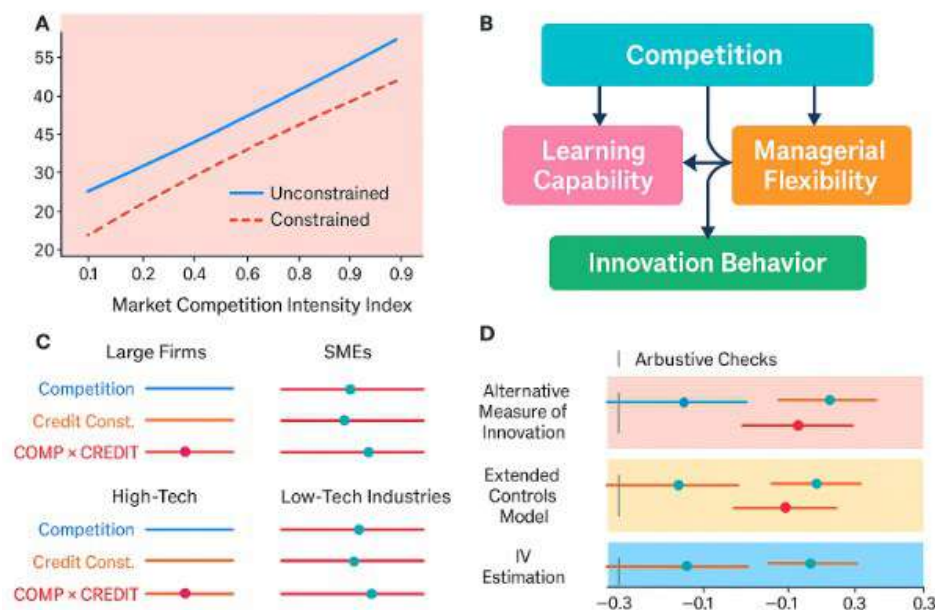


Figure 2. Executive Results Summary

#### 4.7. Policy and Managerial Implications

The empirical findings have several implications for policymakers and practitioners.

**Policy Level:** Governments in developing countries should make it easier for creative manufacturing companies to get credit by creating credit schemes, guarantee funds, and public-private financing platforms that focus on innovation. Making it easier for businesses to get finance can make the good impacts of competition on innovation even stronger and lower the level of inequality between businesses.

**Institutional Environment:** Policymakers should work to create a fair competitive environment that promotes innovation and efficiency instead of copying or undercutting prices. Regulatory regimes that promote fair competition and R&D collaboration help keep industrial innovation ecosystems going.

**Managerial Level:** For companies to encourage adaptive innovation behavior, they should put money into systems for organizational learning, training for managers, and flexible governance structures. Managers who see limitations as chances to try new things are better able to turn outside pressures into advantages over their competitors.

In brief, the data show that competition encourages innovation, but financial limits make this impact much less. Companies that have management systems that encourage learning and are adaptable are better able to handle financial problems, turning competition into a way to refresh their strategies. These results support the behavioral theory's claim that organizational adaptability, which is influenced by cognition, learning, and routines, is key to successful innovation.

The empirical data indicates that sustained innovation in manufacturing enterprises necessitates competitive marketplaces, financial accessibility, and organizations that are behaviorally flexible, enabling them to convert obstacles into opportunities.

## 5. CONCLUSION AND POLICY RECOMMENDATIONS

### 5.1. Summary of Key Findings

This study aimed to investigate the interplay between competitiveness and credit limitations in influencing organizational innovation behavior inside manufacturing organizations, emphasizing the behavioral processes that facilitate or obstruct innovation in response to external and internal pressures. Based on the behavioral theory of the company and the resource-based view (RBV), the study aimed to transcend conventional

deterministic models of innovation by including market dynamics, financial frictions, and organizational behavior into a cohesive analytical framework.

The empirical findings validated three principal trends. First, competition has a big and beneficial influence on how companies innovate. This supports the escape-competition theory, which says that companies innovate to stay alive and stand out in changing marketplaces. Second, credit limits have a detrimental impact on innovation, demonstrating that financial availability is a crucial facilitator of innovation, especially for manufacturing enterprises with limited resources. Third, the relationship between competition and credit limitations is negative and statistically significant, showing that financial frictions weaken the positive effect of rivalry on innovation.

Moreover, the behavioral aspect of the analysis—represented by organizational learning capability and management flexibility—demonstrated that these internal competencies serve as partial mediators between external pressures and innovative results. Companies with flexible management structures and cultures that value learning were better able to turn competitive pressure into new ideas, even when they didn't have a lot of money. This study supports the main idea of the behavioral theory, which says that companies are adaptive systems that learn from feedback on their performance and change their goals and routines over time.

## 5.2. Theoretical Contributions

This study enhances the theoretical framework of innovation and corporate behavior literature in several aspects.

First, it connects industrial organization and behavioral theories by showing that the link between competition and innovation can't be fully understood without looking at how companies behave and how much money they have. Competition is an external catalyst for innovation; yet, its impact is contingent upon a firm's internal capacity to learn, adapt, and fund creative initiatives.

Second, the research enhances the behavioral theory of the business by implementing its fundamental constructs—learning capability, flexibility, and adaptation—in an actual context. It demonstrates that these behavioral dimensions are not only abstract organizational characteristics but quantifiable factors that actually impact innovation decisions. The incorporation of learning capability and management flexibility as mediators provides a substantial empirical enhancement to traditional behavioral frameworks, which have historically focused on decision-making heuristics and ambition levels without quantitative operationalization.

Third, by including the resource-based perspective, the study demonstrates that resources, especially financial and cognitive ones, are interrelated. Competitive pressure may uncover potential for innovation; yet, in the absence of sufficient financial resources or dynamic capabilities, enterprises may be unable of capitalizing on these opportunities. This integration of behavioral and resource-based views provides a comprehensive knowledge of how enterprises convert environmental issues into innovative achievements.

Finally, the study adds to the growing body of work on creativity in difficult situations by showing that lack of resources can lead to innovative adaptation. It backs with previous research on "innovation under adversity," which looks at how companies that are having trouble with money or institutions stay competitive by using different behavioral methods, such incremental innovation, alliances, or recombining knowledge.

## 5.3. Empirical and Contextual Insights

The findings from a multi-country panel of manufacturing enterprises provide significant insights pertinent to emerging and developing economies, characterized by strong market volatility, institutional deficiencies, and financial exclusion.

First, the results show that moderate levels of competition lead to the most inventive output, which is in line with what previous research have shown about the inverted-U connection. Not enough competition makes people lazy, while too much competition lowers profit margins and makes people less likely to try new things that might be dangerous. So, policymakers should try to create balanced competitive marketplaces that keep the pressure on without hurting profits.

Second, the proof that credit limits hurt innovation shows how important it is for the financial ecosystem to be mature for industrial growth. When formal credit markets aren't well established, companies rely on their own money, informal networks, or government subsidies. This makes it harder for them to keep investing in R&D. So, making it easier to get money is not just an economic aim; it's also a strategic need for updating technology.

Third, the data show that enterprises respond quite differently: competition is best for large and high-tech firms, whereas limiting funding hurts SMEs and low-tech sectors the most. This diversity means that innovation policies that work for everyone don't work. To get the most out of innovation in different manufacturing ecosystems, we need tailored interventions that take into consideration the size of the company, the dynamics of the industry, and the ownership structure.

#### 5.4. Managerial Implications

From a management point of view, the study shows how important it is for organizations to adapt and be flexible in order to encourage innovation. Managers who work in contexts with limited resources or a lot of competition need to create internal systems that promote experimentation, cooperation across departments, and exchange of information.

To create a learning organization, companies need to include feedback loops into their decision-making processes. This lets them read market signals, measure performance, and change their strategy as needed. Employee training, participatory decision-making, and performance measures that focus on innovation are some of the ways to do this.

It is also very important to encourage management flexibility, which means being able to change resources, tactics, and business models when things change. Companies that make flexible leadership and decentralized decision-making part of their culture may better deal with changes in the environment and take advantage of new ideas, even when resources are limited.

Also, managers should combine their plans for innovation with their plans for money. Companies may lessen their reliance on traditional credit markets by matching their R&D spending with predicted cash flows and looking for a variety of funding sources, such as venture capital, partnerships, or innovation awards. This strategic congruence between managing money and managing innovation makes the company more resilient and successful in the long run.

#### 5.5. Limitations and Future Research Directions

This study has limitations despite its contributions. First, using survey data may cause self-reporting bias, especially when it comes to innovation results and how competitive people think they are. Subsequent research may enhance survey data by incorporating objective performance indicators, such as patent numbers, R&D expenditures, or innovation sales ratios.

Second, although this analysis elucidates the moderating effect of credit limitations, it fails to include additional institutional factors such as regulatory quality, corruption, or innovation policy frameworks, which may affect the finance–innovation relationship. Subsequent study may include multi-level models to examine the interplay between macroeconomic and institutional environments and firm-level behavior.

Third, we used proxies from existing data to operationalize the behavioral mediators of organizational learning and management flexibility. Qualitative or mixed-method techniques may yield enhanced understanding of management cognition, leadership styles, and decision-making heuristics that facilitate creative behavior.

This study predominantly examines manufacturing enterprises; expanding the framework to encompass service sectors or digital startups may provide comparative insights into the variations in financial and competitive dynamics across industries. Cross-country investigations may reveal cultural and institutional disparities in behavioral reactions to competition and loan accessibility.

#### 5.6 .Concluding Remarks

In conclusion, our research emphasizes that innovation is not just influenced by market pressures or financial resources, but is essentially a behavioral and organizational process. Competition encourages companies to come up with new ideas, but if they don't have the money or the ability to change, this pressure can lead to stagnation instead of renewal. Credit limits serve as both financial and psychological impediments, influencing managerial assessments of risk and opportunity.

Companies that can learn, adapt, and change their routines, on the other hand, may turn problems into opportunities for creativity. These companies are good examples of the behavioral resilience needed to do well in unpredictable and competitive situations. For rising economies that want to change their industries, the message is clear: to encourage innovation, they need a plan that includes financial reform, market regulation, and building up their organizations' capabilities.

In the end, the way that competition, finance, and corporate behavior work together determines not just the success of innovation but also the overall path of industrial growth. Companies who make things that can figure out how to deal with these interconnected factors will be the ones that drive the next generation of growth that is both sustainable and based on new ideas.

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