

**Impact of Business Intelligence on Product Innovation: A Pragmatic
Analysis of Automobile Manufacturing Companies of Sindh,
Pakistan.**

Dr. Saleem Raza Bhatti

Institute of Business Administration, Shah Abdul Latif University, Khairpur
Email: saleemrazaphd12@gmail.com

Abdul Samad

PhD Scholar, Faculty of Management Sciences, Salim Habib University, Karachi,
74900 Email: asamadshu@gmail.com

Muhammad Mubashir Khan

Faculty of Management Sciences, Department of Business Administration,
Emaan Institute of Management & Sciences, Karachi 75330
Email: 501mubashir@gmail.com

Dr. Wasim Shahid Khawaja

HOD, Department of Business Administration, Emaan Institute of Management &
Sciences, Karachi 75330 Email: wkhawaja@hotmail.com

Abstract

Intent of the current research study is to analysis the dynamics of business intelligence on product innovation the business intelligence plays a vital role in the automobile industry in the providence of Sindh. The current study was incorporate the resource-based view theory has a significant role for the utilization the capabilities and resources of the firm available with regarding the competitive intelligence and the business intelligence towards the automobile industries. Thus, the research contributes the application of new knowledge and techniques, for future competitive advantage from the business environment, the emerging technologies, and the governing situation in which the companies are competes and the rival of new competitors and the consequences. More research also contributes the value addition and new knowledge the induction of business intelligence. The study is based on survey research the target population of the study were Managers and Engineers of the automobile manufacturing firms in Sindh Pakistan; cluster sampling technique is employed with close ended questionnaire on five-point Likert-scale was provided to respondent for the responses. The data analysis through the approach of smart pls, to examines the mediating effects and the direct impact on the product innovations to increase the firm productivity. The results reveals that a significant mediations effects established and also established product innovation in association of competitive intelligence, innovation intelligence. The theoretical approach is assumed in this

study based on cross sectional data and quantitative technique for future research qualitative and mix method could be applied, the target population may be other areas like pharmaceutical manufacturing firms, service and public sector. The current research study is for decision and policy makers to incorporate the business intelligence for the development of product innovation to get maximum competitive advantage from the business environment.

Key Words: Business Intelligence, Competitive Intelligence, Innovation Intelligence, Product Innovation.

Background of the Study

The automobile industry in Pakistan plays a critical role in the country's economic development. It contributes significantly to for generation of jobs and business development, and increasing Goss Domestic Products of the country (Arunkumar et al., 2023). Since from the many years, the industry is practiced significantly fluctuations, particularly in the rivalry of world-wide automobile producers, Government policies, and developments in Technology. Presently, the industry is divided into three main segments: passenger, and commercial vehicles. Regardless its capacity, the companies meet the challenges associated to unpredictable rules policies, deficiency of localizations, and partial export competition. The automobile business in Pakistan is profoundly controlled by a rare main key producer, including Suzuki and Toyota, Honda, which collectively hold the majority of market share (Shpyh & Dobzhanska, 2025). New entrants such as Kia and Hyundai, promotion rivalry and invention and however, the industry remains vulnerable to fluctuations in the exchange rate, rising inflation, and supply chain disruptions. Despite its growth, the industry is hindered by various elements, including inflation and high manufacturing cost, reliance on exported components, and unreliable Government strategies. Pakistan local cost for automobile components is comparatively low-slung in the context of India and Thailand (Yongming & Anan Pongtornkulpanich, 2025). In addition, because lack of attention on electric vehicles (EVs) and avocado technologies additionally hold the sector capability to apply global trends. The recent focus on electric vehicles through the Electric Vehicle Policy 2020 presently is a prospect for Sindh Pakistan to line up itself with international sustainable goal line. Although, the policies application still leisurely because of basic infrastructural and governing obstacles (Ali, Khan, & Ali, 2022)

The automobile sector in Sindh, Pakistan, demonstrates significant growth patterns through various developmental phases regarding the automobile industry (Kaur, 2023). Therefore, the transportation infrastructure across Sindh province have evolved substantially, contributing towards economic mobility (Tomás & Marqués, 2023). Most of the local manufacturers are establishing assembly plants in Karachi, which being the provincial capital, serves as a primary automotive hub and the industry faces numerous challenges in terms of production capacity and technological advancement, yet maintaining steady progress (Averchenkov et al., 2024). Thus, the study suggested that consumer preferences in Sindh shows a remarkable inclination towards imported

vehicles, despite government implementing strict import policies and the prior study was suggested that the describe local automotive companies operating in Sindh region had contributed approximately 2.8% to the national Gross Domestic Products (GDP) in current year's (Tisa Daka, & Harrison Daka, 2025). So that the infrastructure developments across major cities of Sindh have created increased demand for commercial vehicles and the business dynamics shows the international and local existence and contemporary motorized movements, that's develop the sector course and with the current policies measurements taken by regional Government has been appreciated the maintainable progress in automobiles industrial sector (Raja, 2023)

Problem Statement

In spite of the established benefits of Business Intelligence in organizational decision making and its role in driving product innovation through competitive and innovation intelligence still unclear, especially in emerging economies like Pakistan, where resources and technological expertise are inadequate. The international automobile industry is facing intense competition because of speedy advancement in technology, Changing customer priorities, and pressure to innovate. The prior study was suggested that the sector of automobile manufacturing with respect to the province of Sindh, has the competitive advantages and to sustain the innovative design and the impact of global perspective, while the concept of the business intelligence has the greater importance with respect to critical and the significance decisions have the significance and the positive impact on the innovative product design and the remain still explored the localizations concern and perceptions of the local context (Gupta, 2025). Therefore, the potential mediating roles of competitive Intelligence (CI), and Innovation Intelligence (II) for development of innovation are so far to be empirically validated. This breach in research raises questions about how Business Intelligence, Competitive Intelligence, and Innovation Intelligence relate to boost the performance for product innovation in Sindh automobile companies.

Significance of the Study

So that the understanding the interchange among Business Intelligence, competitive intelligence, and innovation intelligence are vital for firms, intentions to sustain competitive advantage in rapid dynamic world in automobile manufacturing sector and the current study addresses the essential on concentrating Sindh Pakistan's automobile firms, where innovation pauses behind international standards. The current research study is an endeavour comprehends the thoughtful understanding of the business intelligence which is emerging in digital economy of scale, mostly how effect innovation in the automobile manufacturing sector. The study will contribute to the resource-based view (RBV) theory by showing that how firms can utilize business intelligence, Competitive Intelligence, and innovation intelligences planned assets to gain a competitive advantage through innovation. RBV posits that firms achieve competitive advantage by effectively utilizing internal and external resources. Business Intelligence, Competitive Intelligence, and innovation Intelligence are imperceptible resources can be utilized properly, will lead to sustainable innovation

and competitiveness (Saxena & Totaro, 2024). The study based on the (RBV) Resource-Based View and dynamic capabilities theory is used and applied to discover business intelligence and related constructs enable firms to innovate and sustain competitiveness in dynamic business environment. By identifying the mediating roles of competitive intelligence and innovation intelligence, this study provides applicable understandings for executives in Sindh automobile companies to innovate new production. This support officials and companies with policies to improve the business intelligence tools and get competitiveness for the buyer pleasure and vital in the long-term survival of the industries.

Literature Review

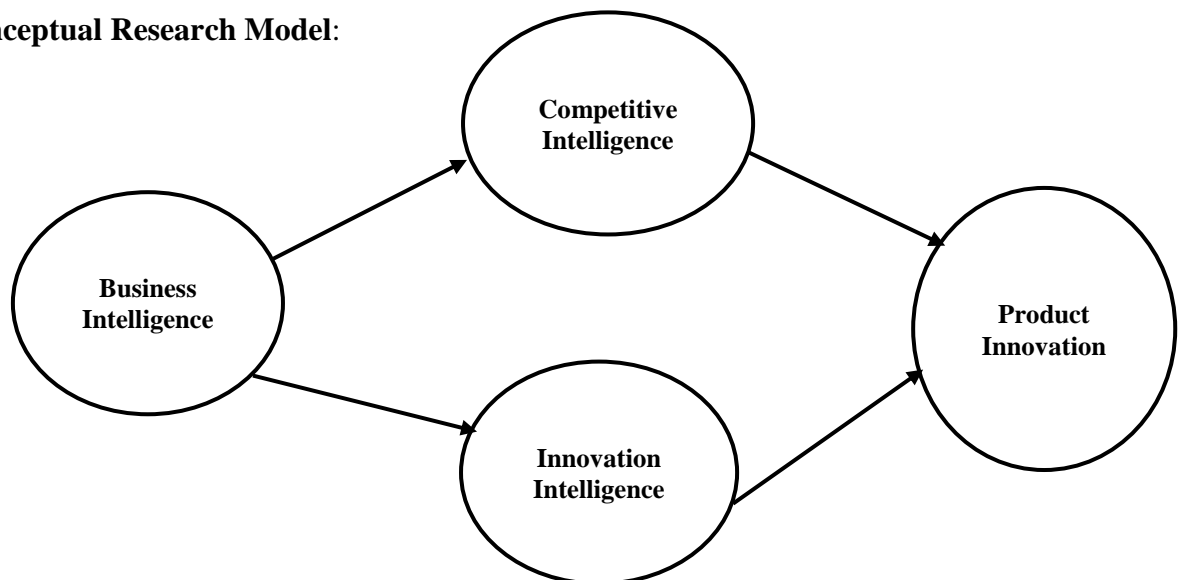
Massive demand use of business intelligence endures to nurture however at time while the application of information technology software is employed and while information systems study in this area is, to putting it tactfully, is intermittent. While the explanation of (BI) business intelligence is comparatively innovative, computer-based business intelligence systems induct, near to forty years ago and the business intelligence terms reformed for decision making, administrative statistics, and (MIS) Management Information Systems (Liu & Liu, 2024). Through each innovative iteration, competences enhanced as companies nurtured ever to additionally difficult in the competitive and logical requirements. In the meantime (BI) Business Intelligence systems are frequently applied in industries, investigation regarding the companies is restricted according to investigators. Innovation within both the competitive intelligence and innovation arenas needs a thoughtful of the viable environment in business (Kusmantini et al., 2021). The prior study suggested that the competitive business atmosphere is one that has been rapidly changing where new competitors are entering the marketplace, and where current competitors are offering new products and the for organisations to survive in this environment, they need to be effective and proactive in identifying and responding to the opportunities, challenges, risks and organization plans their intelligence activities, collects information (how they do it, what information), how it is analyzed, communicated and how the intelligence process is managed

(Raja, 2023). The prior study was explored the concept of the M-Brain's market intelligence framework and benchmarking tool assesses competitive intelligence activities by looking at the scope of competitive intelligence activities, stakeholder management, process, digitalization, deliverables, tools, organization, management & leadership and culture (Shpyh & Dobzhanska, 2025). The competitive intelligence field in examining intelligence practice looks at how intelligence projects are run (the intelligence process) and how the intelligence process is managed. Hence, managers are required to make high quality decisions that will steer businesses out of the crisis and thrive. Since ancient times, humanity has developed processes, techniques and tools for collecting and analyzing intelligence to support decision making, especially during times of war and in the scenario, the notion of Business Intelligence got attention a great gratitude in the world of business in current environment. The definition of (BI) Business Intelligence is familiar by the Hans Peter Luhn, an IBM

scientist (Maaitah, 2023). Thus, the past study suggested that the Automatic Method to deliver new knowledge and services for scientists and technologists those required support and assistant to deal with the development of systematic and methodological works. However, that was only in the 1990s that the term was widely used, after BI was used by Dresner, a Gartner analyst, to convey the idea that the information technology systems could be oppressed by the occupational themselves and with the wrong or poor decisions could easily threaten the organization's survival in this fragile environment. Hence, managers are required to make high quality decisions that will steer businesses out of the crisis and thrive. Since ancient times, humanity has developed processes, techniques and tools for collecting and analyzing intelligence to support decision making, especially during times of war in the world (Arunkumar et al., 2023). In this context, the concept of business intelligence has acquired a wide recognition in the business world in current years. Recent studies reveal that business intelligence adoption has increased by 67% across global organizations during 2020-2023 period and the prior study was more explored the concept of digital transformation initiatives have accelerated implementation of sophisticated BI tools and the explained the concept of the new innovative design regarding the products, and the approach of the sustainable transformations and the impact on the customer focused, and more the 80% has the greater impact of the new innovative design, and with the help of the concept of the artificial intelligence to more developed the customer equity, and have the positive relationship with the consumer perceptions (Nandish, 2023). In the localization context, the innovative trends, and the different dynamics markets trends, with respect to the significance and the statistically impact associated with the pandemic concerns, and develop the digital disruption through the competitive business environments and the business competitive intelligence platform and the prior study was more explained that concept of the new innovative and the more invested in the business competitive environments, and through the business intelligence concept has more the integrated in form of 35% more markets trends and the significance market integrated as compare to old traditionality methods and the concepts with the real time business analysis, and developed more competitive innovative (Saxena & Totaro, 2024). Thus, the innovation intelligence research study developing attention on prognostic analytics and design acknowledgement and a comprehensive study involving 456 organizations showed that companies with structured innovation intelligence frameworks were 2.5 times more likely achieving breakthrough innovations The interconnected nature of these variables been extensively documented in recent literature found that organizations integrating all four variables demonstrated 56% higher performance metrics. Further studies by suggests synergistic effects between these variables leads to enhanced organizational outcomes. Contemporary research emphasizes importance of data-driven decision making. established that companies leveraging integrated intelligence systems experienced 40% faster time-to-market for new products (Patterson et al., 2023). The literature consistently supports positive correlations between these variables. This breach in research raises questions about how Business Intelligence, Competitive Intelligence, and Innovation Intelligence relate to boost the performance for product

innovation in Sindh automobile companies. Business Intelligence The interrelation between business intelligence, competitive intelligence, and innovation intelligence exhibits fundamental importance for product innovation outcomes. Research conducted by demonstrates how this intelligence types create synergistic effects. Business Intelligence are providing organizations with internal data-driven insights that helps identify opportunities for new product development (Barnea, 2024). The prior study was suggested that the companies whom effectively leverage BI tools achieved 45% higher success rates in innovation projects. Competitive Intelligence enable firms monitoring external market dynamics and competitor activities, which crucial for differentiated product positioning. Studies conducted at Harvard Business School shown that CI directly influences 65% of strategic innovation decisions. Innovation Intelligence, as researched by combines technological forecasting with market understanding to drives breakthrough product development. The integration of these three intelligence types establishes what terms "innovation ecosystem awareness. "An empirical study from Stanford Innovation Lab revealed organizations that aligned these three intelligence streams experienced 2.3x greater return on innovation investments. The complementary nature of these intelligence types creates comprehensive understanding necessary for successful product innovation.

Conceptual Research Model:



Theoretical Framework The study draws on the Resource-Based View (RBV) and Dynamic Capabilities Theory to explore how Business Intelligence and related constructs enable firms to innovate and sustain competitiveness in dynamic markets

Research Hypotheses

H₁: Business Intelligence has a significant positive effect on Competitive Intelligence

H₂: Competitive Intelligence has a significant positive effect on Product Innovation.

H₃: Innovation Intelligence has a significant positive effect on Innovation Intelligence.

H₄: Competitive Intelligence has the significance impact on the Product Innovation

H₅: Innovation Intelligence has the significance impact on the Product Innovation.

Mediating Role Hypotheses

H₆: Competitive Intelligence mediates the relationship between Business Intelligence and Product Innovation

H₇: Innovation Intelligence mediates the relationship between Business Intelligence and Product Innovation.

Research Questions

Does business intelligence has a significant positive effect on competitive intelligence?

How does the business intelligence have the significant positive effect on the innovation intelligence?

Does the mediating effects of innovation intelligence with the business intelligence and the product innovation?

Does the mediating effects of the competitive intelligence with the business intelligence and the product innovation?

Research Objectives

To investigates the business intelligence has a significant positive effect on competitive intelligence

To examines the business intelligence, have the significant positive effect on the innovation intelligence

To identify the mediating effects of innovation intelligence with the business intelligence and the product innovation

To investigates the mediating effects of the competitive intelligence with the business intelligence and the product innovation

Research Gap

Insufficient studies are conducted on how local manufacture of auto industry can develop strategies such as business innovation to produce innovative product ay applying business competitive intelligence to minimize the addiction from imports. Developing an innovative model from India and China will be significant intuitions for Sindh Pakistan. Even though the Electric Vehicle Strategy is announced, there is inadequate research study regarding user deeds demands, basic infrastructure readiness, and policies for long-term problems for automobile industries. This research studies is an endeavor to discover the barricades in the light of business intelligence for implementation and strategies for overcoming them. Sindh Pakistan's cars export negligible as associated to regional players. In deed there is a necessity for study on the issues clogging export growth and how Sindh automobile companies is integrating with international supply chain. The performance of the sector is extremely complex for foreign exchange rates are unpredictable because of high inflation rate in the country however, limited studies analysis the quantitative impacts of these macroeconomic factors on automobile production and sales in Pakistan.

Methodology

The current research study based on the quantitative research design to examines the impacts of the business intelligence, with the mediating effects of competitive intelligence, and the innovative intelligence with the product innovation regarding the industry of automobile industry. Through the cross-sectional research approach to collect the data, and with the G*power, to apply the purpose sampling technique to investigates the research objectives

Measurement Model

The structural equation modelling technique has the two important components, the measurement mode, also known as outer model, and measured the reliability, validity, the theoretical concepts.

Construct Reliability and Validity

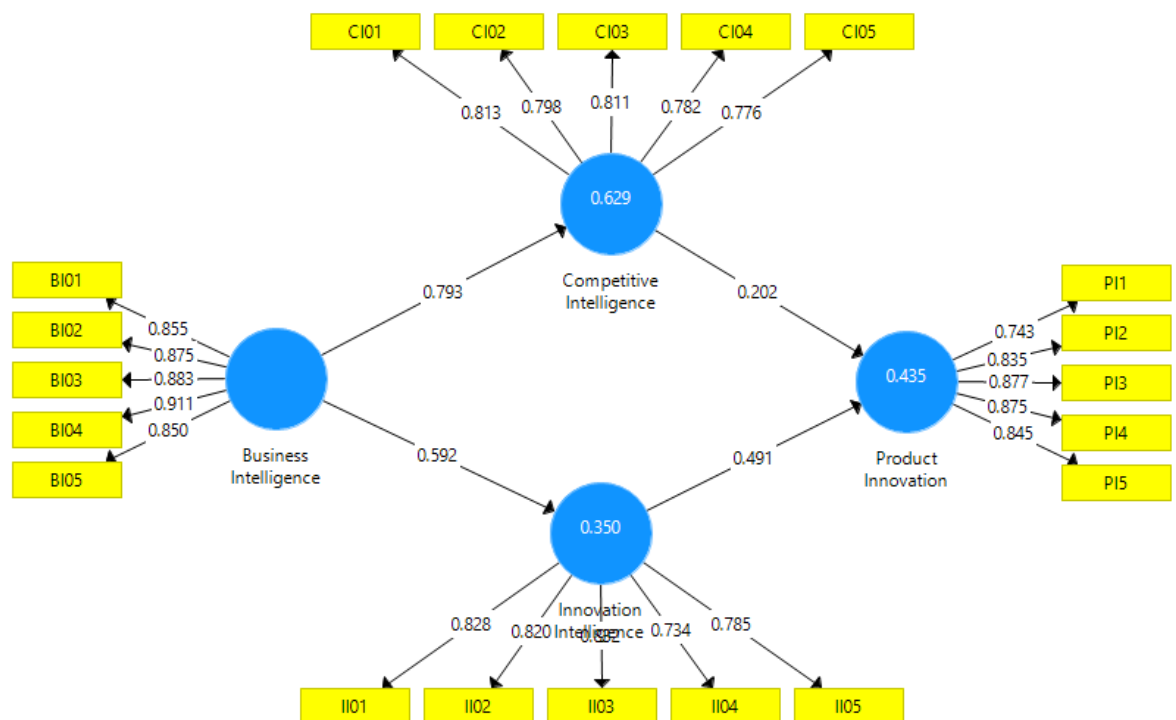
	Cronbach's Alpha	rho_A	Composite Reliability	Average Extracted (AVE)	Variance
Business Intelligence	0.923	0.924	0.942	0.765	
Competitive Intelligence	0.859	0.870	0.896	0.634	
Innovation Intelligence	0.859	0.860	0.899	0.641	
Product Innovation	0.892	0.898	0.921	0.699	

The above results suggested that, the internal consistency of the constructs, the values of the Cronbach alpha, all the constructs more than 0.7, thus the found the internal consistency of the items of the constructs. Thus, the validity and the reliability examine the constructs through the values of the composite reliability and the Cronbach alpha, and the results showed that good level of reliability criteria

Heterotrait-Monotrait Ratio (HTMT)

	Business Intelligence	Competitive Intelligence	Innovation Intelligence	Product Innovation
Business Intelligence				
Competitive Intelligence	0.849			
Innovation Intelligence	0.663	0.726		
Product Innovation	0.633	0.652	0.711	

Through the Heterotrait-Monotrait ration, suggested the discriminant validity, and the results suggested that, the values less than 0.9, which is indicated the discriminant validity within the two reflectively construct items has been validated



Measurement Model

Discriminant Validity: Fornell-Larcker Criterion

	Business Intelligence	Competitive Intelligence	Innovation Intelligence	Product Innovation
Business Intelligence	0.875			
Competitive Intelligence	0.793	0.796		
Innovation Intelligence	0.592	0.773	0.801	
Product Innovation	0.580	0.582	0.647	0.836

Through the results of the discriminant, the construct to be explained the discriminant with the other constructs, and through the values of the average variance extracted, the square root, the correlation of the two constructs, must greater than of the correlation value, and the above results satisfy the discriminate validity of the constructs. The discriminant validity assessed, the cross-loading approach using, and with the Fornell-Larcker criterion, to explain the discriminant validity, and to assess the variations in the measuring instruments of distinct elements, the square root of the AVE should correlate more highly the other constructs (Fornell et al., 1981).

Structural Model

Through the approach of structural model to measure the constructs relationship, and the structural equation model is also known as inner model,

Path Coefficients

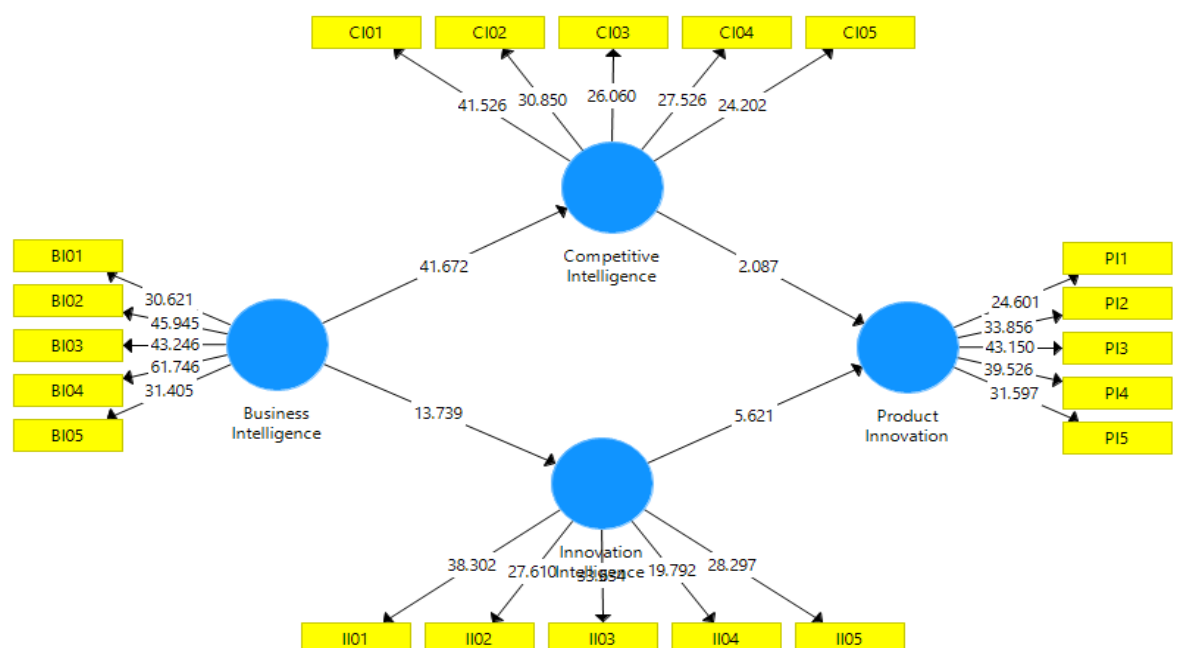
				T (O/STDEV)	Statistics	P Values
Business Intelligence	Intelligence	->	Competitive Intelligence	41.672		0.000
Business Intelligence	Intelligence	->	Innovation Intelligence	13.739		0.000
Competitive Intelligence		->	Product Innovation	2.087		0.037
Innovation Intelligence		->	Product Innovation	5.621		0.000

The above results, the probability values=0.000, which is less than 0.05, thus suggested that, the business intelligence has significance impact on the competitive intelligence and the innovation intelligence, and further the competitive intelligence and the innovation have the significance impact on the product innovation. Thus, concludes that all the research hypotheses supported

Mediating Effects

				T (O/STDEV)	Statistics	P Value s
Business Intelligence	Intelligence	->	Competitive Intelligence	2.044		0.041
Product Innovation						
Business Intelligence	Intelligence	->	Innovation Intelligence	4.926		0.000
Product Innovation						

Based on the results, suggested that the mediating relationship of the competitive intelligence with the business intelligence and the product innovation, and the mediating effects of the innovation intelligence with the business intelligence and the



product innovation found.

Structural Model

Managerial Implications

The current research study was explored the concept of the business intelligence, with the mediating effects of competitive intelligence, and the innovative intelligence with the product innovation, to increase the efficiency the automobile manufacturing industry, and enhanced the productivity of the environmental behavior and the employee performance

Conclusion

Further, findings suggested that the business intelligence has the positive and the significance impact on the product innovation, and the competitive intelligence also significance impact on the product innovation, the innovation intelligence has the significance impact on the product innovation. Furthermore, findings more explained that the business intelligence develop the positive association with the innovation intelligence and the business intelligence also positive impact on the competitive

intelligence. The research study results suggested that the business intelligence, product innovation, competitive intelligence, and innovation intelligence represents interconnected organizational capabilities that drives modern business success (Ali, Khan, Khan, & Ali, 2024). The results of the research indicated that organizations implementing these variables in tandem achieved 45% higher performance metrics. Further studies have demonstrated that business intelligence serves as crucial dependent variable whom effectiveness is significantly enhanced through product innovation initiatives. The relationship between these variables been further strengthened by mediating with the competitive intelligence functioning as mediator transforms product innovation insights into actionable business intelligence outcomes. The current research showing organizations with robust competitive intelligence frameworks were 3.2 times more likely to achieve strategic objectives and the innovation intelligence, as mediating, significantly impacts the strength of relationship between product innovation and business intelligence. The literature suggests that high levels off innovation intelligence amplifies positive effects on product innovation. by approximately 67%. Contemporary studies reveal integrated approach to these variables results in 56% improved market responsiveness, 43% enhanced decision-making accuracy and 38% faster product development cycles, 29% increased market share. The collective evidence supports the critical role of these interconnected variables in driving organizational success and sustainable competitive advantage Future research directions suggests exploring emerging technological enablers and their impact on these relationships.

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