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Assessing blockchain technology: Enhancing integration and sustainability in automotive supply chains

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Abstract
Analyzing the relationship between blockchain technology and sustainable supply chain performance will be the primary goal of the study. In particular, the study was conducted to examine the immediate and interactive effects of blockchain technology on supply chain integration and sustainability using hypotheses. According to the fluidity philosophical prism, the current study conceptualizes the use of blockchain technology as a collaborative computing asset for reconfiguring links. The investigation's findings support the notion because blockchain technology improves the performance of the sustainable supply chain. It demonstrates that the relationship between blockchain technology and sustainable supply chain performance is significantly impacted by supply chain integration, with an all-encompassing influence.

Keywords: Supply chain integration, blockchain technology, automotive sector

1. Introduction
Organizations can become leaders in their industry sector by optimizing inventories, cutting lead times, and improving customer service and quality with the support of a strong traceability system. Difficulties the automotive sector faces in managing its supply chain are examined in this study. Global industry expansion has resulted in increasingly complicated and dispersed supply chains. The majority of businesses still only have a few component tracking systems in place, even though significant expenditures have been made to enhance value or part monitoring in supply chains. Systems used within and between enterprises differ significantly in many organizations. Reducing expenses, waiting times, and improving quality and customer service overall, all of which would help businesses gain a competitive edge, requires a traceability system. Additionally, modern consumers want to know if the thing they purchased has an ethical origin. Automation has become increasingly important in the make available sequence process in topical years. Several systems must be integrated, which implies the quantity of statistics generated, to automate the SC process. To maintain quality, it is necessary to monitor the products and their status at every stage. One significant industry that propels a country's economy is the automobile sector. Organizations in this industry are currently dealing with a variety of difficulties. First of all, manufacturers are having trouble tracking down the parts that are in transit, the goods that are being produced internally, and the products that are being shipped. It continues to be a significant obstacle for the whole supply chain. Second, another issue that leads to excessive spending and compromises the overall efficacy of SC activities is overcapacity. Consumers want to know where the parts come from and are worried about the parts' sustainability. Tracing the parts and semi-finished products used in a specific vehicle or product family becomes essential in the automobile business. Since none of the supply chain's stakeholders have a standard framework for accessing information, it is challenging to carry out this procedure in real time and for them to communicate with one another in real time.
One of the foremost drivers of Indian economy is the car industry, which employs approximately thirty million people and accounts for forty-nine percent of the country unpleasant domestic product (GDP). The automobile business in Asia is categorized as the world's fifth-biggest producer of trucks and buses, with a Two-wheelers, transport cars, trucks, and oxen are the four sectors Sahoo and Rath (2018) [15]. Given the huge opportunity for rechargeable and driverless vehicles, India is anticipated to by the twenty-first century, emerge as the dominant force in shared transportation.

The manufacturing sector for automobiles is fiercely demanding, viable, with a constant push to enhance its sustained performance of the supply chain (SSCP) White (2017) [19]. To achieve sustainability SC performance, businesses must be creative in how they offer value to their clients. Furthermore, it be predict that the use of Industry 4.0 innovations offered via ICT will perk up operational unity, most important to long-term corporate success (Lu and Xu, (2017) [10] and Kamble *et al*., (2018) [9]. Its specific environmental concentration is upstream and downstream, free of flaws. In order to get long-term benefits, modern companies are continuously looking for narrative approach to incorporating ICT addicted to their day-to-day activities. While earlier research (Chen *et al*., 2018) [3] supported the idea that expenditures on information and communication technologies enhance integration of the SCI and Supply Chain Performance (SCP), later research discovered that these funds have not had a lasting effect upon organizational effectiveness. We are motivated to investigate the association regarding ICT-enabled SCI and SSCP more after finding inconsistent results. Furthermore, there isn't a single study on the impacts of BT on the SSCP. According to Pradabwong *et al*., (2017) [13], SCI plays an important role in fostering better working relationships and partnerships across supply chain practitioners. By securely storing all supply chain operations and making them readily available to each of the SC suppliers, BT raises the supply chain integration grade**.** About a variety of variables that are both dependent and independent, prior research has also acknowledged SCI as a noteworthy mediated element in SSCP field**.** BT can improve supply chain integration by promoting ecology and outstanding corporate performance. Blockchain can give a hand in managing the automotive supply chain's operations, given the number of components involved. Businesses continue to look for methods to perk up the good organization of their SC and welcome the transformation that BCT brings. Despite the deployment of information expertise, it is said that there is less trust in the middle of supply chain associates in the present SC. In order to increase trust, organizations are concentrating on building positive associations through extra supply chain participants. However, present is no assurance that information is reliable, as some supply chain participants may intentionally or inadvertently spread misleading information that affects the entire ecosystem. In order to enhance supply chain operations, this essay attempts to apply blockchain technology in a modern automotive company. Blockchain be able to assist in managing the automotive supply chain's operations, given the number of components involved. Businesses continue to look for methods to get better the effectiveness of their SC and welcome the transformation that BCT brings. Despite the deployment of information technology, it is said that there is less trust among SC associates in the present supply chain. In order to enhance supply chain operations, this essay attempts to apply blockchain technology in a modern automotive company.

2. Conceptual foundation of the formulation of hypotheses

2.1 Blockchain technology in automobile sector

Globally, the automotive sector has been essential to both technological advancement and economic expansion, and India is no exception. The way cars are made, sold, maintained, and driven has changed dramatically in recent years due to the integration of BCT. As per the recent survey of 72 percent of professionals in automobile manufacturing thought that by 2021, blockchain technology would have a major impact on auto sector in this SC management. But the Indian vehicle industry remains hesitant to make use of equipment because of for a variety of causes, however, is gradually gathering steam to seize novel probability Kamble *et al*. (2018) [9]. By increasing transparency, decreasing fraud, simplifying procedures, and opening up new business opportunities, blockchain a decentralized as well as protected digital ledger has the probable to wholly transform the Indian auto sector. According to study, BCT has the latent to completely change the automobile industry, having a big effect on SCM. Blockchain is organism progressively adopted by the Indian automobile industry, but the government is also developing legislation to make integration easier and bring the industry into compliance with global norms. In addition to supporting developments in connected solutions like telemetric and SOS systems, this entails addressing safety and pollution standards. In the end, several sources claim that blockchain can increase supply chain effectiveness, lower the number of fake parts, and allow for more individualized car ownership and control. Due to the recent flurry of tech changes, Indian automakers now must develop and apply cutting-edge technology in SCM. The automakers need to shift their objectives, generating an edge over others by developing fresh client prospects through market price optimization through life phase cost optimization Kamble *et al*. (2018) [9]. According to Saberi*et al*., (2018) believe BT inside supply chains unites all of the supply chain stakeholders to jointly produce revenue through carrying out respective designated jobs, accomplished by dynamically configuring supply chain assets. The main values that BT upholds are greater openness, rigidity, transactional dependability, security, and credibility. The efficiency and achievement of the SC workforce be thought to be enhanced in the implementation of BCT. Blockchain was suggested by Polim *et al*. (2017) [12] as a means of having the strong capacity for integrating knowledge. According to the findings of this research, BT is an agile firm that may connect, construct, and reconfigure both within and without skills for coping with circumstances that very quickly.

2.2 The Blockchain Technology (BT)

Scattered Ledger Technology, or blockchain, is a relatively young knowledge. Blockchain technology makes it possible to transform and store anything, including currency, in a digital manner. In reality, it is a data block-based interchange procedure. One block is joined to another in this way. It is impossible to hack these blocks. The goal of blockchain technology is to protect digital documents. You can learn about Blockchain technology by using Google Docs as an example. A document is distributed rather than copied or transferred when it is created and shared among a group of people. Blockchain, however, is more complicated than Google Docs. In a nutshell, Blockchain is Distributed Ledger Technology, which uses decentralization to make any digital asset visible and unchangeable. Blockchain makes it possible to capture and share digital information. Blockchain is an unchangeable, undeletable, and irreversible record of transactions. Although blockchain was initially proposed as a research project in 1991, it was employed in

Bitcoin in 2009. Block technology hand round as the basis for the cryptocurrency known as Bitcoin. According to the latest study, a lot of parties and automobile manufacturers have chosen BT to accomplish expansion, verification, and immediate tracking in connected automobiles, self-driving vehicles, and cybercrime**.** Blockchain technology can enhance supply chain transparency and traceability by if a protected and immutable evidence of dealings. Because public blockchain is accessible to everyone, it can draw a large user base with vibrant communities. The following phases of potential blockchain development were established by Kamble *et al*. (2018) [9] based on the various forms of blockchain technology and the usage characteristics that go along with it. Blockchain 1.0 is primarily concerned with monetary transactions, namely using encryption to enable peer-to-peer Bitcoin transactions. Smart contracts, privacy, and blockchain tokens Ethereum being the most well-known platform are the main components of Blockchain 2.0. Smart contracts that can be used in more intricate real-world situations are the focus of Blockchain 3.0. In the meantime, artificial intelligence (AI) integration will be a feature of the forthcoming Blockchain 4.0. As of right now, blockchain technology is independent of crypto currencies like Bitcoin. Rather, it is self-sufficient, meaning it may be applied to every aspect of society. For instance, a number of industrial sectors have been actively researching ways to use blockchain technology, including the use of "blockchains + supply chains".

2.3 Supply chain integration (SCI)

Organizations have considered SCM to be an effective technique that improves performance and competitiveness by streamlining internal and external processes. In order to meet customer demands and provide value for them, businesses are now vying with one another in the supply chain for prompt delivery, a wide variety of creative products, and services. In order to make SCM more innovative and responsive, it has thus become a popular research topic for scholars, practitioners, and organizations. The supply chain has become a competitive weapon that forces firms to collaborate and integrate with external partners as globalization and the advancement of information technology (IT) have altered relationship structures and brought organizations closer together. SCI was defined as "the efficient and effective movement of materials, information, money, and knowledge as needed by the customer through the alignment, linkages, and coordination of processes, people, information, knowledge, strategies, and communication across the supply chain among all points of contact." A survey of these articles, however, reveals a lack of agreement regarding the definitions, dimensions, and conceptualization of SCI. Additionally, it demonstrates that SCI dimensions and measures have been examined from an extensive variety of angles and in an assortment of contexts. A study of the literature that offers a thorough perspective on SCI was therefore deemed necessary. According to (Wong *et al*., 2011) [20], CI is amorphous as "the size to wherein a rigid cooperates by clients to enhance insight and facilitate joint preparation." PI connects both primaries via areas into a fully automated computer system, making the firm's interconnected repository easily accessible. According to (Alfalla-Luque, 2013) [1], procedure integration gives every unit a link to actual-time information that is useful for controlling and restoring the condition of inventories during the supply chain. Research has shown that using a PI enhances the relationship between initial vendors as well as lower-value customers**.** The purpose of its adoption in a factory is to orchestrate the stream of items and data between and through SC. In the current investigation, we investigate the roles played throughout the inside and outside supply chain integration factors. Public markets like auto auctions and closed markets like funding of supply chains may constitute the basis for industries. Therefore, to create supply chain integration, firms in the automaker sector which are constantly searching for tools, techniques, and advancements that will allow companies to improve SSCP required coordinating with each other inside the automobile SC. 2.5% within the automobile industry, sustained SC performance. A company's aptitude to operate successfully depends in large part on SSCP. The development, application, and assessment of strategies are aided by prompt and efficient assessments of supply chains. The present relationships among the SC parties must be changed in order the SC to transition to a digital society, while data entry must be made available to all members. For collaboration and community innovation to be properly integrated, each SC partner becomes as essential**.** Most of the earlier research on SSC has emphasized the need to include sustainability's economic, social, and environmental facets. I an effort to highlight enhancing the car industry SC's financial results and confirming its viability over time, we have concentrated on its economic viability in the current work. Our study centers under the power of association operating in the automotive manufacturing process to attain superior ongoing economic success as opposed to focusing on immediate objectives of greater inefficiency and profitability of SCM. The role of industry durability in enhancing the financial success of a company and the value chain comprises several businesses' structural and tactical collaboration perform. Taking an overall look of the SC, the study considers the significant roles that vendors and consumers perform for accomplishing SCI.

As a result, SCP and SSCP deal with the changes built within enterprises as a result of the impact of a worldwide society that its traits of intense weak logistical groups, worldwide rivalry, and fast digitization and the ability to share facts**.** Such the traits of a very fluid setting that the DC idea is intended. A study of the literature that offers a thorough perspective on SCI was therefore deemed necessary. Thus, by reviewing the literature, the current work attempts to close the previously described gap and makes multiple contributions to the research on supply chains. We have first determined the causes and motivators of SCI. Second, we provided clarification on the definition and scope of SCI as they are covered in the present literature. Third, we encompass categorized publications pedestal on academic frameworks and hypotheses that may help us better known SCI and its consequences. Fourth, we contain categorized the SCI ending in a methodical manner. Lastly, we have outlined the prospect research schedule and suggested an intangible structure for the evaluation of SCI.

2.4 The success of viable supply chains and implementation of blockchain technology

Information, product movements, cash, and materials/goods are all intricately intertwined inside a supply chain. All supply chain participants can no longer be coordinated by a

coordination system that has a single chain leader at its center. The network architecture of supply chains become more complex as the number of nodes increases, making it easier for information to be distorted. This degrades confidence amongst supply chain nodes and impacts the chain's efficiency. Blockchain-based supply chain collaboration can increase supply chain stability and dependability, lower transaction costs, and increase supply chain efficiency. Consequently, as the most modern science created in the supply chain, BT led to safer deals, enhanced openness, and product identification in the framework of digitizing**,** resulting in decreased enhanced SSCP and lower expenses. Considering this, given the undertake of BCT to add to SSCP using the hypothesis (H_1, H_2 and H_3), this investigation puts forth the following first entails H1 blockchain technology adoption in SSC, influences it directly and positively. SCI, and the effectiveness of an environmentally friendly SC According to (Wang *et al*., 2019) [17] and the researchers (Wang *et al*., 2015) [18], blockchain technology facilitates the chain of custody by securely integrating many parties and offering benefits such as product tracking, deal construction, process digitization, and electronic contract fulfillment. Among the important features of BT, is integrating data. According to the authors (Kamble, 2018) [9], BT allows hyper-levels in SC mixing that connect information regarding clients, vendors, and users. To establish the cause of SC interruptions and well lever events like evoke of items, proposes connecting blockchain and IoT. Likewise, BT unification with various new technologies could decrease ambiguity and improve processes of cooperation, authenticity, and supply chain openness. According to (Lu and Xu, 2017) [10], blockchain improves logistical chains' productivity, silence, or transparency. According to current research, SCI is a significant mediated factor in the relationship between SSCP and ICT-enabled integrated solutions and supply chain data systems.

3. Methodology

3.1 Techniques and examples applying a methodology based on surveys,

The model that was suggested is depicted in Figure 1, and the related hypotheses were studied. The businesses were first chosen through the databases of the Society of Indian Automobile Manufacturers (SIAM) and the accessories of car manufacturers. Utilizing a Dropbox connection, the online poll was created and sent to 525 leaders from 305 different firms. The poll was limited to participants with not less than two a year's work in the automobile business, and responses were kept voluntary. This ensured that those who replied were preferably a little familiar with the specifics of this industry. Furthermore, the poll was limited to those who were familiar with the principles of BT and SCI. The study was completed by 253 respondents representing who were representatives of 187 manufacturers of automobiles and auto components.

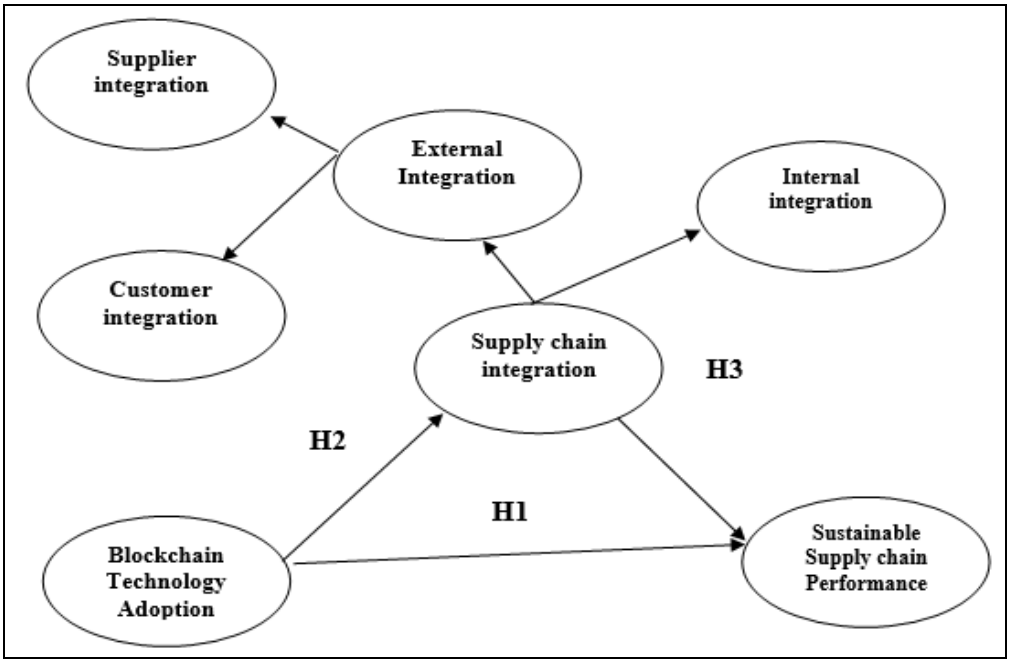

Fig 1: The proposed research model

Accordingly, the total number of organizations (N=187) corresponds to the optimal population size. The 187 organizations had different employee counts: fewer than one hundred individuals (17%), 100-500 personnel (33%), 500-1000 jobs (35%), and more than 1,000 staff members (15%). Additionally, the level of control over the firms shifted, with 78% being private businesses and 22% being collaborations. Considering the subjects of BTA and its interaction with the lead is automation supervisors (12%), supplies, including sourcing (18%), plant leaders (8%), SC planned (21%), and transport (9%). The 187 organizations had different employee counts: fewer than one hundred individuals (17%), 100-500 personnel (33%), 500-1000 jobs (35%), and more than 1,000 staff members (15%). Considering the subjects of BTA and its interaction with the lead is automation supervisors (12%), supplies, including sourcing (18%), plant leaders (8%), SC planned (21%), and transport (9%).

3.2 Levels of Evaluation

The evaluation levels were determined via a 5-point Likert scale, by BTA criteria ranging as of 1 (don't think about

integrating) to 5 (done properly). The scale is also second-hand to assess blockchain expertise parameters based on previous research, initially with 12 factors but reduced to 10 after specialist consultation. Supply chain integration initiatives were also measured using a 5-point scale, adapted from prior studies. Here's a more detailed breakdown:

- **Likert Scale:** Opinions and attitudes regarding the evaluation's various components were gathered via a 5-point Likert scale.
- **BTA Criteria:** Technology integration was evaluated using the BTA (Business Technology Application) criteria, which were rated scheduled a 5-point Likert scale; where 1 denoted least amount of integration and 5 the most.
- **Blockchain Technology Parameters:** After consulting with experts, the original set of 12 components used to measure blockchain technology was reduced to 10.
- **Supply Chain Integration:** A 5-point Likert scale, by 1 denoting strong dissatisfaction and 5 denoting strong support, was also used to assess the supply chain integration endeavor.
- **Background Information:** The supply chain integration initiatives were made to order as of studies by (Green *et al*., 2008) [4] while the creation of the blockchain technology characteristics was guided by current research, particularly by (Kamble *et al*., 2018) [9].

3.3 Validation evaluation

3.3.1 The third errors caused by reactions and biases in typical methods

The poll detailed the data that was gathered over 10 weeks, from October 28, 2019, to January 10, 2020, using two mail waves. T-tests were used to compare the initial (143 replies) and phase two (120 responses) groups. There be approval statistically major difference connecting the set, according to the results of the t-tests for constructions CI (t=-0.417, P=0.672), SI, BTA (t=-1.320, P=0.159), and II (t=1.691, P=0.124). On the other hand, we calculated the existence of typical technique skepticism as it was suggested by (Podsakof, 1986) [11] to use the company's one-factor evaluation.

- **Elaboration:** In order to gather data, the study used a survey method, splitting the participants into t2 groups: first group (143 responses) and second phase group (120 responses). Over the course of ten weeks, two mailings were sent out as part of the survey. T-tests were then used to compare the two groups in the data analysis. There is no statistically significant difference amid the set according to the findings of the t-tests for CI, SI, BTA, and II. In other words, the third signal of respondents did not represent a new, distinct group of individuals with different opinions or characteristics.

Key points

- **Survey Method:** To gather data for the study, a survey was employed.
- **Two Waves:** To collect replies, two mail waves were distributed.
- **Extrapolation:** Extrapolation was used to address late responses.
- **Statistical Analysis:** The two groups were compared via t-tests.

3.3.2 Normality of data and statistical descriptions

The skewness and kurtosis of the data can also be used to verify its normalcy. Despite the fact that skewness and kurtosis are frequently employed in practice, there is no set criteria that specifies which values are considered normal. A normal distribution or symmetrical dataset should ideally have skewness equal to 0. In Table 1, the normality metrics, the skewness and kurtosis, along with the average (mean) and variance are shown. The average readings within the 3.98-4.14 spectrums showed the strong capacity for organizations to use blockchain technology for an enhanced SSCP. Skewness, along with the highest percentages, have been discovered to be 1.26 (with a correspondingly 2.18 with 0.306 (out of which standard error is 0.271). The readings for skewness and kurtosis were all above the recommended bounds, thus demonstrating the normality of provided the information they needed.

Table 1: Factor loadings and descriptive statistics

Factor loadings	Kurtosis	Skewness	SD	Mean	Measurement items
0.976	1.03	-0.82	1.03	4.02	SSCP6
0.935	1.02	-0.47	0.99	3.79	SSCP5
0.745	1.09	-0.17	1.35	3.98	SSCP4
0.616	1.26	-0.59	1.23	4.06	SSCP3
0.867	1.22	-0.63	0.85	4.04	SSCP2
0.795	1.14	-0.86	0.79	4.09	SSCP1
0.833	0.99	-0.74	1.22	4.23	SI3
0.972	1.02	-0.83	1.29	3.97	SI2
0.834	1.09	-0.66	0.88	3.82	SI1
0.798	-0.36	-0.72	0.98	3.44	CI4
0.684	-0.39	-0.89	0.79	3.67	CI3
0.376	-0.41	-0.97	1.16	3.28	CI2
0.765	-0.32	-0.94	1.24	3.72	CI1
0.921	0.56	-0.88	1.07	3.87	II3
0.645	-0.62	-0.38	1.23	3.67	II2
0.712	-0.38	-0.68	1.09	3.98	II1
0.723	-1.08	-0.58	1.49	3.48	BT3
0.789	-1.34	-0.28	1.35	3.23	BT2
0.815	-1.19	-0.16	1.44	3.09	BT1

3.3.3 Evaluation of factors
To find out what people felt about all the things chosen for the research, factor research took place. Five elements went out accounting for 76% of the whole variation. With Barlett's testing, the significance level of probability 0.01, which is the "Kaiser-Mayer-Olkin" (KMO) statistic for sampling sufficiency of 0.90, is regarded as their worth Table 6.1 provides the variable load numbers of supply chain management.

3.3.4 Study of Variability
By evaluating Variance Inflation Factor (VIF) and assessing the appropriateness of sample size using power analysis, this study investigates variability across survey data. According to (Hair *et al*., 2010) [6], correlation between independent variables, or multicollinearity, is measured by the VIF scores, which range from 1.234 to 2.073, indicating moderate multicollinearity. With a consequence size of 0.10 and an importance level of 0.05, a post hoc power analysis was conducted using G*Power, yielding a power value of 3.1.

Elaboration
- A statistical metric called the VIF is new in multiple regressions to evaluate how multicollinearity affects the variance of estimated coefficients. When autonomous variables in a weakening model encompass an elevated degree of connection by one another, this is known as multicollinearity. How to Interpret VIF Values: No multicollinearity is shown by a VIF of 1, moderate multicollinearity is suggested by a VIF of 5, and high multicollinearity is indicated by a VIF of 10.
- A statistical technique called power analysis is used to compute the accurate model size required in favor of a study in order to detect a significant impact with a given degree of probability (power). The significance level, or the likelihood of rejecting the null hypothesis when it is true, is represented by the importance level (0.05).
- Effect Size (0.10): This indicates how big the effect under study is.

4. Resultant
4.1 Method of Quantification
Using CFA, the underlying conceptions' one-dimensional was also examined**.** The framework's fit metrics of RMSEA=0.061, CFI=0.97, TLI=0.796, DF=517, $\chi 2$/DF= 2.894, a chi- ($\chi 2$)=1329.47, guaranteed a reasonable ft. The load factors from the exploratory factors, mixed reliability, and the average variation extraction (AVE) values according to (Hu & Bentler, 1999) [7], were utilized to assess the validity of the convergent analysis. Table 1 show that every factor loading for every item was greater than suggested cut-off of 0.50. Additionally, mean AVE and joint reliability indices be over proposed endpoints of 0.60 and 0.90, separately.

Table 2 demonstrates that there were no problems with discriminate accuracy because the sum of the square roots AVE for every element was greater compared with the connections across that element and other variables.

Table 2: Average variance extracted, composite reliability and correlation between the constructs

BT	SI	II	CI	SSCP	AVE	CR	Constructs
0.729	0.343	0.413	0.548	0.337	0.515	0.928	BT
	0.854	0.615	0.563	0.489	0.748	0.923	SI
		0.732	0.603	0.437	0.543	0.853	II
			0.972	0.395	0.912	0.934	CI
				0.925	0.875	0.934	SSCP

4.2 Making assumptions
The structural framework was examined using the SEM, and then its formulated conclusion went to scrutiny. The consistent beta coefficients (β) or different association coefficients (R_2) were calculated using SPSS technology. The dimensional representations of the model's variables are shown in Figure 2. Figure 2 simulation illustrates how BT affects SSCP both directly and indirectly by way of supply chain integration's modulating effect remarkably, financial success is seen as the sole motivator for long-term practicality of an affordable supply chain. The subsequent scene was displayed by the design. Indexes of modification: F^2=12.673, F^2/DF ratio=goodness of fit index (GFI)=0.95. Neither non-nor mated fit index (NFI)=0.94; adjusted goodness of fit index (AGFI)=0.74; good foot index (AGFI)=Root means square residual (RMR)=0.07 and correlation coefficient (CFI)=0.97 show a good 3 ft.

4.2.1 Unaffected SCI and SSCP by BTA
With the strategy of SEM, the immediate possessions of BT going on the SSCP (H1) and supply chain integration (H2) are scrutinized. The BT effectively and favorably affects the SSCP, according to proposition H1, which was determined as critical (β=0.192, P=0.002), using a rate of 6.5% (R^2) explanation based on the blockchain technology. For the variations throughout the SSCP factor According to premise H2, BTA both personally and indirectly has a large beneficial effect on the SCI (β=0.327, P=0.001), and the BTA accounts for 30.5% of the variance (R^2). This nonetheless has no effect on our strategy in supply chain management.

4.2.2 SCI's mediating consequence on SSCP and BTA (H3)
The metrics derived commencing the unified investigation study in Figure 6.2 are applied. Kay and colleagues examined the intermediary consequence of SCI in the link among BTA and SSCP. Three requirements for conciliation were identified by **(Hill*et al*., 1997)** as complete negotiations, intermediate arbitration, sans middleman. Table 3 shows the initial impact of this BTA on an SSCP in addition to a mediator. The Z-statistic of 3.96, the median variable of 0.81, in addition to the correlation coefficient of β=a value of (p<0.0001) suggest the mediating effect is significant. Table 4 presents an outline of the findings from this research's assumption assessment. The study's characterizations the critical hypothetical and useful consequences of this exploration are recorded beneath.

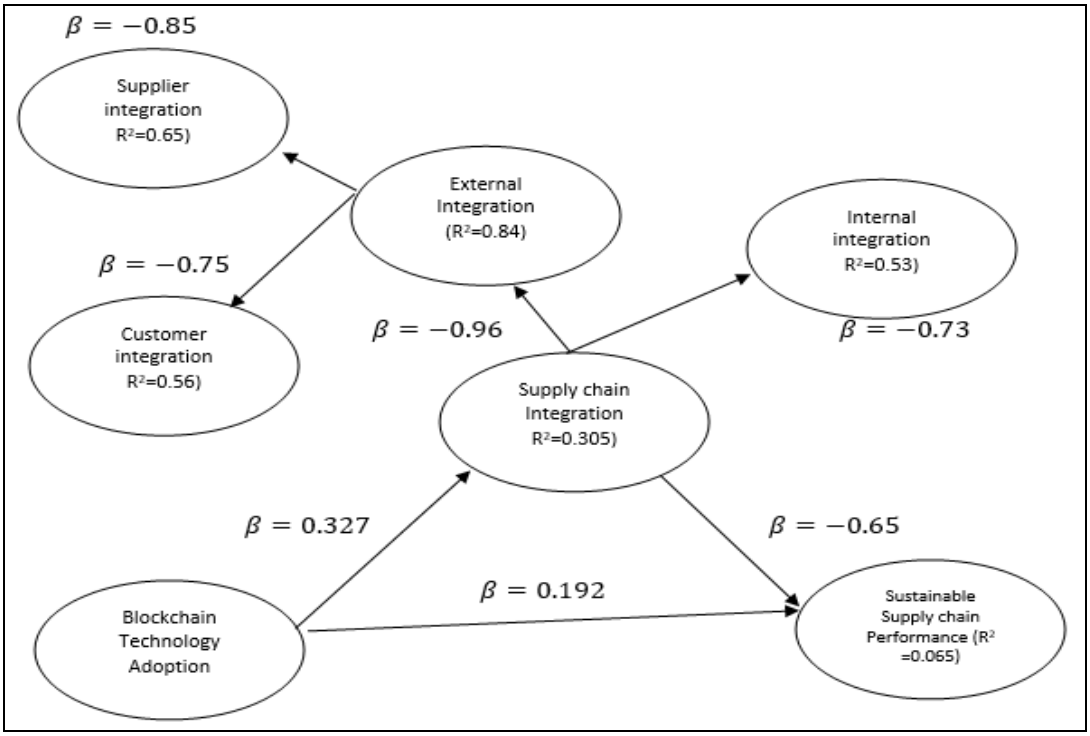

Fig 2: Integrated structure of equation model

5. Study implications

The primary theoretical and practical ramifications of this study are listed below.

5.1 Contextual ramifications

Using flexibility theories, this investigation clarified how BTA, SCI, and SSCP relate to one another. The consequences involve that BT adoption, which influences SSCP by facilitating SCI advancement; can mitigate the delays bring about via the virtualization of supply networks. According to study results, BT is a crucial flexible strength for an organization that is able to combine, develop, and reconfigure both inside and outside skills to meet the demands of an ever-shifting landscape**.** Our findings also demonstrate how important it is for stakeholders to be integrated into the SC. Additionally, as an organization improves its capacity to achieve its goals, it might grow adaptable and receptive to shifts in its surroundings that affect its SC.

Table 3: A list of the mediation's outcomes

Dependent variable: The direct connection in being there of meditation The direct relationship without meditation	Independent variable
Insignificant by β=-0.07, at P=0.604 Significant by β=0.187, at P=0.004	BT

Table 4: An overview of the studies tested hypotheses

Result	Sig.	C.R.	S.E.	Unstandardized estimate	Hypotheses
Full mediation exists				0.397	H_3: SCI mediate the association among BTA and SSCP
Supported	0.000	3.943	0.089	0.433	H_2: BTA unswervingly and certainly influence SCI
Supported	0.004	3.042	0.072	0.198	H_1: BTA straight and certainly influence the SSCP

Blockchains can as well effect in supply chain disruption, which reduces corporate inefficiencies in the chain by reducing operation time and energy due to fewer players it may be possible to set up the goods and procedures more quickly, thereby lowering the speed of transactions and errors made by people. Additionally, by ensuring the confidentiality and integrity of the information, BT can lower the price of preventing deliberate and careless data misuse, raising risks related to the supply chain, and decreasing organizational dependability. In addition, governments and consumers are both asking for vendor integrity. Integrity has an edge over rivals that forward-thinking businesses have recognized. This has increased trust among consumers, which has benefited the business financially. It propels hypotheses with verifiable information in regards to blockchain innovation's impact on the SSCP. The outcomes tended to the hole and presented the defense that, thanks to SCI's mediating effect, blockchain technology contributes to SSCP. Therefore, according to (Bonson*et al*., 2019) and the research study conducted by (2019), blockchain technology is associated with both continuous supply chain efficacy and supply channel cohesion. Additionally, by exhibiting the impacts of Various SCI aspects, including the Implementation of Processes (PI), Supplier Integration (SI), with customer Integration (CI), the examine we conducted adds to a wealth of literature already in existence regarding the inner and outer forces of integrating supplies that either stall or foster effective implementation of blockchain technology via the goal of SSCP. An investigation demonstrates why operators

in the vehicle sector believe this BT-empowered SCI works on the SSCP by involving its monetary perspective as an impetus for the drawn out monetary reasonability of supply chains. According to (Schifanella *et al*., 2021) [16], BT in the motor vehicle sector has a chance to enhance confidence and cooperation amongst commercial partners, encompassing users and car models. It has been discovered that the BT directly affects each of the SCI levels. This suggests that the perception of BT as a flexible skill is that it enhances internal cohesion as well as exterior competences (suppliers and customers). By implementing BT, SC management may use this knowledge to improve efficiency within the SC networks. The recommended model uses an instance of a work-based, effective unanimity technique. A consortium blockchain including several companies was employed to agreement legitimacy and consistency of firmware raise. To encourage the cars to disseminate revisions that keep every seller bank in the blockchain's credit profile intact, a compensation structure is set up and put in place. Considering an extensive level of insertion, these functions give organizations possession of error-free, unchangeable material that is available to all authorized collaborators. The results suggest that the blockchain's abilities enhanced the incorporation of suppliers and strengthened the supply chain infrastructure, chief to superior partnerships by suppliers, and prompt deliveries. When it comes to internet-enabled or autonomous automobiles, blockchain technology has enormous opportunities. Our findings will inspire people in the car sector to put money into blockchain technology and improve the environment, as blockchain technology is still an entirely novel concept throughout India.

6. Conclusion

The main motto of the research was to review the connection amid BT, SCI, in addition to SSCP. Following confirmatory factor evaluation and modelling of structural equations, answers gathered from 187 manufacturers of automobiles and auto components were analyzed. As indicated by the examination supporting the dynamic capacity principle, blockchain technology influences the operation of the SC and organizational assets. The analysis aids earlier research on ICT-enabled SCs by highlighting BT's pivotal contribution to influencing the SSCP via the integration of supply chains. Our investigation has several constraints, just like every other academic study, yet these drawbacks open the door for new research avenues. Additionally, the present research focuses primarily on the financial aspect of SSCP. Future research should, however, concentrate more on social and environmental SSCP. Additionally, Industry 4.0 novel innovations like large-scale analytics, IoT, and advanced manufacturing are frequently linked with BT solutions.

7. References

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