Online ISSN: 2249-460X
Print ISSN: 0975-587X
DOI: 10.17406/GJHSS

Global Journal

of Human Social Sciences: E

Economics



Towards a Self-Reliant India

Acumulation through Digital Platforms

Highlights

Brazilian Publicly Listed Corporations

Dispossession of the Digital Commons

Discovering Thoughts, Inventing Future

VOLUME 24 ISSUE 2 VERSION 1.0

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Volume 24 Issue 20 was originally issued as E2

Global Journal of Human-Social Science: E
Economics

Global Journal of Human-Social Science: E
Economics

Volume 24 Issue 2 (Ver. 1.0)

Open Association of Research Society

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USA Toll Free: +001-888-839-7392
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Volume 24 Issue 20
Originally issued as E2



Global Journal of HUMAN-SOCIAL SCIENCE: E
Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

Capitalist Accumulation through Digital Platforms: From Click-Farms to Dispossession of the Digital Commons

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Abstract- The article analyzes several theoretical perspectives from the political economy of communication on the contribution of the activities of users and workers on digital platforms to capitalist accumulation. To this end, it addresses the transformation of crowdsourcing platforms into click farms and the commercial production of disinformation as opposed to the activity of ordinary users of social platforms. In this context, it proposes replacing the search for a particular update of the theory of digital labor and digital surplus value with an understanding of the Internet as a field in which different strategies of accumulation compete, linking the subsumption of intellectual labor to processes of accumulation through the dispossession of the general intellect. Finally, it points to the perspective of an algorithmic prince as a fundamental political condition for the maintenance and expansion of capitalist accumulation through digital platforms.

Keywords: *surplus value. platforms. accumulation through dispossession. digital labor. Click farms.*

GJHSS-E Classification: *LCC: HM548-548.7*



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Capitalist Accumulation through Digital Platforms: From Click-Farms to Dispossession of the Digital Commons

Kenzo Soares Seto

Abstract- The article analyzes several theoretical perspectives from the political economy of communication on the contribution of the activities of users and workers on digital platforms to capitalist accumulation. To this end, it addresses the transformation of crowdsourcing platforms into click farms and the commercial production of disinformation as opposed to the activity of ordinary users of social platforms. In this context, it proposes replacing the search for a particular update of the theory of digital labor and digital surplus value with an understanding of the Internet as a field in which different strategies of accumulation compete, linking the subsumption of intellectual labor to processes of accumulation through the dispossession of the general intellect. Finally, it points to the perspective of an algorithmic prince as a fundamental political condition for the maintenance and expansion of capitalist accumulation through digital platforms.

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I. Introduction

In the tradition of, or in dialogue with, the political economy of communication (PEC), several authors have sought to understand the role of digital platforms for capitalist accumulation, mainly by proposing a new general paradigm that updates Marx's conception of the exploitation of labor through the extraction of surplus value.

This theoretical tendency arises from the fact that the PEC seeks to analyze the processes through which society supplies itself with symbolic goods "under capitalist conditions of production and consumption, including its political and institutional processes, taking as a starting and ending point the labor theory of value" (DANTAS, 2012, p. 286).

In this sense, Dantas (2012) proposes a general law of information capital; Bueno (2017) states that the attention economy is the central contemporary form of value production; Fuchs (2013) defines digital work as its source; and Bolaño (2000, 2012) offers a general theoretical framework for analyzing the cultural industry and information commodities, including in the digital context.

New "general laws" and "general theoretical frameworks" are certainly ambitious interpretations that, by proposing a single logic capable of synthesizing all the multiple economic relations traversed by the digital, constitute a field of controversy centered around two questions: whether and in what terms the category of "surplus value" remains valid to characterize all contemporary processes of labor exploitation; and if so, who are the exploited people from whom surplus value is extracted in digital platforms.

For some authors, the digital economy does not produce value (DURAND, 2017); for others, the extraction of surplus value is reduced to the exploitation of formal employees of companies such as Alphabet (BOLAÑO, 2012), and in some cases extends to all users of these services, almost half of humanity (DANTAS, 2012; FUCHS, 2013, BUENO; 2016). In the next section, this article describes the central lines of argument from each of these perspectives, in order to then present a theoretical alternative for understanding the role of the Internet and digital platforms for capitalist accumulation.

To this end, in the second section we recover Marx's theory of productive and unproductive labor, particularly his reflections on the labor that produces intangible goods. This is necessary in order to consider the applicability of these concepts in analyzing the diversity of social relations mediated by digital platforms that involve the production of content, data, and metadata.

The third section examines the role of click farm workers and ordinary platform users in the digital economy. In this sense, we develop an argument for replacing the search for a single general paradigm of digital labor for all digitally mediated relations with an understanding that they constitute a field of multiple accumulation strategies by different capitalists.

Thus, the controversy over whether or not the activities of professionals from Internet companies and ordinary users of the platforms should be generally recognized as productive labor gives rise to a case-by-case analysis of the role they play at different times in the private appropriation of socially produced wealth, considering the combination of processes of surplus value extraction with what Harvey (2005) calls accumulation by dispossession. In this sense, the contributions of authors such as Durand (2018), Bolaño (2012), Dantas (2012), Fuchs (2013), and Zuboff (2018) become complementary rather than contradictory.

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Finally, in the conclusion, we announce our next steps of research agenda, developing the debate of an "algorithmic prince", in the Gramscian sense of prince as conductor of hegemony, as a fundamental political condition for the maintenance and expansion of capitalist accumulation through digital platforms.

II. The Digital Economy and the Production of Surplus Value

There is a tradition of Marxist thought, of which Machado (2017) is a typical example, that understands the processes of capitalist accumulation centrally through factory production, ignoring the possibility that the creation of intangible goods participates directly in the global production of value. An updated perspective on this tradition is represented by Durand (2018, p. 8, our translation):

> In the perspective chosen here, the exploitation of labor always plays a central role in the formation of a global mass of surplus value, but the focus is on the mechanisms of capturing capital (monopoly intellectual) that allows it to accumulate its profits, taken from this mass global surplus value, and limiting their direct involvement in exploitation (Foley 2013, 261). The digital economy is therefore a rent economy, not because information is the new source of value, but because controlling information becomes the best way to capture value.

Like Harvey (2005) and other authors, Durand (2018) emphasizes that the diffusion of information technologies has allowed the fragmentation of value production chains on a global scale, with the distribution to the capitalist periphery of several stages of production previously concentrated in countries of central capitalism. The concentration of value and its return to the central countries then occurs through the tightening of intellectual property rights, which characterizes the monopolistic intellectual capital. This works through the decentralization of tangible assets, factories, inputs, for example, combined with the centralization of intangible assets.

In this perspective, the role of digital platforms is to integrate and coordinate these global value chains, articulating automated production management and customer relationship systems. The control of infrastructures software offers a central role in the governance of production chains, which allows a disproportionate capture of value in exchange. In this way, although the production of value is mainly transferred to the periphery, the headquarters of the companies in the central countries accumulate value in the form of profits from the rent derived from intellectual rights and from the concentration of the benefits of network externalities in the intangible stages of accumulation.

According to Durand (2018), this growing disconnection between the tangible and the intangible is accompanied by a powerful increase in the logic of value capture to the detriment of production, which contributes to contemporary stagnation and fuels the leap in financialization, which is also accelerated by the crescent digitalization and algorithmic automation of the stock market and other speculative investments.

It is necessary to emphasize that there is a certain consensus in the PEC literature in recognizing the role that digital communication plays in what Marx (2011, p. 699) called "the nullification of space by time," that is, the acceleration of the circulation of capital through the development of communication and transportation. To accelerate the time of capital circulation, virtual platforms contribute as a counter-trend to the anarchy of capitalist production through the advertising function of communication (Bolaño, 2000), which accounts for the majority of the revenues of giants such as Alphabet and Facebook (FUCHS, 2015).

Today, digital platforms match supply and demand in an increasingly instantaneous and efficient manner, concentrating human attention on an unprecedented scale through the spectacularization of life, combined with user data extraction processes that allow algorithmic predictive effects and detailed market segmentation. In addition, platforms accelerate not only the exchange of information about the demand and production of material goods, but also the intangible nature of the production and exchange of cultural goods that occurs through them, allowing the expansion of the volume of transactions while shortening the interval between the consumer's decision and the fulfillment of his desire.

Beyond this consensus, a group of authors (BOLAÑO, 2000, 2006; BOLAÑO, VIEIRA, 2014; BUENO, 2017; DANTAS, 2012, 2014; FUCHS, 2015) consider that immaterial production processes also contribute directly to the accumulation of capitalist production value through the creation of intangible goods. However, these thinkers disagree among themselves in defining which actors, whether platform users or their tech workers, would perform the productive work of transforming digital data into audience commodities, as will be developed below.

Smythe (1977) was the first to systematize a theory of "audience work" that created the "audience" commodity. For Smythe, capitalism extended the productive working day into the domestic experience of individuals by transforming them, for example, into spectators: the spectators' time occupied by commercial media, during which their consumption tendencies are formed, would produce the audience commodity, sold in the form of advertising time in the broadcast media to those who would make them their consumers (SMYTHE, 1977). This contribution of Smythe is fundamental to the division of different authors in the analysis of the economic contribution of users and professionals of digital media to capital.

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In this sense, Bolaño (2000) disagrees with Smythe (1977), as he considers that the production of the audience is not separated from the production of content by the workers of the cultural industry. Bolaño (2000) carries out a broad review of the different PEC traditions in order to propose a general theory of the cultural industry based on the dual character of cultural goods.

According to the author, "the work of professionals in the cultural industry would have the specificity of producing two goods at the same time: the object (program, newspaper, film) or cultural service and, at the same time, the audience" (BOLAÑO, 2000, p. 43). It would be the concrete activity of artists, journalists and producers, within the degree of relative creative freedom that limits their real subsumption under capital, that would produce the audience by capturing the attention of the spectators on the basis of their symbolic value.

For example, the price and interest of the advertising market for a given audience would depend not only on the number of viewers, but also on the quality of the audience reached by the program through the "credibility," sophistication, or sensationalism conveyed by the professionals involved, qualities that advertisers may want or fear to be associated with their products (BOLAÑO, 2000). In more recent works, Bolaño (2012, 2014) presents his hypothesis that, for the production of value on the Internet, the interaction of users and the content they produce do not have a directly productive dimension for capital.

From this theoretical perspective, the attention and data generated by users, including the content generated by them, serve as input for the production of a commodity called audience through the combination of the dead work of algorithms with the live work of data analysts and programmers who are regular workers of the platform companies. The resulting audience is then sold by the platforms to third parties (BOLAÑO, 2012). Therefore, platforms like Facebook and Google only update a traditional business model of the cultural industry, in which the audience produced has the use value for other capitalists of guaranteeing potential sales, and the entire mass of surplus value comes from the work of its employees.

Fuchs (2015) disagrees with Bolaño: for him, the information produced by users that allows the mapping of segmented audiences would not only be inputs processed by others, but the fruits of their own work as prosumers. According to Fuchs (2015), prosumers are the users whose consumption is immediately unpaid labor disguised as free access to the platforms. Fuchs (2015) and Dantas (2014) agree that the users' activities produce surplus value, although they disagree on how the extraction of surplus value defines the amount of value.

The work of paid technicians on digital platforms also participates in the construction of data useful to advertisers, according to Fuchs (2015); however, this wage labor combines with the free labor of users in what Marx (1978) called socially combined labor. In socially combined labor, "the cooperative character of the labor process itself [...] necessarily extends the concept of productive labor" (MARX, 2013, p. 136). In order to "work productively, it is no longer necessary [...] to personally put one's hand to the work; it is enough to be an organ of the collective worker, performing one of its subfunctions" (MARX, 2013, p. 136).

For Fuchs (2015), in this combination, the work of ordinary users is even more crucial than that of the company's workers, since the contribution of the latter is largely already frozen as dead work in the form of codes, algorithms, and automated procedures. In contrast, Fuchs argues that if ordinary Facebook users refuse to access and interact on the platform, the company immediately loses the ability to continue to provide its value to advertisers, that is, to sell advertising, since its users are a fundamental asset for its business model. Therefore, as the author details, the price of an ad on Facebook represents the value of the audience on these platforms, produced according to the average time that the segmented audience of users spends paying attention to Facebook, divided by the average number of ads presented to them in that period (FUCHS, 2015).

For Fuchs (2015), this means that we have the production of a classic commodity. The value of advertising space and the attention of potential buyers are the result of the expenditure of users' working time, whose work has a concrete dimension - the specific information of each user - and an abstract dimension - the general audience time, which serves as a measure of value. And since this time is absolutely unpaid, the surplus value is extracted absolutely. Contrary to Fuchs (2015), Dantas (2012) claims that the productive work of users does not produce a new commodity, since the information they produce, like all information, has properties that make it difficult to transform it into a commodity.

To reach this conclusion, Dantas (2012) compares the characteristics of tangible and digital goods in terms of their possibility of being subject to the commodity relationship. According to Dantas (2012), tangible goods are rival goods because when they are sold, their ownership is transferred to the new owner not only as a legal relationship, but also as a concrete possibility of consumption. Moreover, the exchange value of a tangible good can be measured in terms of the human labor time consumed in its production (MARX, 2013).

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However, information has the property of being reproducible, "consumed" by an infinite number of people at the same time; information is a non-rival good. Moreover, the reproduction of information occurs at a speed that is independent of human working time; its value is not related to the expenditure of abstract labor, although its production still depends on the concrete work of its creator (DANTAS, 2012).

In conclusion, information is difficult to transform into a commodity because access to it is difficult to privatize; it is difficult to exercise absolute ownership over its availability in order to create scarcity, in addition to the fact that its production does not take place according to the law of value, which allows for the equalization of the exchange value of commodities in the capitalist system.

In this context, in order to maintain private property over the information produced by users, in order to negotiate access to it in the market, platforms must use extra-economic coercion, such as intellectual property rights. For example, it becomes a crime to copy proprietary information.

At the same time, in order to prevent the violation of intellectual property not only in law but also in practice, platforms try to monopolize the audience in environments where the copying of data and code is technically prevented through encryption, login systems and restrictive terms of use, what Dantas (2012) calls "walled gardens". Therefore, according to Dantas (2017), the added value extracted by the free work of users is not realized as profit from the sale of a commodity called audience. The profit comes from the monopoly rent that platforms earn by giving advertisers temporary access to the live activity of users' interactive audiences.

As already mentioned, the value of this information is not related to socially necessary human labor time, but Dantas (2012, 2014, 2017) considers that the category of surplus value still applies to the process of capital accumulation on digital platforms, due to the fact that the attention and interaction time that users dedicate to digital platforms is not paid for.

Like Fuchs (2015), Dantas (2012) argues that the exploitation by capital of users' life activity is a form of extraction of absolute surplus value, in which the extension of the part of the worker's unpaid journey has reached the point of your entire working time. However, to the extent that this surplus value occurs in the production of information that does not become a commodity, it is not realized in the form of profit. It must be accumulated from rights to wealth in the form of rent.

Fuchs (2015) argues otherwise, stating that Marx's definition of rent is that of wealth obtained not as the result of human labor, but as property rights to goods such as land and nature. As interpreted by Harvey (2005), it is sufficient for the capitalist owner of land to maintain legal ownership over it and wait for a moment of scarcity to rent it, or to "produce" scarcity by claiming that his land has a unique character. Rent therefore means the consumption of surplus value and not its production, since the rentier owner appropriates part of the value produced by society. Therefore, according to Fuchs (2015), it is not possible to consider as productive work of value an activity whose contribution to the social production of wealth, in order to be privatized, depends on rent mechanisms.

III. Different Strategies of Accumulation: Surplus Value, Freedom and Dispossession

So far, we have analyzed several concepts that have been proposed to understand globally how the Internet and digital mediation contribute to the accumulation of wealth under capitalism. Without endorsing any of them, this article proposes that the Internet is an ecosystem that is not traversed by a single mode of surplus extraction or production, but by different strategies through which actors privately appropriate socially produced wealth. These strategies will now be analyzed in order to consider, in each case, the adequacy and limits of the previous author's propositions.

It is necessary to remember that Marx (2011), in proposing economic categories to understand social relations, takes into account the political determination of these relations, that is, the collective and individual interests of different actors that govern their actions and the correlation of forces between them. For example, in Marx's (1980) definition of unproductive and productive work, we have that productive work is that which is directly exchanged for capital, that is, that which is already subordinated to the logic of capitalist accumulation, in what Marx (1980, 2013) defines as subsumption. Therefore, "the specific character of productive labor is in no way linked to the concrete content of the labor" or to "the nature of its product" (MARX, 1980, pp. 137-128).

> The same kind of labor may be productive or unproductive. For example, when Milton wrote Paradise Lost for five pounds, he was an unproductive worker. In contrast, the writer who works for his editor in the manner of factory labor is a productive worker. Milton produced Paradise Lost for the same reason that the silkworm produces silk: by an impulse of his nature. Then he sold his work for five pounds. But the Leipzig intellectual proletarian who produces books (e.g., compendia on economics) under the direction of the publisher is a productive worker; for his product is subsumed under capital from the beginning, and only comes to light to increase its value. A singer who sells her singing at her own risk is an unproductive worker. But the same singer, if hired by a businessman to make money from her singing, is a productive worker, for she produces capital. (MARX, 1978, p.76, emphasis in original).

From the point of view of the production of value, it is irrelevant whether the commodity produced is

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material or immaterial, tangible or intangible, and its use value "may be totally insignificant" (MARX, 1980, p. 138). What matters is the absence of freedom: the production of value means the hegemony of the logic of exchange value over use value, that is, the subordination of free creation, of the producer's interests and desires to the sole objective of accumulating his employer's capital. In this sense, the definition of value production proposed by Durand (2018), based on the tangible or intangible character of the goods produced, can be considered unsustainable in Marxist terms.

However, Marx (1980) makes the warning that while these types of immaterial labor may contribute to the accumulation of the individual capitalist who employs them, they are insignificant to the production of value as a whole. This begs the question: wouldn't it be contradictory if productive labor, from the point of view of the capitalist who employs it, were insignificant from the global point of view of capital? After all, does this labor produce value or not?Marx adopts a perspectivist definition:

> […] the fixed definitions of rent and capital exchange places with each other, appearing, from the point of view of the isolated capitalist, to be relative definitions that disappear when we consider the global process of production. […] It is possible to overcome the difficulty if we imagine that what is rent for some is capital for others, and that these definitions therefore have nothing to do with the effective particularization of the components of the value of the commodity. (MARX, 1981, p. 969)

To the extent that rent and capital are social relations, or categories that describe these relations, different subjects can simultaneously have different relations to the same portion of socially produced wealth. To a large extent, private appropriation occurs at the same time that wealth is produced under the control of capital, in what Marx (2013) called the production of value, which he explained in terms of the extraction of surplus value and which is commonly associated with a description of the industrial process of material goods. In these situations, it simultaneously contributes to increasing the general wealth of society and establishes private property over this part added to the whole.

In other cases, the activities only produce private rights over the wealth produced by society as a whole, so the capitalist involved in them accumulates his capital by extracting money whose value originates from other sources, in what Marx (2013) calls rent.

As a social relation, however, the definition of value is essentially political. A decision such as the privatization or socialization of the means of production, and in this case the choice between self-management or state control, has far greater historical economic effects on the accumulation of value at a given moment than the industrial production of an entire country. In this context, the applicability of the categories proposed by the authors discussed above for analyzing the social relations mediated by the Internet depends on how the producers, intermediaries and consumers of attention, content, data and metadata understand their own activities and the interests that guide them.

IV. Click Farms and User-Generated Content: Productive Labor and Dispossession

The general logic of the cultural industry described by Bolaño (2000) applies perfectly to click farms, social interaction factories, or the commercial production of disinformation, and also partially explains services such as Netflix, YouTube producers, and some digital influencers, as their workers recognize: "Of course I made money by publishing fake news, but Google made more," says Christian, 19, a young man from Macedonia who works in a disinformation factory (TARDÁGUILA, 2017).

Christian is an employee whose sole goal in producing content for the Internet is to reach a measured audience through user interaction, for which his company receives a portion of the advertising revenue. The Macedonian tested the political positioning that generated the most clicks on the Internet: "Not Hillary, not even Bernie Sanders. Trump won" (TARDÁGUILA, 2017). It is therefore the example of an intellectual proletarian described by Marx (1980): his product is subsumed under capital and only comes to light to increase its value.

However, the company where Christian works doesn't sell the content it produces; it is freely published online with the aim of generating an audience that is offered through Google's auction system. The company also does not acquire the data of the users who access its services, monopolized by Alphabet, which only provides some information about the audience to the owners of the sites. In this sense, the model of the cultural industry proposed by Bolaño (2000), based on the duplicity of cultural commodities, is updated in this case: producers offer their content for free, expressing a real subsumption to capital, and at the same time they lose control over the offer of the audience they produce.

One can assume, like Fuchs (2015) and Dantas (2014), that to the extent that advertising depends on user interaction, users also contribute to the process of audience production. This does not detract from the fact that salaried content producers for the Internet are perfectly included in Marx's (1980) analysis of productive workers of value; they even understand themselves as such, like Christian, who understands perfectly that most of the wealth resulting from his work does not remain with him.

In the case of click farms, however, the interactions on social platforms, such as clicks or likes, are produced exclusively by salaried professionals. They are workers in miserable conditions, worthy of the

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descriptions in Marx's Capital: "[...] they sit in front of screens in dark rooms with windows covered by bars, sometimes working at night. To do so, they must generate 1,000 likes or follow 1,000 people on Twitter to earn a single US dollar" (ARTHUR, 2019).

Arthur (2019) describes the interaction industry that combines precarious work in Bangladesh with a legal platform façade, *crowdsourcing*. *Crowdsourcing* is a means of social collaboration inspired by the logic of *crowdfunding*, collaborative financing, through which users can exchange goods or services among themselves without monetary intermediation, in a barter process. *Crowdsourcing* it is one of the practices of the "new economy", a showcase of a supportive, creative and cool capitalism, based on decentralized models and distributed exchanges, the latest version of "California ideology". C*rowdsourcing* platforms contribute to users sharing rides or practicing *couchsurfing,* the free accommodation of tourists in the homes of hosts who, in exchange, will one day stay in the homes of other users.

The oligopolization of the Internet on a global scale, based on the algorithmic mediation of online content, has largely extended to the algorithmic mediation of crowdsourcing practices that originally emerged as nonprofits facilitated by digital technologies. Uber has commodified the provision of rides, just as Airbnb has built a business model inspired by the culture of couchsurfing.

In the case of the crowdsourcing service Shareyt, analyzed by Arthur (2019), despite the appearance of being a service for the free exchange of likes between users, about 30 or 40 percent of the clicks came from Bangladesh factories. This is a reversal of the paradigm of Bueno (2017) and advocates of cognitive capitalism, in which capitalism accumulates wealth by tracking spontaneous human relationships that occur outside the disciplinary logic of work.

In click factories, workers create interactions mechanically, completely alienated from their personal desires or interests, producing fictitious digital trails that simulate for their customers, brands, and digital influencers the capture of desire and attention from fake profiles, from a non-existent population. At the same time, the human nature of these factory workers is what makes them fool the filters of digital platforms that are capable of blocking automated interaction actions.

Therefore, both in the salaried production of likes and in the production of misinformation, we consider that the accumulation model based on the extraction of surplus value remains valid, especially absolute surplus value due to the extension of the working day, precariousness and payment of wages of hunger. This is a fusion between Bolaño's (2000) proposition of the production of surplus value by salaried professionals and that of the audience as an interaction produced by users proposed by Fuchs (2015) and Dantas (2014, 2017).

However, much of the content, interactions, and digital traces produced on the Internet are not the result of paid labor, but of activities by platform users motivated by their own interests and perceived as consumption of services offered by Google, Facebook, and other companies. Can work be considered an activity that is not perceived by those who perform it? In particular, can we consider value-producing labor as an activity that develops on the basis of the users' own impulses and is not directly subordinated to the command and control of the capitalist, to the real subsumption of labor?

The question may be who should answer this question. Considering the historical determination of the relations of exploitation not only as economic but also as political, the propositions of Dantas (2014, 2017) and Fuchs (2015) about digitally mediated social interaction as work may become valid to the extent that users themselves begin to recognize their activities as economically subordinated to capital, as an exploitation of their time, knowledge, and data, and begin to demand something in return beyond access to platforms.

Bueno (2017) describes the debate on how claims of rights from users regarding their attention capacity equivalent to those of workers in relation to the sale of their labor power are already emerging:

> 1) Ownership: I own my attention and can store it safely privately; 2) Mobility: I can move my attention wherever I want, whenever I want; 3) Economy: I can pay attention to whoever I want and *get paid for it*; 4) Transparency: I can see how my attention is being used.(GOLDSTEIN, 2005 *at* GOOD, 2017, p. 56)

Silveira (2017) points to an identical logic in relation to the data market, with the emergence of proposals that consider that data and metadata producers should be remunerated in exchange for their process of alienating rights and control over them. However, according to David Harvey (2005), there is an alternative understanding, originating in the work of Marx and developed by Rosa Luxemburg, that captures processes of wealth accumulation by capitalists without depending on the production of value through the extraction of surplus value. This is the first process of capitalist accumulation in history, which Marx (2013) called primitive and, when it occurs in a contemporary way, Harvey (2005) calls dispossession.

In the context of the primitive accumulation of capital described by Marx (2013), Bolaño (2000) highlights what he calls the "primitive accumulation of knowledge": to the extent that the knowledge previously exclusive to workers was appropriated by capital, along with scientific knowledge through intellectual property, the conditions were created for the incessant technical

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development of the productive forces in capitalism, a historical process also described by Dantas (2012).

In this sense, Harvey (2005) revisits the concept of primitive accumulation, which he renames dispossession, when he describes how processes of mercantile accumulation occur simultaneously through the transformation of various forms of "property rights - common, collective, state, etc. - into exclusive property rights; [...] and the suppression of alternative forms of production and consumption, including resources" (HARVEY, 2005, p. 84). - and the suppression of alternative forms of production and consumption, including natural resources" (HARVEY, 2005, p. 84).

The advantage of the category of dispossession applied to the production of attention, interaction, and data is that instead of proposing the regularization of this activity appropriated by capital as waged labor, that is, the formal recognition of exploitation, it offers a non-market alternative for understanding the fruits of these activities: the common good, or what Marx (2013) called the commons.

In short, we proposed that the interactions between users and their results on the Internet be understood as a kind of common good, a wealth produced by humanity as a whole, but which is immediately dispossessed by proprietary platforms. Messages, photographs, knowledge and content in general, produced by users on the basis of their use-values and previously governed by non-commercial principles, become private property under the mercantile logic of corporations once the terms of use of their social platforms are accepted, which undermine or destroy universal rights such as privacy and confidentiality.

The private appropriation of wealth occurs at the moment of its production, but not because its production has been subsumed by capital, but rather through the extra-economic legal coercion of terms of use or through the oligopolization of the mediation of attention flows and Internet connection. An example is the appropriation by the Google algorithm, in its search engine and word auction system, of content from indexed non-commercial sites such as Wikipedia or pirate sites.

In this way, the current moment does not mark the epistemological exhaustion of Marx's theory of value (2011, 2013), which would be incapable of grasping new processes of valorization based on immaterial work, as Bueno (2017) argues. It marks the concrete exhaustion of wealth accumulation through the appropriation of other people's working time, which becomes, according to Marx (2011), a miserable measure for the potential for wealth production, in what Bensaid (2013) calls the miserability of the value.

This is because the moment of *General Intellect* is not just one in which socially produced knowledge becomes available to everyone, as advocated by Marx and Engels(1961), but also one in which it becomes incorporated in the form of machines and automated processes increasingly autonomous in relation to humans (MARX, 2011). It is the peak of the organic composition of capital, of the successive replacement of humanity's living labor by the dead labor of machines, of reification: the moment of humanity's general intellect converted into productive force.

The miserability of value is the anticipation by Marx (2011, p. 943) that, as automation becomes potentially universal, it no longer makes sense to base an economic and social system on the exploitation of employees and mass wage labor, because the means of satisfying needs through social cooperation between men and machines become abundant, calling into question private property and the private accumulation of wealth as a social logic.

Dispossession, unlike the analyzed propositions centered on new modes of value production, considers that, even if the wealth extracted from free activity appears in the form of surplus value for the capitalists who own the platforms, it appears as rent from the global point of view of capitalism. This is the difference in relation to Bueno (2017), for whom capitalism can continue its permanent expansion based on new immaterial sources of value. However, in opposition to what Dantas (2014, 2017) defends, it is not about rent arising from work subsumed under capital, but rather the dispossession of free activity constitutive of a common good, the *General Intellect*.

The accumulation of data, interactions and digital content as a global expansion of surplus value is hampered not only by the particular properties of information as a “commodity” (DANTAS, 2014, 2017), but also by the inherent difficulty in trying to grasp the wealth produced by *General Intellect* in the “miserable form of the theft of working time” (MARX, 2011, p. 943). According to Marx (2011), the emergence of *General Intellect* marks the moment in which the private appropriation of humanity's production by a small portion of it enters into a profound contradiction and dominant interests can only remain as barriers to free creation. Therefore, cognitive capitalism and the enormous wealth accumulated by internet oligopolies are unable to reverse the continuous and accelerated fall in the profit rate, demonstrated using different analysis methods by Toshio (2017).

V. Conclusion

The perspective that seeks to define all digitally mediated activity as labor truly subsumed under capital, and to demand remuneration for it, is to formalize and at the same time legitimize a new form of exploitation. Meanwhile, dispossession shows that capital does not take possession of most of the wealth produced on the Internet by fulfilling a productive historical role, but in a violent way through legal coercion and the violation

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and destruction of rights. This also means that capital, through technological development, has not inaugurated a new era of expansion of its accumulation through new productive processes of value, but that it can only continue to exist in increasingly fictitious forms based on the extraction of rents.

There is an enormous production of wealth in the form of new relationships and products capable of satisfying immaterial human needs, of "fantasy" as defined by Marx (2013), but since these tend to become common goods and capital can only appropriate them in a coercive way, the resulting accumulation is only monetary and derives from the ability of Internet corporations to capture investment in the financial market and rent in the advertising market.

Therefore, the accumulation of capital through digital platforms is a symptom of the fact that the domination of capital increasingly depends not on the economic efficiency of its mode of production, but on its violent domination of human life, exercised through other relations of power that allow it to continue to focus attention and exploit data. This is a contradiction that, as Bolaño (2008) concludes, updates the meaning of the maxim "socialism or barbarism" and points to the urgency of a political solution.

In this sense, as a future research agenda, we propose to analyze how accumulation relations mediated by digital algorithms on oligopolistic platforms are legitimized by the political effects of algorithmic mediations on these same platforms, and what counter-hegemonic strategies to these effects would be.

For development in subsequent work, we argue that the category of "electronic prince" created by Ianni (1999) to characterize broadcasting agents can be updated to "algorithmic prince," a new politically dominant capitalist fraction organizing the new power relations and accumulation that have emerged with the digital. Specifically, the algorithmic mediation of an increasing proportion of human relations under the control and ownership of digital oligopolies suggests that there has been a process of change not only in the quantitative but also in the qualitative conditions of hegemony, an intrinsic dimension of the capital accumulation system.

Declaration of Conflicting Interest

The Author declares that there is no conflict of interest.

Funding

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Finance Code 001

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Global Journal of Human-Social Science (E) Volume XXIV Issue II Version I Year 2024
10

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Global Journal of HUMAN-SOCIAL SCIENCE: E Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

Consolidation of Proceedings in Brazilian Publicly Listed Coporations' Arbitration

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Abstract- The objective of this Article is to demonstrate how arbitration proceedings involving publicly listed corporations, multiple shareholders, and consolidation of proceedings are being processed in Brazil. Some listed companies in Brazil are required to submit to arbitration all corporate disputes, and there is no procedural rule set forth by law or by the rules of some of the arbitration chambers in Brazil on how to consolidate similar proceedings initiated by different parties on the same issues, and how to decide on the jurisdiction of the arbitral tribunals. This issue has since been discussed by scholars, legislators, and arbitration chambers, that propose different solutions, and has recently been ruled by The Brazilian Superior Court of Justice. Within this context, a deductive approach will be applied to the Article, with bibliographic and case-law research.

Keywords: *brazil, arbitration, publicly listed companies, shareholders, corporate disputes, consolidation of arbitrations.*

GJHSS-E Classification: *LCC: KHD3790*



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Consolidation of Proceedings in Brazilian Publicly Listed Coporations' Arbitration

Leading Competence Conflict Case Ruled by the Brazilian Superior Court of Justice

Renata Moquillaza da Rocha Martins

Abstract- **The objective of this Article is to demonstrate how arbitration proceedings involving publicly listed corporations, multiple shareholders, and consolidation of proceedings are being processed in Brazil. Some listed companies in Brazil are required to submit to arbitration all corporate disputes, and there is no procedural rule set forth by law or by the rules of some of the arbitration chambers in Brazil on how to consolidate similar proceedings initiated by different parties on the same issues, and how to decide on the jurisdiction of the arbitral tribunals. This issue has since been discussed by scholars, legislators, and arbitration chambers, that propose different solutions, and has recently been ruled by The Brazilian Superior Court of Justice. Within this context, a deductive approach will be applied to the Article, with bibliographic and case-law research.**

Keywords: brazil, arbitration, publicly listed companies, shareholders, corporate disputes, consolidation of arbitrations.

Introduction

The aim of this Article is to demonstrate how arbitration proceedings involving publicly listed companies are being processed in Brazil, specifically regarding the consolidation of arbitrations involving the same object and/or requests, and on deciding which arbitral tribunal has jurisdiction to rule the consolidated proceedings.

The problem was recently raised before the Superior Court of Justice while reviewing Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*), when three (3) different arbitration proceedings were initiated against the same listed corporation by different shareholders to discuss the same issue before two (2) different arbitral tribunals. Both arbitral tribunals declared themselves competent to rule the proceedings, and the problem was taken to the Judiciary to be resolved.

The main issue is that there is no domestic law regulating if and how the arbitral proceedings should be consolidated, and how their jurisdiction should be determined. Also, the rules of the Brazilian Arbitration Chamber competent to hear such proceedings (*Câmara de Arbitragem do Mercado - CAM*) does not foresee such possibility and, for this reason, does not have any rule to decide on the jurisdiction of consolidated arbitration proceedings initiated against the same listed companies by different shareholders.

Although the possibility of publicly listed companies participating in arbitration proceedings was, by itself, a very important evolution in Brazil, the lack of procedural rules by the only arbitration chamber competent to rule on the arbitration proceedings is a problem.

Therefore, in this Article, we will detail (i) in chapter 1, the current legal situation regarding the submission to arbitration of corporate disputes in Brazil; (ii) in chapter 2, the need for specific rules for the definition of jurisdiction on consolidated arbitrations and the problem raised before the Brazilian Superior Court of Justice on Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*); and (iii) in chapter 3, the legislative and arbitration chambers' response and actions to the problem raised by the Brazilian Superior Court of Justice (laws and rules). Finally, we will conclude that the Brazilian Securities and Exchange Commission, some arbitration chambers, and the legislative system are presenting a well-suited response to grant the Brazilian stock market and its investors legal security, to avoid future problems on the issue.

For this study, a deductive approach will be used, with bibliographic and case-law research.

I. The Submission to Arbitration of Corporate Disputes in Brazil

In Brazil, as of 2001, listed corporations' bylaws can determine that any disputes arising between the corporation and its shareholders or between the controlling shareholders and minority shareholders must be resolved through arbitration (Federal Law No. 10.303/2001 included article 109, § 3 to Federal Law No. 6.404/1976 – Brazilian Corporation's Act– *Lei das S.A.*).

Since then, the Brazilian Securities and Exchange Commission (CVM) has determined that any corporation participating in the New Market (*Novo Mercado*), Level 2 of Corporate Governance (*Nível 2 de Governança Corporativa*), Bovespa Plus (*Bovespa Mais*)

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or in the Bovespa Plus Level 2 (*Bovespa Mais Nível 2*)[1] programs must include an arbitration clause in its bylaws, as per article 109, § 3, of the Brazilian Corporation's Act.

The programs mentioned above were created by CVM to protect investors, with the creation of a more rigid governance policy and a set of new practices with the scope of improving the information provided to investors and to foster the stock market. Thus, corporations participating in these programs must resolve through arbitration all disputes between shareholders, managers, members of the fiscal board, and B3 (the Brazilian stock corporation), according to article 39 of the B3 New Market Regulation.

Article 40 of the B3 New Market Regulation also states that "*the investiture of managers and the effective and alternate members of the supervisory board is subject to the signing of a term of investiture that must include their subjection to the statutory arbitration clause*".

Moreover, article 136-A of the Brazilian Corporation's Act provides that there is a specific quorum for the approval of the insertion of the arbitration clause in the corporation's bylaws (as per article 136 of the Brazilian Corporation's Act[2]) and assures dissident shareholders the right to withdraw from the corporation if they disagree with the inclusion of the clause.

Thus, any new shareholder of the corporation is aware of the arbitration clause when purchasing shares, and any older shareholder of the corporation who disagreed with the inclusion of the arbitration clause in the corporation's bylaws has the right to leave the corporation.

At first, there was a lot of debate whether all shareholders would be bound by the arbitration clause - even those who did not explicitly agree to the arbitration clause. Notwithstanding the academic discussion, the prevailing opinion among scholars is that the arbitration clause is binding to all shareholders if the legal quorum was properly obeyed (FRANZONI, 2015, p. 58).

However, in 2015, Federal Law No. 13.129/2015 (which altered a few of the Brazilian Corporation's Act articles) was enacted, and its article 136-A sets out that the approval of the inclusion of the arbitration clause in the corporation's bylaws obliges all of its shareholders, and the dissident shareholder has assured the right to leave the corporation and be properly reimbursed of the value of his stocks (as mentioned above), with a few exceptions[3], what diminished the discussions on the matter.

Currently, the main discussion about the binding arbitration clause regards the high cost of the arbitration proceeding to minority shareholders, who could be, in practice, deprived of their right to have a legal dispute decided by an arbitration court (MUNIZ, 2020).

It is essential to highlight that, even though confidentiality is the norm in arbitration proceedings, under the full disclosure principle, reflected, for example, in CVM Resolution No. 80 of March 29, 2022, publicly listed corporations must follow the rules on disclosing relevant information for stockholders and the market in general, even when it comes to arbitration proceedings. The corporation is not required to disclose information on the business itself, but information that could be relevant to the market, that could protect investors and maintain a fair market.

For this reason, the disclosure of information regarding arbitration proceedings to the market is prioritized over confidentiality:

> "We conclude that confidentiality should be set aside in corporate arbitration conducted within the scope of publicly listed companies to allow the disclosure of relevant information to the market. Moreover, such information should be disclosed by the company itself, which in many cases will be involved in the dispute as a party. It is the responsibility of the management to provide the market with all relevant information regarding the arbitration process that may influence the buying and selling of shares and other securities issued by the company. The controller may also be held accountable if such disclosure is not practiced." (our translation) [4]

One must be cautioned when disclosing information to the market to avoid unnecessary and unexpected negative repercussions, but when the criteria of CVM resolutions (such as No. 80/2022) are observed, the information must be disclosed. If the requirement has been met, there should be no top-management discretion on whether to disclose or not.

The arbitration clause included in the corporation's bylaws, according to the B3 New Market Regulation, states that CAM is fit to rule on the arbitration proceedings (article 39). CAM was created with the purpose to expedite corporate disputes and

[1] https://www.b3.com.br/pt_br/produtos-e-servicos/solucoes-para-emissores/segmentos-de-listagem/sobre-segmentos-de-listagem/. Access on October 5, 2023.

[2] The quorum for approval is shareholders representing at least half of the shares with voting rights.

[3] § 2nd. The right to withdrawal as set forth on the article's caput will not be applicable:

I – in case the inclusion of the arbitration clause in the corporation's bylaws represents a condition for securities issued by the corporation to be admitted to trading on a stock exchange or organized over-the-counter market listing segment that requires a minimum shareholding dispersion of 25% (twenty-five percent) of the shares of each type or class;

II – if the inclusion of the arbitration clause is made in the bylaws of a public-held corporation whose shares are liquid and dispersed in the market, in accordance with paragraphs "a" and "b" of item II of article 1367 of this law.

[4] FRANZONI, Diego. Arbitragem Societária: Fundamentos para uma Possível Regulação. Faculdade de Direito da Universidade de São Paulo, 2015. p. 145.

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having arbitrators specialized in the issues commonly discussed[5].

To illustrate the result of the incentive of CVM and Brazilian law for companies to include arbitration clauses in its bylaws, in 2021 Brazil had 381 companies listed in the stock exchange and trading shares in the stock market, of which 234 (approximately 61%) had arbitration clauses in their bylaws. Also, 158 companies (41% of the total listed companies) had shareholders' agreements, out of which 122 (approximately 77%) had arbitration clauses[6].

Additionally, from the 202 companies registered in B3's traditional segment and Level 1, 27% (55 companies) had arbitration clauses in their bylaws, and approximately 12% (25 companies) had arbitration clauses in their shareholders' agreements. Moreover, among those companies that have shareholders' agreements (49 companies), 51% (25 companies) included arbitration clauses in their agreements[7].

However, even though CAM was specifically created for the ruling of corporate disputes, important aspects of listed companies' corporate disputes were not foreseen by CAM procedural rules.

In the next chapter, the most critical unresolved procedural issues will be detailed.

II. The Need for Specific Rules for the Consolidation of Arbitration Proceedings – the Superior Court of Justice Ruling

In June 2022, the Brazilian Superior Court of Justice ruled on Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*)[8], brought before the high court so that it could settle which arbitral tribunal had jurisdiction to rule on the same issue raised in three different arbitral proceedings initiated before CAM, and to decide if all proceedings should be consolidated or if the minority shareholders proceedings should be dismissed.

Proceedings No. 93/2017, 110/2018, and 186/2021 from CAM were all filed for the civil accountability of the controlling shareholders and managers of JBS S.A., a publicly listed corporation (hereinafter referred to as "JBS"), due to illicit acts previously confessed in a criminal lawsuit.

On October 30, 2020, a general meeting was held for the approval of the corporation to take the necessary legal matters, and JBS initiated arbitral proceeding No. 186/2020 before CAM on January 27, 2021, requesting the accountability of the controlling shareholders and managers, as well as for damages for the losses the corporation suffered, as per articles159[9] and 246[10] of the Brazilian Corporation's Act.

However, a minority shareholder (who owned 0,0000036% of JBS's shares) had already initiated arbitral proceeding No. 93/2017 to discuss the same matters, and another shareholder, who owned 0,26% of the corporation's shares, also had initiated arbitral proceeding No. 110/2018 to discuss the same issues and with the same requests, as per article 246 of the Brazilian Corporation's Act. On September 27, 2018, CAM's president ordered the consolidation of these two arbitral proceedings, to be ruled by the same arbitral tribunal (with the consent of the parties).

In this scenario, JBS requested CAM to dismiss the proceedings initiated by the minority shareholders and requested the recognition that the jurisdiction of arbitral proceeding No. 186/2021 should prevail and should be the only one ruled_-, since (1) the minority

[5] https://bvmf.bmfbovespa.com.br/pt-br/a-bmfbovespa/download/Folder_NovoMercado.pdf. Access on October 5, 2023.

[6] PARGENDLER, Mariana; PRADO, Vivine M.; SANTOS, Ezequiel F. and VIOL, Dalila M. Cláusulas Arbitrais em Números no Mercado de Capitais Brasileiro (Arbitration Clauses in Number in the Brazilian Capital Market). Revista Brasileira de Arbitragem, n. 75, jul-set. 2022, São Paulo, p. 63.

[7] PARGENDLER, Mariana; PRADO, Vivine M.; SANTOS, Ezequiel F. and VIOL, Dalila M. Cláusulas Arbitrais em Números no Mercado de Capitais Brasileiro (Arbitration Clauses in Number in the Brazilian Capital Market). Revista Brasileira de Arbitragem, n. 75, jul-set. 2022, São Paulo, p. 63.

[8] Second Panel of The Superior Court of Justice, Rapporteur Justice Marco Aurélio Belizze, ruled on June 22, 2022. https://scon.stj.jus.br/jurisprudencia/externo/informativo/?acao=pesquisar&livre=%28%22CC%22+adj+%28%22185702%22+ou+%22185702%22-DF+ou+%22185702%22%2FDF+ou+%22185.702%22+ou+%22185.702%22-DF+ou+%22185.702%22%2FDF%29%29.prec%2Ctext. Access on October 9, 2023.

[9] Article 159. By a resolution passed in a general meeting, the corporation may bring an action for civil liability against any officer for the losses caused to the corporation's property.
(…)
Paragraph 3. Any shareholder may bring the action if proceedings are not instituted within three months from the date of the resolution of the general meeting.
Paragraph 4. Should the general meeting decide not to institute proceedings, they may be instituted by shareholders representing at least five per cent of the capital.
Paragraph 5. Any damages recovered by proceedings instituted by a shareholder shall be transferred to the corporation, but the corporation shall reimburse him for all expenses incurred, including monetary adjustment and interest on his expenditure, up to the limit of such damages.
Paragraph 6. A judge may excuse the officer from liability, when convinced that he acted in good faith and in the interests of the corporation.
Paragraph 7. The action permitted under this article shall not preclude any action available to any shareholder or third party directly harmed by the acts of the officer.

[10] Article 246. A controlling corporation shall be obliged to compensate any damage it may cause to a controlled corporation by any acts infringing the provisions of article 116 and 117.
Paragraph 1. Proceedings for compensation may be brought by: (a) shareholders representing five per cent or more of the capital; (b) any shareholder, provided he guarantees payment of the legal costs in the event of the action being dismissed.
Paragraph 2. If the controlling corporation is held responsible, in addition to paying compensation and costs, it shall pay an indemnity in respect of lawyers' fees of twenty per cent of the compensation awarded and a further premium of five per cent to the plaintiff.

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shareholders would only have grounds to seek the accountability and claim damages against the controllers and managers if the corporation itself failed to take legal action within three months after the date of the general meeting in which the issue was discussed, as per article 159, § 3, of the Brazilian Corporation's Act; and (2) JBS did not have the opportunity to participate in the minority shareholders' proceedings as a party, but only as an intervener, thus not having all of the legal rights and duties a party had (for example, JBS claimed it did not have a chance to choose the arbitrator's panel in such proceedings).

On the other hand, the minority shareholders requested that Arbitral Proceeding No. 186/2001 be dismissed, since their claims were prior and JBS could participate as an intervening party, making itself a party to the arbitration(s) (*assistente litisconsorcial*).

The arbitral tribunal responsible for reviewing and deciding on Arbitral Proceedings Nos. 93/2017 and 110/2018 rejected JBS's request, did not recognize the jurisdiction of the arbitral tribunal formed in Arbitral Proceeding No. 186/2021, and decided that the ruling of Arbitral Proceedings Nos. 93/2017 and 110/2018 should be considered *res judicata* for the corporation.

Contrarily, the arbitral tribunal responsible for reviewing Arbitral Proceeding No. 186/2021 granted JBS's requests and acknowledged its jurisdiction and preference over the other arbitral tribunal competent to rule on the two proceedings initiated before by the minority shareholders, stating that the arbitral award of Arbitral Proceeding No. 186/2021 would be considered as *res judicata* for the corporation and its shareholders, considering JBS took the necessary legal measures within the three (3) months outlined in law.

Claiming that the arbitral tribunals could render different and conflicting awards on the same issues and requests, JBS filed Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*) before the Brazilian Superior Court of Justice requesting the court to declare the arbitral tribunal of Arbitral Proceeding No. 186/2021 the sole competent to rule on the issue of accountability of the corporation's controllers and managers, with the dismissal of the other two proceedings initiated by the minority shareholders.

Initially, there was a discussion on whether the Brazilian Superior Court of Justice was competent to settle the conflict between arbitral tribunals since this was an unprecedented case[11]. On this matter, the Brazilian Superior Court of Justice settled on its competence to decide on the issue, according to article 105, I, d, of the Brazilian Federal Constitution[12], stating that the "courts" mentioned in this article include arbitral tribunals:

> "In delimitation to the constitutional attribution of the Superior Court of Justice, the jurisprudence of the Second Panel, *following the premise that the activity carried out within the scope of the arbitration has a jurisdictional nature,* acknowledges the competence of this Court of Justice to resolve conflicts of jurisdiction in which the Arbitration Court appears, either as the plaintiff or as the defendant." (our translation) [13]

While reviewing JBS's arguments, Justice Marco Aurélio Bellizze stated the following:

> "However, in the arbitral proceeding, the entity wielding adjudicative power is of the duly constituted arbitral tribunal, as indicated by the parties in the formation of the arbitral panel; the Arbitration Chamber merely administers the arbitral proceeding, without possessing any adjudicative power to resolve any impasse that may arise between the arbitral tribunals affiliated with it, rendering conflicting decisions.
>
> Ideally, the resolution of a jurisdictional conflict between arbitral tribunals affiliated with the same Arbitration Chamber would be governed and resolved by the Rules of the Stock Market's Arbitration Chamber (CAM), when elected by the parties to resolve their conflict of interests; this would naturally adhere to the principle of autonomy of wills, guiding all arbitration.
>
> However, in the specific case at hand, the Rules of the Stock Market's Arbitration Chamber (CAM) are entirely silent on governing the resolution of the impasse between the arbitral tribunals that may have rendered, in theory, irreconcilable decisions in arbitration proceedings with partially identical claims and causes of action. The Chamber's Presidency has rightly acknowledged its lack of authority to resolve this, following the Rules.
>
> It is noteworthy, in this regard, that the mentioned Rules are limited to regulating the possibility of consolidating cases in the event of a connection, provided it occurs before the constitution of the second arbitral tribunal and with the parties' agreement on the composition of the previously constituted arbitral tribunal, circumstances that are indisputably absent in this case. As stated, there is no regulatory framework to address a competence conflict between arbitral tribunals affiliated with the Stock Market's Arbitration Chamber (CAM) that, within each proceeding, may issue mutually exclusive deliberations."(our translation and underline)[14]

[11] The Brazilian Superior Court of Justice had already settled for its competence to rule conflicts of competence between a judiciary court and an arbitral tribunal (CC No. 111.230/DF and CC No.113.260/SP), but never between two arbitral tribunals.

[12] Article 105. The Superior Court of Justice has the competence to:
I – institute legal proceeding and trial, in the first instance, of:
(…)
d) conflicts of competence between any courts, except as provided in article 102, I, o, as well as between a court and the judges not subject to it and between judges subject to different courts;

[13] Competence Conflict Proceeding No. 185.702/DF, Second Panel of The Superior Court of Justice, Rapporteur Justice Marco Aurélio Belizze, ruled on June 22, 2022. - <https://scon.stj.jus.br/jurisprudencia/externo/informativo/?acao=pesquisar&livre=%28%22CC%22+adj+%28%22185702%22+ou+%22185702%22-DF+ou+%22185702%22%2FDF+ou+%22185.702%22+ou+%22185.702%22-DF+ou+%22185.702%22%2FDF%29%29.prec%2Ctext>. Access on October 9, 2023.

[14] Competence Conflict Proceeding No. 185.702/DF, Second Panel of The Superior Court of Justice, Rapporteur Justice Marco Aurélio

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Thus, the Brazilian Superior Court of Justice acknowledged the *kompetenz-kompetenz* principle and that the arbitration environment should regulate itself, but in this case, the sole arbitration chamber competent to decide on all of the disputes involving shareholders, managers, and members of the fiscal board of the corporations participating in the New Market (Novo Mercado), Level 2 of Corporate Governance (Nível 2 de Governança Corporativa), Bovespa Plus (Bovespa Mais) or in the Bovespa Plus Level 2 (Bovespa Mais Nível 2) simply did not have any specific rule on the matter.

The Brazilian Superior Court of Justice also acknowledged that the rules agreed by the parties and the rules of the arbitral chamber should govern the arbitral proceeding, not the Brazilian Civil Procedure Code, and also acknowledged that applying the basic consolidation rules of the Brazilian Civil Procedure Code to the case could lead to the ruling of the proceeding by an arbitral tribunal that was not chosen by the parties, what would violate one of the most basic principles of arbitration:

> "The arbitral procedure is, therefore, governed, in this order, by the agreements established between the litigating parties—whether at the time of the arbitration agreement or the signing of the arbitration clause, or during the course of the arbitral process—by the rules of the elected arbitral tribunal, and by the determinations issued by the arbitrator.
>
> Notwithstanding this observation, one must not forget, particularly, that the rules of connection or joinder established in the Brazilian Civil Procedure Code are inapplicable to the case at hand, as they represent a fundamental frustration of the basic tenet of arbitration, which is that the selection of the arbitral panel is made by the litigating parties.
>
> One can anticipate very clearly that the consolidation of the proceedings—contemplated by the Federal Public Prosecutor and rejected, however, by both litigating parties, each seeking, under different grounds, the termination of one of the mentioned proceedings—would lead to the unwarranted imposition of subjecting one of the parties to the judgment of an arbitral tribunal whose composition was not chosen by it, in clear violation of articles 13 and 19 of Law No. 9,307/1996.
>
> (…)
>
> A fundamental precept of arbitration is the prerogative of the litigating parties to choose the arbitrators who will decide on their conflict of interests, as a manifestation of private autonomy and the trust of the contracting parties. In arbitration, it is the arbitral tribunal, whose composition was freely chosen by the parties, that is connected to the case under judgment.
>
> The subjective effectiveness of the upcoming arbitral award is legitimized precisely by the trust placed by the parties, not only in the chosen arbitration chamber to resolve their dispute but primarily in the specific and designated arbitrators chosen by mutual agreement for the adjudication of the case.
>
> Thus, as already anticipated, it is impractical in the realm of arbitration to simply promote the consolidation of cases, improperly imposing on one of the parties the judgment by an arbitral tribunal whose composition was not chosen nor consented to by it." (our translation) [15]

Although the Brazilian Superior Court of Justice settled the conflict of competence, the court pointed out the importance of CAM fully regulating the consolidation of arbitral proceedings involving publicly listed corporations, with the same object and/or requests initiated by different shareholders and/or the corporation.

It is noteworthy that, in this particular case, the Brazilian Superior Court of Justice ruled in favor of JBS's requests, stating that the three (3) arbitral proceedings discussed the same facts but that proceeding No. 186/2021 had a broader scope, since JBS requested for the accountability of controllers, managers, and former managers of the company, seeking damages according to articles 159[16] and 246 of the Brazilian Corporation's Act, while the minority shareholders only asked for damages under article 246 of the Brazilian Corporation Act.

Belizze, ruled on June 22, 2022. - https://scon.stj.jus.br/jurisprudencia/externo/informativo/?acao=pesquisar&livre=%28%22CC%22+adj+%28%22185702%22+ou+%22185702%22-DF+ou+%22185702%22%2FDF+ou+%22185.702%22+ou+%22185.702%22-DF+ou+%22185.702%22%2FDF%29%29.prec%2Ctext. Access on October 9, 2023.

[15] Competence Conflict Proceeding No. 185.702/DF, Second Panel of The Superior Court of Justice, Rapporteur Justice Marco Aurélio Belizze, ruled on June 22, 2022. <https://scon.stj.jus.br/jurisprudencia/externo/informativo/?acao=pesquisar&livre=%28%22CC%22+adj+%28%22185702%22+ou+%22185702%22-DF+ou+%22185702%22%2FDF+ou+%22185.702%22+ou+%22185.702%22-DF+ou+%22185.702%22%2FDF%29%29.prec%2Ctext>. Access on October 9, 2023.

[16] *Article 159.* By a resolution passed in a general meeting, the corporation may bring an action for civil liability against any officer for the losses caused to the corporation's property.
Paragraph 1. The resolution may be passed at an annual general meeting and, if included in the agenda or arising directly out of any matter included therein, at an extraordinary general meeting.
Paragraph 2. The officer or officers against whom the legal action is to be filed shall be disqualified and replaced at the same general meeting.
Paragraph 3. Any shareholder may bring the action if proceedings are not instituted within three months from the date of the resolution of the general meeting.
Paragraph 4. Should the general meeting decide not to institute proceedings, they may be instituted by shareholders representing at least five per cent of the capital.
Paragraph 5. Any damages recovered by proceedings instituted by a shareholder shall be transferred to the corporation, but the corporation shall reimburse him for all expenses incurred, including monetary adjustment and interest on his expenditure, up to the limit of such damages.
Paragraph 6. A judge may excuse the officer from liability, when convinced that he acted in good faith and in the interests of the corporation.
Paragraph 7. The action permitted under this article shall not preclude any action available to any shareholder or third party directly harmed by the acts of the officer.

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Also, the Brazilian Superior Court of Justice accepted JBS's argument that the minority shareholders only had extraordinary grounds to bring legal action claiming civil liability and damages against the controllers and managers, while the ordinary grounds to seek such measures belonged to the corporation:

> *"As a rule, the action for damages caused to the corporation by acts of managers and controllers should be initially filed by the directly harmed corporation, which is naturally the holder of the material right discussed.*
>
> Effectively, the so-called social action for civil liability of managers and/or controllers must be primarily initiated by the injured corporation itself (social action *ut universi*). In case of omission (inaction) by the company (to be accurately specified in each case), the law provides, subsidiarily, to the shareholders, as per the law, extraordinary grounds to bring forth the aforementioned action (social action *ut singuli*).
>
> Law No. 6,404/1976 sets forth in detail the accountability of managers in its article 159, which, according to specialized doctrine and this Court's jurisprudence, *allows for an extensive application to the accountability of controllers (provided for in article 246),* even though some moderation may be observed, considering its particularities and purposes.
>
> It is noted that the company's inaction constitutes, evidently, the basis for the minority shareholder's action in extraordinarily grounds to claim.
>
> When dealing with the claim for managers' civil liability, article 159 of the Law sets forth that the Corporation, *through a prior general meeting,* is entitled to take legal action for civil liability against the manager for damages caused to its assets. Paragraph 3 of article 159 authorizes *any shareholder* to initiate legal action if, after the authorization of the general meeting, the judicial measure is not filed within three (3) months from the date of the general meeting. Paragraph 4 of article 159 provides that even if the general meeting decided not to file the lawsuit, the claim can be filed by shareholders representing at least five per cent (5%) of the corporation's capital stock.
>
> (...)
>
> As previously mentioned, *specialized doctrine deems article 159 extensively applicable to the social action for civil liability of controllers,* which aims for the restoration of the corporation's assets (holder of the harmed right), considering the conciseness of the wording adopted by article 246 of Law No. 6,404/1976, which limited itself to establish the obligation of the controller to repair the damages caused to the corporation – from which arises the ordinary grounds of the injured corporation – and the grounds (extraordinary, evidently) of the shareholders representing five per cent (5%) of the capital stock, or any other shareholder, provided they post a bond to ensure payment of costs and fees in case of dismissal of the lawsuit; and establish a five per cent (5%) reward on behalf of the plaintiff in case of success.

Therefore, considering JBS filed the arbitration proceeding within three (3) months of the general meeting that decided legal action should be taken against the controllers, managers, and former managers, the Brazilian Superior Court of Justice concluded that only JBS had grounds to file a lawsuit requesting the civil liability and damages, since "*minority shareholders' social action, even though capable of being exercised individually (under the conditions established by law), may only occur if the corporation fails to initiate legal action for the controller's liability, in the exercise of its subsidiary extraordinary grounds to claim*."

It is essential to point out that on February 28, 2023, CVM ruled differently on an administrative probe, stating that minority shareholders have grounds to initiate their own claim for damages (as set forth on § 1st of article 246 of the Brazilian Corporation's Act) without previous deliberation by JBS in a general meeting[17], and the jurisdiction of the arbitration initiated by JBS after the general meeting would not prevail. Essentially, CVM did not apply the extensive application of accountability of managers and controllers provided for in article 246 of the Brazilian Corporation's act as the Brazilian Superior Court of Justice did:

> *"The point here is the following:* Even if someone argues that it would be economically more efficient to require a prior general meeting for the filing of the action under article 246, this alone is not sufficient to determine that this is the meaning of the current law, considering the inherent limitations therein. For the reasons stated above, it also seems perfectly legitimate to argue that there is a systematic interpretation indicating that prior deliberation by the general meeting is not necessary for the shareholders mentioned in paragraph 1 of article 246 to have the right to bring an action, on behalf of the company, against the controller." (our translation)

Thus, for the Superior Court of Justice to rule on the jurisdiction of a single arbitral tribunal, it was necessary for the court to review some of the arguments regarding the interpretation of article 246 of the Brazilian Corporation's Act (and the same was done by CVM).

We point out that CVM's decision does not overrule the Superior Court of Justice's ruling. In the words of CVM's Director, João Accioly[18]:

> "This Agency does not have legal competence to pronounce itself on some of the matters that constitute the grounds for the (Superior Court of Justice's) ruling, especially regarding strictly procedural and arbitral issues, such as the possibility of consolidating proceedings, the right to choose arbitrators, the regularity of the constitution of the arbitral tribunal, etc. To avoid misunderstandings, the

[17] CVM Administrative Proceeding No. 19957.007423/2021-12, Reg. Col. 2672/22, rapporteur: João Accioly (it was a consult presented for CVM to clarify if, as per article 246 of The Brazilian Corporation's Act, (1) there is no need for a previous general meeting to be held for a minority shareholder to have grounds to file a lawsuit for civil liability and damages against the controller; and (2) the corporation filed a lawsuit for the civil liability and damages against the controller after the minority shareholders, should the lawsuit filed by the minority shareholders be the immediately tossed out).

[18] CVM Administrative Proceeding No. 19957.007423/2021-12, Reg. Col. 2672/22, rapporteur: João Accioly.

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clarification above is provided so that this response to the Consult is not mistakenly considered an attempt to oppose the judgment of that Higher Court. The answers to the queries are not simple and, as we will demonstrate below (this introduction was written after the conclusion of the queries), although they are both affirmative, they do not imply the understanding that the conclusions of the Honorable Ruling are not supported by other grounds beyond corporate law and the stock market, the only sphere on which CVM has legal competence to render an opinion about." (our translation).

This difference of opinions only shows that the issue is controversial and demonstrates the importance of the consolidation of arbitral proceedings to be fully regulated by CAM and/or by domestic law.

Indeed, if such a rule existed on CAM's regulations, only the competent arbitral tribunal would be able to evaluate the merits of the issue, and conflicting decisions/interpretations on the issue could be avoided.

III. The Legislative and Arbitration Chambers' Response and Actions - Laws and Rules

After the recent Brazilian Superior Court of Justice's ruling, the Brazilian arbitral community started discussing what measures could be taken to avoid future issues such as the one object of Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*), and to improve arbitral proceedings involving publicly listed corporations.

Initially, Centro de Arbitragem e Mediação Brasil- Canadá (CAM-CCBC), one of the most important arbitration chambers in South America, created a new set of rules to be applied solely to corporate disputes. Even though CAM-CCBC is not the competent chamber to rule on arbitrations involving publicly listed corporations participating in the New Market (*Novo Mercado*), Level 2 of Corporate Governance (*Nível 2 de Governança Corporativa*), Bovespa Plus (*Bovespa Mais*) or in the Bovespa Plus Level 2 (*Bovespa Mais Nível 2*), it is frequently chosen to decide on corporate disputes by other companies and its shareholders[19], and, for this reason, can face issues similar to those explained in the previous chapter.

The CAM-CCBC Corporate Arbitration Regulation sets forth important guidelines, especially regarding third parties, as per the definitions brought by article 1[20]:

> *"Article 1:* The provisions of these Corporate Arbitration Rules will be applied whenever all the following requirements are met:
>
> a) the arbitral award possibly affects not only the claimants of the arbitration or those who have been included as respondents in the Request for Arbitration, but also the legal level of a corporation, limited liability company or association ("Legal Entity") and, concurrently, partners, associates or shareholders holding securities of a class or type directly subject to the effects of the arbitration award, and/or the administrators also subject to it ("Affected Third Parties");
> b) the nature of the disputed legal relationship submitted to arbitration requires a uniform decision for all Affected Third Parties; and
> c) the bylaws or articles of incorporation of the Legal Entity contain a clause according to which the parties agree that the arbitration will be administered by the CAM-CCBC and governed by the CAM-CCBC Rules, pursuant to article 1 of the CAM-CCBC Arbitration Rules." (underlined by us)

Additionally, CAM-CCBC has created vital rules for third affected parties (such as minority shareholders) to participate in the proceeding, for the consolidation of multiple proceedings, and for the disclosure of arbitration proceedings involving publicly listed corporations:

> *"Article 4:* In the same opportunity or after requesting information from the parties on the Affected Third Parties, the CAM-CCBC Presidency will determine the notice of the latter ("Notice of the Affected Third Parties"). This Notice serves to invite them to partake in the arbitration proceedings should they desire to do so. All notified parties are bound by the outcomes of decisions rendered throughout the proceedings, irrespective of their active participation therein.
>
> (…)
>
> *Article 5:* In the case of publicly held companies that require the publishing of information on corporate legal actions, the Notices of the Affected Third Parties must be disclosed following the provisions of the Brazilian Securities and Exchange Commission (CVM). In the case of other Legal Entities, the Notices of the Affected Third Parties must be disclosed in accordance with the procedure for convening partners or associates to meetings, pursuant to the articles of incorporation or, if silent, to the Legal Entity's governing law.
>
> *Article 6:* The CAM-CCBC Presidency shall be responsible for analyzing and consolidating the arbitration with another possibly pre-existing one, after hearing the parties to both proceedings.
>
> *Sole Paragraph:* The provisions of article 19 of the CAM-CCBC Arbitration Rules are applicable in the event of a new arbitration filed by any Affected Third Party or Legal Entity to discuss a relief sought in the first arbitration. In this case, the

[19] It is the second arbitration chamber mostly elected by corporations' bylaws to rule on arbitration proceedings (3% of the corporations), and the International Chamber of Commerce – ICC has been the third arbitration chamber most elected by corporations' bylaws (2% of the corporations). PARGENDLER, Mariana; PRADO, Vivine M.; SANTOS, Ezequiel F. and VIOL, Dalila M. Cláusulas Arbitrais em Números no Mercado de Capitais Brasileiro (Arbitration Clauses in Number in the Brazilian Capital Market). Revista Brasileira de Arbitragem, n. 75, jul-set. 2022, São Paulo, p. 68.

[20] CAM-CCBC's Corporate Arbitration Rules: <https://ccbc.org.br/cam-ccbc-centro-arbitragem-mediacao/en/supplementary-rules-02-2023/>. Access on November 21, 2023.

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jurisdiction of the previously constituted Arbitral Tribunal shall prevail.

Article 7: The Notice of the Affected Third Parties will fix a period of thirty (30) calendar days within which Affected Third Parties and, if applicable, the Legal Entity, can provide their response. Both may request their inclusion in the arbitration (i) supporting Claimants' demands, (ii) indicating that they intend to join the original Respondents, or (iii) merely following the course of the proceedings.

Sole Paragraph: After the period provided for in this article, the CAM-CCBC Secretariat will notify the Respondents, offering them the opportunity to present their Answers to the Request for Arbitration. (…)" (underlined by us)[21]

Unfortunately, CAM did not follow CAM-CCBC's example and has not created a similar set of rules, which would be essential and could solve most of the problems existing nowadays, as pointed out by the Brazilian Superior Court of Justice.

However, legislators in Brazil are currently discussing the creation of a new law that will change part of the Brazilian Corporation's Act, bringing more transparency to arbitration proceedings, new procedural rules, and more security for investors of the Brazilian stock market.

It is Law Bill No. 2925/2003[22], that has been presented to the Brazilian Chamber of Deputies and has been drafted by players from the arbitral community, by CVM, and by the Ministry of Finance of Brazil.

The current draft of the law includes essential changes, such as the possibility of a class action lawsuit for damages to be filed by shareholders, but with the limitation that such shareholders represent an equal or greater percentage of 2 and 5 tenths percent of the shares (of the same type or class), or who possess an amount of shares equal to or greater than BRL 50 million (article 27-H)[23]. This bill also suggests that CVM can stablish procedural requirements for the arbitration chambers other than those established in the chamber's regulations, such as "*the need to specify in their regulations the procedure for consolidating arbitral proceedings in cases of connection and joinder*" (article 109, § 6).

The Brazilian Ministry of Finance has argued that the bill was discussed with a wide range of experts and representative entities of capital market institutions, starting from a study conducted by the Organization for Economic Cooperation and Development (OECD) in partnership with the Brazilian Ministry of Finance and CVM. The Ministry of Finance states that "*the study diagnosed the Brazilian model, comparing it with models from other jurisdictions, and indicated improvements in mechanisms for safeguarding the private rights of minority shareholders.*" [24]

The bill was presented in June/2023 and will still be reviewed by a commission formed by representatives of the Brazilian Chamber of Deputies under its constitutional and legal aspects (*Comissão de Constituição e Justiça*), and changes to the draft can be proposed.

Therefore, even if CAM does not create a specific set of rules for the consolidation of arbitrations involving different shareholders and the same subject and/or requests, the Brazilian Ministry of Finance and CVM are paving the way to create more legal certainty for investors and to bring more seriousness to the Brazilian securities market.

IV. Conclusion

This Article has demonstrated how arbitration proceedings involving publicly listed corporations are being processed, reviewing, specifically, the problem pointed out by the Brazilian Superior Court of Justice in Competence Conflict Proceeding No. 185.702/DF (*Conflito de Competência*) regarding the lack of guidelines in CAM's rules to consolidate arbitration proceedings initiated by different shareholders on the same issue and/or with the same requests, and to decide on which arbitral tribunal has jurisdiction to rule the cases.

It is our opinion that CAM should create its own set of rules for the issue, following CAM-CCBC's lead, since it is the sole competent arbitration chamber to rule on arbitration proceedings involving publicly listed corporations participating in the New Market (*Novo Mercado*), Level 2 of Corporate Governance (*Nível 2 de Governança Corporativa*), Bovespa Plus (*Bovespa Mais*) or in the Bovespa Plus Level 2 (*Bovespa Mais Nível 2*). This would allow arbitration chambers to maintain their independence to create its own set of procedural rules, thereby preserving the *kompetenz-kompetenz* principle and avoiding the judicialization of issues that would originally be subject to arbitration.

Even though CAM has not taken these measures until this date, it is our opinion that CVM and the Brazilian Ministry of Finance are taking the necessary legal manners to solve the problem and to bring (foreign and local) investors the needed legal certainty and security to continue investing in Brazilian publicly listed corporations and to sustain a stable (and maybe growing) stock market.

[21] CAM-CCBC's Corporate Arbitration Rules: <https://ccbc.org.br/cam-ccbc-centro-arbitragem-mediacao/en/supplementary-rules-02-2023/>. Access on November 21, 2023.

[22] <https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra?codteor=2284015&filename=PL%202925/2023>. Access on November 21, 2023.

[23] We point out that this kind of procedural grounds limitation will probably cause legal discussions on the restriction to the constitutional right of action and to the legal rights minority shareholders already have under the Brazilian Corporation's Act.

[24] <https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra?codteor=2284015&filename=PL%202925/2023>. Access on November 21, 2023.

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Although we do not fully agree with the Brazilian Superior Court of Justice's conclusion that minority shareholders could not have taken legal action against JBS's managers and controllers to claim civil liability and damages in this particular case (we agree with CVM's opinion), we agree that a set of specific rules on the matter would avoid conflicting decisions/interpretations of the Brazilian Corporation's Act, and would allow the sole competent arbitral tribunal to rule on the procedural issues and on the merits of the case, it is our opinion CAM-CCBC has created a good set of rules on the main procedural issues that could arise in corporate arbitration proceedings with regards such as joinder, third party intervention and consolidation of proceedings.

We hope for the speedy approval of Law Bill No. 2925/2003 on this matter and reserve the right to publish a new article after its publication to reflect on the practical consequences and changes brought by a law change.

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Global Journal of Human-Social Science (E) Volume XXIV Issue II Version I Year 2024
20

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Global Journal of HUMAN-SOCIAL SCIENCE: E Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

Exploring the Relationship between Language of Instruction and Academic Achievement among Primary School Students: Evidence from UAE

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Keywords: TIMSS, native language, second language, students' performance, propensity score technique.

GJHSS-E Classification: FOR Code: 130204



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I. Introduction

Since its founding in 1971, the United Arab Emirates (UAE) have transformed from a desolate desert into a bustling metropolis thanks to money earned from oil profits. The United Arab Emirates has attained international status in fields including business, tourism, aviation, and architecture by using international standards to gauge its objectives. Nonetheless, comparable educational advancements still lag behind the nation's social and economic growth (Harold, 2005). Despite strong government support for the education sector, the quality of education as measured by student performance in international evaluations such as Trends in International Mathematics and Science Study (TIMSS) remains below international standards.

The language capital is an aspect that may affect student performance. Language capital, or more simply "the mother tongue," is defined in the literature as the set of skills that are acquired during childhood with no particular effort and strengthened in school (Chiswick and Miller, 1995). Arab students in UAE speak two varieties of Arabic; the classical Arabic known as « fushaa » and the different dialects spoken at home (the mother tongue). In such "dialect-dominated" environment, students are unlikely to be fluent in Arabic. Thus, language acquisition efficiency will be significantly limited (Boutieri, 2012). It has been shown that learning a first language requires at least 12 years of experience (Collier, 1989). By the time they reach this age, arabic-speaking pupils have not finished this process, and it might take them much longer to learn the fundamentals of the language.

In addition, a "new school model" has been announced by the government of Abu Dhabi in the United Arab Emirates for state kindergarten and early primary grades with effect from the academic year 2010-2011, and extending annually thereafter to cover all grade levels. Amongst a range of ongoing pedagogic, curricular and school leadership reforms, a major new departure is the introduction of English as an additional medium of instruction alongside the existing medium of Arabic. The reason to introduce English as a medium of learning for all Emirati children at such a young age is the belief that learning a second language at a younger age is beneficial. Despite this widespread view, international research on the issue is "surprisingly ambiguous" (Saville-Troike, 2006), with some review studies showing that adolescents are better language learners than young children, and others showing the opposite (Marinova-Todd et al., 2000). Cummins' (1984) asserts that there is an interdependence between the first language (L1), or the mother tongue, and the second language (L2), which also influences academic achievement (Cummins, 1978). According to the language interdependence hypothesis, L2 development depends in part on the developmental level of the L1, and students with lower levels of L1 and L2 proficiency are more likely to experience academic difficulties in school (Cummins, 1984).

Bilingual education in the Arab world has received little attention (Al-Khatib, 2006), and there has consequently been little research on language-in-education issues in the region. This paper aims to bridge this gap. Using the UAE as a case study, we want to explain the disparity in academic achievements of two groups of young students living in a dialect-dominated environment. The first is taught in English, while the second is taught in classical Arabic. More specifically, building on Cummins' theoretical background, we aim to provide (a) evidence of language interdependence in the Emirati context, and (b) its association with academic performance as measured by the standardized TIMSS 2019 test.

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Our work adds to the empirical literature linking academic performance to school language. It was implemented with three objectives in mind. The first is to expand research on the variables that influence academic performance. The second is to test the language interdependence hypothesis in the Emirati context. The third is to consider future language policies in a multilingual context.

II. Context of the Research Study

Since the early 1990s, the UAE has witnessed remarkable transformation in all aspects of socio-economic and political life in a short period of time and this rapid development has been made possible by an influx of an expatriate population. Martin (2003) reports that in 1968, nationals of the United Arab Emirates (UAE) comprised 63% of the population, but by 1975, after the discovery of oil, nationals comprised only 36%. Along with the commercialization of oil and migration of expatriate laborers came the proliferation of the English language to the UAE. English has historically played an essential role for the modernized Arab world. However, English, and the values it represents, has become a controversial issue within a culture dominated by Islamic traditions (Al Mahrooqi & Denman, 2015).

English might act as a connecting bridge to the outside, international community, but as such it replaces Arabic as the primary means of communication among local people. In the UAE society today, English not only as a medium of instruction in education, but also in mass media and communication technology, such as satellite TV stations, computers, and the Internet. Knowledge of English has become the key to better jobs, especially in the private sector: "*A good command of English is regarded as one way of gaining access into the private sector workforce*"(Troudi & Al Hafidf, 2017). That is why everyone feels the need to learn English. In certain settings, such hospitals and private businesses, the usage of English is becoming so imperative that Arabic is now considered secondary. This important role of English explains the increasing focus on using English as a medium of instruction in UAE schools.

Most parents who can afford it are keen to send their children to the mushrooming private and international schools that start English instruction from kindergarten. People are more and more eager to have an English education which they believe is the prerequisite to professional and social success (Troudi and Jendli, 2011).

It is generally understood that individuals' attitudes towards foreign languages are influenced by social, economic, and political factors. In the UAE, the spread of English in education has been made more rapid as a consequence of decisions taken by the government, private institutions, and individuals. Because policy makers in the region tend to link English to modernization, it has been aggressively taught in schools at all levels (Hanani, 2009).

A major challenge facing the new school model is a linguistic one: Arabic diglossia which refers to two varieties of the same language being used alongside each other for different functions. Modern Standard Arabic (MSA) is used in reading, writing, and formal spoken situations, while colloquial Arabic is used for speaking. According to Badry (2004) "the linguistic situation in every Arabic speaking country is characterized by diglossia where literate speakers select from several varieties of Arabic depending on the setting, interlocutors, and occasion of the communication". Furthermore, Al Sharhan (2007), in his study of educational languages in the United Arab Emirates, showed that Emirati children need to master not only two but three Arabic languages (trilingual): Gulf Colloquial Arabic; Modern Standard Arabic which is the language of instruction in schools and the language of written media; and Classical Arabic, required for learning the Quran. Emirati schoolchildren learning their first language faced significant challenges in mastering all registers of the language (Abu-Libdeh, 1996).

This complex linguistic situation is likely to contribute to the low levels of first language literacy in UAE, and is thought to be an aggravating factor in poor general educational attainment levels (Maamouri, 1998).

III. Theoretical Background

Bilingual or multilingual people are those who use two or more languages in their everyday lives. In order for someone to be considered bilingual, he/she needs to have an appropriate functional ability in both languages. Such control of the two languages is referred to as balanced bilingualism. However, most bilinguals use each language for different purposes, in different circumstances, and with different people in their everyday lives (Fishman, 1972). Bilingualism comes in three flavors: sub-coordinate, coordinate, and compound. Compound bilinguals acquire two languages in the same setting, combining their two verbal expressions to form one thought. Coordinated bilinguals learn both languages in distinct settings, such as school and home, so their vocabulary is part of two distinct and autonomous systems. One language predominates in a sub-coordinate multilingual (D'acierno, 1990).

There is also a difference between subtractive and additive bilingualism (Cummins, 2000). When the first language continues to be developed and the first culture continues to be valued while the second language is added this is known as additive bilingualism. According to research cited by Cummins (1994), kids who study in additive bilingual environments tend to be more successful than those whose original language and culture are completely or partially

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devalued by their schools and society and are instead substituted by a powerful second language.

For these reasons scholars have called for the need to use the mother tongue in the primary stages of education in order to improve the quality of education as well as to preserve the language, and to provide a solid foundation in the students' native language. This approach prepares them better for learning a second language (Baker, 2001; Cummins, 1999, 2000). Cummins (1984) argues for the need to make a distinction between the academic (cognitive academic language proficiency; CALP) and the conversational (basic interpersonal communicative skills; BICS) dimensions of language proficiency. BICS refers to the development of conversational fluency in the second language, which is a language needed to interact socially with other people and is an earlier development. CALP describes the use of language in decontextualized academic situations which include listening, speaking, reading, and writing. The above hypothesis means that a student's ability to converse in a second language (BICS) is not an indicator of his/her ability to engage in academic skills (CALP) in that second language.

Cummins (2001) elaborates the relationship between L1 and L2 development in his Development Interdependence hypothesis. According to him, cross-lingual proficiency can aid in the growth of intellectual and cognitive abilities. Cummins claims that if a minimal level of L1 academic and cognitive development is met, then cognitive and literacy abilities developed in the mother tongue, or L1, will translate between languages. Therefore, reading in L1 can help with both the continuation of first language development and the growth of literacy and knowledge in L2. This implies that the learner may struggle to become bilingual if the threshold of cognitive proficiency in L1 is not met. Research has shown that it usually takes at least five years for second language learners to catch up academically to their native English-speaking peers, but conversational fluency in English is often attained within two years of intensive exposure to the language (Cummins, 1999). Cummins (2001) further argues in his Threshold hypothesis that there are threshold levels of linguistic competence that bilingual children must achieve in both of their languages to take advantage of the benefits of bilingualism.

The findings of several investigations support Cummins's hypothesis (1979). According to Papanastasiou (2000), students who took TIMSS evaluations in a second language experienced lower achievements. Similarly, Herbert et al. (2002) showed that students who received their instruction in English (second language) instead of Chinese are more disadvantaged than native students. In the same vein, Brock-Utne (2007) emphasized that using English as a medium of instruction in Tanzania hinders students' learning. Likely, Samuelson and Freedman (2010) showed that using English as the only language of instruction, would not always allow students to participate successfully in the global economy because many of them will not develop a solid command of academic literacy in their mother tongue.

The Cummins (1979) theoretical framework has been beneficial for second language education from a theoretical standpoint. His main argument is that bilingualism can be advantageous for academic and cognitive purposes when LI abilities are sufficiently developed. In this paper, we will examine the linguistic interdependence in the setting of the United Arab Emirates by comparing the academic achievement of two groups of students whose mother tongue is "Arabi" (Dialect). One group is receiving instruction in English, while the other is receiving instruction in Arabic.

IV. TIMSS Data and Methods

a) *TIMSS Data*

The primary aim of the TIMSS (Trends in International Mathematics and Science Study) assessments is to establish a reliable and valid measure of knowledge and skills in mathematics and science. These assessments hold significant value within the global education community and are designed to align with the curricula of participating countries. Introduced in 1994/1995, the initial implementation of TIMSS involved 45 countries, with Kuwait being the only Arab participant at that time. However, as time has progressed, the participation of Arab nations in TIMSS evaluations has increased, encompassing both fourth and eighth-grade levels.

In the latest TIMSS survey conducted in 2019, a total of 64 countries and 8 benchmarking participants took part. Notably, 9 Arab countries participated at the fourth-grade level, while 11 Arab countries participated at the eighth-grade level. The TIMSS 2019 assessment witnessed the involvement of 6 Gulf countries, namely Bahrain, Oman, Qatar, the United Arab Emirates, Saudi Arabia, and Kuwait. In addition, Dubai played a role as a benchmarking participant. To ensure meaningful comparisons across countries, the TIMSS assessments are strategically scheduled to take place at the end of the academic year. This timing allows for greater cross-country comparability by minimizing potential variations in the content and timing of instruction across different educational systems.

The choice to use the United Arab Emirates as a sample for our study investigating the impact of language of instruction on academic achievement for primary students is justified for multiple reasons. Firstly, UAE has demonstrated a strong commitment to education and have made significant investments in their educational systems. The UAE's Ministry of

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Education (MOE) has started a number of educational reforms since the early 1990s, at a period of significant social and economic development in the country as well as growing influence from foreign cultures (UNESCO, 2016). In 2009, the Abu Dhabi Education Council (ADEC) which is the government organization in charge of managing public education in Abu Dhabi, developed the New School Model (NSM). Amongst a range of ongoing pedagogic, curricular and school leadership reforms, a major new departure is the introduction of English as an additional medium of instruction alongside the existing medium of Arabic. Furthermore, the UAE has a distinctive linguistic diversity due to the various ethnic groups that comprise its population (Syed, 2003). Because of this intricate language map, English has come to be used as the common language across the various ethnic groups. This English invasion has also been expedited by the United Arab Emirates' rapid advancements in business and communication technology.

b) Sample Design and Exclusion

TIMSS is a globally recognized assessment program that employs meticulous sampling procedures to ensure the accuracy and reliability of its estimates, striving to provide an accurate representation of the larger population. In order to maintain consistency and fairness across different cycles of TIMSS, stringent exclusion criteria have been established at both the school and student levels, as documented by Martin et al. (2020). At the school level, certain criteria are employed to exclude specific schools from the dataset. Schools located in remote areas or with an extremely small student population, such as four or fewer students in the target grade, are excluded. Additionally, schools that deviate significantly from the mainstream educational system or exclusively cater to children with special needs are also excluded. These exclusion criteria ensure that the dataset primarily consists of schools that align with the typical educational context. Moreover, international guidelines are implemented to determine within-school exclusions. These guidelines take into account students with functional disabilities, students with intellectual disabilities, and students who are non-native language speakers. By excluding these specific student groups, the aim is to maintain a standardized assessment environment and ensure that the results accurately reflect the abilities of the target population. It is important to note that these exclusion criteria are designed to enhance the validity and reliability of the assessment outcomes. In our specific sample, the overall exclusion rate is 5,6%, demonstrating the adherence to these exclusion guidelines while still maintaining a robust and representative dataset for analysis *(Table A-1).*

The reason for selecting fourth grade students is that at this grade most uses of language in school is cognitively demanding and context-reduced, which means that students have to rely primarily on linguistic cues to meaning and may in some cases require suspending knowledge of the "real world" in order to appropriately interpret the logic of the communication (Cummins & Swain, 1986). Since our aim is to test the linguistic interdependence hypothesis and its link to students' performance, we define two groups of students: those who took the tests in Arabic known as the control group and those who took the tests in English known as the treatment group. In order to get more accurate results and knowing that only native speakers are allowed to participate in TIMSS (according to the students' exclusion criteria discussed above), we restricted the participants who took the test in English to those whose both parents were born in the country. By doing so, we excluded students who were born from mixed marriages (having a native parent), and speak Arabic and English at home. Our sample is then composed of 3092 students wehere the proportion of students who took the tests in English amounts to 32,47%.

V. Methods

a) Empirical Model and Technique

OLS regression is first used to estimate the average treatment effect of the use of English as a medium of instruction. The variable treatment is introduced in *Equation (1)* as a dummy variable. Recall that the treated group consists of students receiving English instruction, while the control group consists of students receiving Arabic instruction.

$$P_{i,c,s} = \alpha_0 + \alpha_1 F_{i,c,s} + \alpha_2 T_{i,c,s} + \varepsilon_{i,c,s} \quad (1)$$

Where P_{ics} is the score of student i in class c at school s. F_{ics} is a vector of individual and family background characteristics. T_{ics} is the treatment variable which is a binary variable that takes the value 1 for treated observations and 0 for control observations. To draw valid inferences, we use the students' sampling weights. The aim of OLS regression is to examine if there are any significant differences in performance between the treatment and control groups. To gain better understanding of performance differences, and because it is not straightforward to directly compare the outcomes for these two groups because those who choose English education may differ from those who choose Arabic, we use the propensity score matching technique. The propensity score matching (PSM) is a quasi-experimental method in which the researcher creates an artificial control group by matching each treated unit with a nontreated unit with similar characteristics. PSM, in particular, computes the probability of a unit enrolling in a program based on observed characteristics. This is the propensity score. Then, based on the propensity score, PSM assigns

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treated units to untreated units. PSM is based on the assumption that untreated units can be compared to treated units based on some observable characteristics, as if the treatment had been fully randomized (Rubin, 2001).

The use of the matching technique is to control for the potential confounding influence of pretreatment variables (individual and family variables). We utilize a logit model to predict children's propensity for the treatment group. Following that, we use the Nearest Neighbor Matching to pair cases in both groups based on their likelihood of experiencing a treatment. We use matching with replacement to identify neighbor cases (Frisco et al., 2007).

b) Variables

This section describes the outcome variables used for the purpose of this study as well as the covariates.

Outcome variables: The dependent variables are overall performance in mathematics and science. In TIMSS, student achievement is represented by sets of five plausible values: Math 1, Math 2, Math 3, Math 4 and Math 5 for mathematics achievement and Science 1, Science 2, Science 3, Science 4 and Science 5 for science achievement. Plausible values are imputed values drawn from the estimated ability distributions (Martin et al., 2016; Mislevy, 1991). Plausible values are generated by making use of all available background data of the students. Plausible values are not intended to be estimates of individual student scores, but rather are imputed scores for like students- students with similar response patterns and background characteristics in the sampled population- that may be used to estimate population characteristics correctly (Martin et al., 2020). A detailed review of the plausible values methodology is given in Mislevy (1991).

Covariates: The core explanatory variables are individual and family background characteristics. These variables and their coding are listed in *Table A2.* Controlling for socioeconomic status (SES) and pre-education is important as they may influence the rate at which a second language is learned. Individual factors include the students' age, gender, and the number of years in pre-primary education. Family factors include parents' education and educational resources at home. The latter was constructed based on the data reported by students and their parents regarding the number of books and other study materials in their homes, the parents' levels of education (National Academies of Sciences, Engineering, and Medicine, 1997) and the parents' employment. Cut scores were used to define students into three categories: students with Many Resources, students with Some Resources and students with Few Resources. All the nominal variables were introduced in the model as dummies. For Sex, it takes the value 1 for females and zero for males. Parents' education level takes four categories: some primary, lower secondary, upper secondary, post secondary and university or higher. The category some primary is considered as a reference category. For home resources, students are assigned to three categories which are the following: students with many resources, students with some resources and students with few resources. The category few resources is considered as a reference category.

c) Descriptive Statistics

In what follows, we provide a comprehensive overview of the descriptive statistics pertaining to the outcome variables *(Table 1 and 2)* and covariates employed *(Table 3).* For continuous variables, we compute the means to summarize the central tendency of the data. On the other hand, categorical variables, such as gender or socioeconomic status, are characterized by distinct categories or groups. In order to depict the distribution of these variables, we calculate proportions.

Table 1: Descriptive statistics for Mathematics Achievements

Variables	Mean of Total Sample	Mean of Control Group	Mean of Treatment Group	Effect Size (Cohen's d)
Math1	480.668	492.112	456.868	-0.396
Math 2	481.054	492.763	456.705	-0.409
Math 3	481.271	492.183	458.576	-0.386
Math 4	480.936	491.953	458.025	-0.386

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Math 5	479.333	491.600	453.821	-0 .426
Number of Observations	3092	2088	1004	

Table 2: Descriptive statistics for Science Achievements

Variables	Mean of Total Sample	Mean of Control Group	Mean of Treatment Group	Effect Size (Cohen's d)
Science 1	480.616	503.133	433.787	-0.703
Science 2	479.929	503.619	430.66	-0.739
Science 3	478.889	500.441	434.0671	-0.675
Science 4	478.269	500.715	431.589	-0.690
Science 5	479.363	501.947	432.396	-0.691
Number of Observations	3.092	2088	1004	

Within both the treated and control groups, the mean values of the outcome variables hover around the global average of approximately 500 points. The negative sign associated with the effect size signifies that learning in English is less effective than learning in Arabic. The effect size in mathematics and science performance is relatively important (for further insights on the range of variation, refer to Borenstein, 2009, and Hattie, 2009).

Table 3: Descriptive statistics of covariates for all students

Variables	Mean/Proportion	Min	Max
Age	9.612	8.42	11
Gender	0 .553	0	1
Pre-Education	1.566	0	4
Parents' education			
Some primary	0.0268	0	1
Lower secondary	0.0252	0	1
Upper secondary	0 .213	0	1
Post-secondary	0 .177	0	1
University or higher	0 .558	0	1

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Resources			
Few resources	0.0124	0	1
Some resources	0 .890	0	1
Many resources	0 .0976	0	1
Number of Observations	3092		

The students included in the sample exhibit an average age of 9.61 years. In addition, the sample is approximately evenly divided between boys and girls, ensuring a balanced representation of both sexes in the analysis. Students typically received two years of pre-primary education. Furthermore, 55 percent of parents in UAE have a university degree or higher and more than 98 percent of students have access to some home educational resources.

VI. Results and Discussion

The following section provides a comprehensive analysis of the results obtained from both Ordinary Least Squares (OLS) regression and propensity score matching techniques. OLS regression analysis was conducted independently five times for each evaluation. To derive the final parameter of interest, Rubin's rules (Rubin, 1987) were applied, which enable the combination of results from multiple regression analyses to generate a comprehensive and reliable estimate. The findings from the OLS regression analysis are presented in *Table 4,* while *Table 5* presents the results obtained from propensity score matching.

The OLS results reveal a significant negative association between taking the test in english and academic achievement. Students who took the tests in English have significantly lower achievement in mathematics and science than their peers who passed the tests in Arabic.

Consistent with previous research (Ammermüller et al., 2005; Chiu & Khoo, 2005), the analysis reveals that family variables have a significant positive impact on students' performance. These findings emphasize the influential role of family factors in shaping academic outcomes. Moreover, when examining individual student characteristics, the coefficient of gender demonstrates a significant influence in evaluations; Boys outperform girls in mathematics, however, girls outperform boys in science. Preschool education participation has a positive and significant influence on overall performance for both evaluations which is in line with previous studies (Holla et al., 2021).

Table 4: OLS Results

Variables	Mathematics Achievement	Science Achievement
Treat	-45,436*** (3,918)	-81,918*** (4,835)
Age	28,496*** (4,180)	37,453*** (4,7630)
Sex	-6,083* (3,280)	5,848* (3,609)
Pre Education	3,897*** (1,379)	2,466*** (1,539)
Parents' Education		
Lower secondary	3,130 (14,713)	5,695 (16,004)
Upper secondary	-6,639 (11,745)	6,601 (12,884)

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Resources		
Some resources	27,306** (13,593)	15,991 (16,735)
Many resources	42,786*** (14,227)	35,430** (17,537)
Constant	177,0532*** (42,794)	90,805* (48,426)

Notes: Standard errors are in parentheses.
**** p<.01, ** p<.05, * p<.1*

To further substantiate the finding between language of instruction and academic achievement, we employ a propensity score model. The results of this analysis are presented in *Table 5.*

Table 5: ATET Nearest Neighbor Results

ATE TREAT (1 vs. 0)	Mathematics	Science
Overall Performance	-51,003*** (4,128)	-88,844*** (5,106)

Notes: Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Students who received English-language mathematics instruction (Treatment group) had their overall scores reduced by 51 points, respectively, when compared to students who passed the Arabic-language Mathematics test (Control group). Similarly, students who received science instruction in English (Treatment group) had their overall scores fall by 88 points, respectively, as compared to students in the control group. This suggests that performance at this grade level is lower when education is offered in English. All the differences are statistically significant at the 1% level. Our findings reveal that students whose mother tongue is Arabic and with early English learning experience score significantly lower in TIMSS evaluations than their peers who take the tests in Arabic. The differences are more noticeable in science than in mathematics. The learning of mathematics and science requires a variety of linguistic skills that second language learners may not have mastered by the age of nine. Even though mathematics language seems to be abstract, the study of mathematics (especially at the primary level) begins with the study of real-world problems and requires the application of the language. Therefore, the language plays an important role in conveying mathematical knowledge to students and in knowing how abstraction is interpreted (Ferrari, 2003). Likely, the difference in science proficiency between the treatment and control group is manifest. This provides evidence that a first language enhances more science learning than a second language. At grade 4, science context domains are more linked to real-world situations and thus to "home language." Students need to develop a deep understanding of science concepts, make connections among concepts and apply concepts in explaining natural phenomena or real-world situations. Students in science classes must be engaged in science inquiry, have to negotiate ideas and justify claims based on evidence. It has been shown that sometimes, and for effective instruction in science, teachers focus on students' home language as an instructional support. They use students' home language to explain science terms (Goldenberg, 2013).

A key premise in the literature is that age is significant in child language acquisition, whether in L1 or L2 (Oliver and Azkarai, 2017). Given that the critical period of twelve years is required to be fully proficient in the first language (Collier, 1989), students in UAE at the age of nine (fourth grade) have not yet begun to complete full cognitive development in the first language and so do their peers in their native languages. Nonetheless, the difference is that English native speakers are approaching the completion of L1 acquisition, whereas students whose "mother tongue" is Arabic (Dialect) require additional years to improve their Arabic language skills. So they lag behind their peers in terms of years of L1 acquisition. The mismatch between the language of the home and the language of the school makes those students less proficient in "modern Arabic."

VII. Conclusion and Recommendations

In this study, we investigate the effect of the language of instruction (English in this case) on academic achievement of Emirati-speaking students who are expected to learn science and math in a second language (L2) before achieving a sufficient level of proficiency in it.

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Based on Cummins's (1984) theoretical framework, which links language proficiency to academic achievement, we offer some insights regarding the connection between Emirati students' academic achievement in mathematics and science and their L1 and L2 proficiency. In order to explain the disparity in academic performance in science and mathematics between two groups of young children living in a dialect-dominated environment who got instruction in English and who received instruction in Arabic, we used the propensity score technique and the TIMSS 2019 standardized tests.

Our results demonstrate that the differences in performance between the two groups can be explained by the language used during instruction. Young children who started studying L2 before their L1 was fully matured showed overall performance losses as compared to children who started learning Arabic at the same age. The results of this study support the linguistic interdependence hypothesis developed by Cummins (1984). This study helps us to think about future language policy not only in the UAE, but also in Arab countries that are all multilingual.

Strengthening early exposure to the Arabic language (modern Arabic) will minimize the retardation produced by the mismatch between students' mother tongue and the school language. Arabic should be taught and learned in schools in a more practical manner. Additionally, Arabic learners should have access to audio-visual resources, which have the added benefit of advancing the language's cognitive and intellectual components in addition to its fluency. Finally, pupils who are fully proficient in both languages would benefit from the cognitive and academic advantages of bilingualism, while bilinguals who are only sufficiently proficient in one of their languages would not face any such academic drawbacks.

Statements and Declarations:

Funding: There has been no significant financial support for this work that could have influenced its outcome.

Ethical Approval: Not applicable.

Informed Consent: This article does not contain any studies with human participants performed by any of the authors.

Author's Contribution: There is only one author for this article

Conflict of Interest: We know of no conflicts of interest associated with this publication.

Data Availability Statement: https://timss2019.org/international-database/

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Appendix

Table A-1: Coverage and Exclusion Rates in UAE

Coverage	Overall exclusion	Schools	Students
100%	5.6%	2.6%	3%

Source: TIMSS (2019)

Table A-2: Variables' List, coding and meaning

List of Variables	Coding	Meaning
Overall Performance Math1-Math5	asmmat 01–05	The 1st to 5th plausible value of Overall Performance in Mathematics
Overall Performance Science1-Science5	asssci 01–05	The 1st to 5th plausible value of Overall Performance in Science
Age	asdage	Quantitative variable which indicates student's age.
Sex	asbg01	Dummy variable which takes the value 1 for female and 0 for male.

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Pre-Education	asbh04b	Quantitative variable which indicates the number of years in pre-primary education for each student.
Parents' Education	asdhedup	Categorical variable which reflects parents' education level as follows; some primary, upper secondary, postsecondary and university or higher. The category some primary is considered as reference category.
Resources	asdghrl	A score calculated based on the number of books and other study materials in the students' homes, their parents' level of education, and their parents' employment. Scores were used to define students into three categories: students with Many Resources, students with Some Resources and students with Few Resources. The category few resources is considered as a reference category.

Source: TIMSS (2019)

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Global Journal of HUMAN-SOCIAL SCIENCE: E
Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

Effects of Technological Change on the Labor Market in Mexico: An Analysis of Autoregressive Vectors for the Manufacturing Sector, 2005-2021

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Abstract- This paper presents an analysis of the effect of technological change on the labor market in the manufacturing sector in Mexico, in the period 2005-2021. Based on the human capital theory and the biased technological change approach, we study whether the manufacturing labor market presents a skills-biased technological change based on the correspondence between groups of low- and high-skilled workers in relation to the distribution of tasks: abstract, manual and routine. The objective is to show, through separate equations, whether the supply of skilled workers is related to abstract tasks and, on the other hand, whether unskilled work is assigned to manual and routine tasks. Through a VAR analysis, in general, consistent evidence is shown that the future of the supply of skilled labor is explained by abstract tasks..

Keywords: *labor market, technological change, skills, vector autoregressive analysis.*

GJHSS-E Classification: *E24, I24, J24, J31, O33*



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Effects of Technological Change on the Labor Market in Mexico: An Analysis of Autoregressive Vectors for the Manufacturing Sector, 2005-2021

Jonathan Andrey Barrandey Chavira [α] & Daniel Gonzalez Olivares [σ]

Abstract- **This paper presents an analysis of the effect of technological change on the labor market in the manufacturing sector in Mexico, in the period 2005-2021. Based on the human capital theory and the biased technological change approach, we study whether the manufacturing labor market presents a skills-biased technological change based on the correspondence between groups of low- and high-skilled workers in relation to the distribution of tasks: abstract, manual and routine. The objective is to show, through separate equations, whether the supply of skilled workers is related to abstract tasks and, on the other hand, whether unskilled work is assigned to manual and routine tasks. Through a VAR analysis, in general, consistent evidence is shown that the future of the supply of skilled labor is explained by abstract tasks.**

Keywords: labor market, technological change, skills, vector autoregressive analysis.

I. Introduction

In recent years it has been documented that labor markets in most countries have had substantial changes in the labor structure due to technological progress specific to tasks. The established consensus is that the sectors that are more intensive in highly skilled workers are associated with a technological change, specific to cognitive-type occupations. This has allowed, in tasks where higher qualifications are required, workers to register an increase in the wage premium, which is due to technological change biased towards skills.

The importance of studying technological change specific to occupations in the manufacturing industry consists of verifying whether, in fact, the technological level in each of the tasks; abstract, manual and routine, is related to the supply of workers by type of skills, which would confirm the skills-biased technological change. Technological change is understood as the introduction of specific information and communication technologies to the labor supply that are capable of increasing productivity.

The Hypothesis of Biased Technological Change (HBTC) argues that technological advances in the various sectors of production are creating capital infrastructures that have as a consequence the substitution of low-skilled workers, being complementary to high-skilled work (Author et al., 1998 and Acemoglu, 2002).

In fact, companies that continually introduce information technologies, such as personal computers or even machines that incorporate advanced technology in production processes, tend to demand highly qualified workers, particularly because this type of workers allows for increased productivity. While in companies whose production is based on manual tasks, the level of technology tends to be complementary with unskilled workers, therefore, in these tasks it has been confirmed that wages are usually low. On the other hand, there are companies that produce with routine tasks performed by medium or even low-skilled workers, which according to Gregory et al. (2019), in such occupations as repetitive activities, the introduction of digital technologies generally tends to displace workers who perform this type of routine activities.

From the perspective of technological change biased towards the tasks of Acemoglu and Autor (2010, 2012), in various occupations and even in sectors, it has been highlighted that the introduction of new technologies has replaced routine occupations more than manual tasks and abstract tasks, because those, being repetitive activities, do not require communication skills and complex cognitive skills, which are usually replaced by advanced technologies that perform well-defined routine tasks, which may well be performed to a lesser extent by qualified workers, in this way the result is obtained much more efficiently than routine tasks (Autor et al., 2003).

In the international context, empirical evidence indicates that due to the decrease in the prices of information technologies at the end of the last century, today, companies have had access to greater use of computers and industrial machines that are more complementary with skilled workers, this has consequently had effects on a growing wage gap between skilled and unskilled workers. The result is that the labor market has rewarded the wages of workers with higher skills more.

Thus, when skilled workers are relatively productive and complementary to capital, it leads companies that produce goods and services with technological content to have a greater demand for skilled labor.

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In Mexico, large companies in the manufacturing industry are not distant from task-specific technological change, but rather, as they are experiencing continuous technological changes, it is an indication that the use of new technologies requires the demand for highly qualified employment. The proof of this is that those occupations in the industry that have to do with jobs such as officials, managers, art workers, professionals and technicians show a relationship with high levels of education but with an undesirable remuneration of wages in particular cases.

The objective is to show whether the supply of skilled workers is related to abstract tasks and, on the other hand, whether unskilled labor is assigned to manual and routine tasks. The general working hypothesis of this research is to carry out two separate equations for companies in the manufacturing industry: 1) that the specific technological change towards abstract tasks shows a positive relationship with the supply of highly skilled workers. 2) Manual tasks present a direct relationship with the supply of low-skilled labor, because the bias of technological change towards tasks shows that there is a one-to-one relationship between type of tasks and workers' skills.

In this paper it is established that the labor market in the industry is composed of demand variables; occupations in abstract, manual and routine tasks and, by worker supply variables; high and low-skilled workers, wages by type of worker and work experience, which in turn are affected by the unemployment that persists in each type of occupation.

A Vector Autoregressive (VAR) analysis is carried out in order to use a dynamic analysis framework of the labor market, estimating two separate equations; one represents high-skilled occupations and another for low-skilled labor. There is a vector of variables available that include; wages of high and low skills, supply of each type of work, experience of workers, unemployment rate and occupations in tasks; abstract, manual and routine. The method followed is to apply a VAR model to a set of quarterly time series data, from the period from 2005 to 2021, using information from the National Occupation and Employment Survey (ENOE).

The work is structured as follows, section 1 presents the literature review, section 2 presents the method and the data, section 3 describes the data, in section 4 the results and discussion and finally the conclusions.

II. Literature Review

a) *Technological change and labor market*

This section reviews the main approaches to the relationship between technological change and the labor market: the theory of human capital and biased technological change. Afterwards, empirical literature is presented for the case of Mexico on the effects of technological change on the labor market.

The analysis of the effects of technological change on the labor market is not recent. This relationship was initially analyzed by the theory of human capital to explain economic growth and income distribution. Currently this relationship is analyzed from the perspective of skill-biased technological change.

The human capital approach developed by Becker (1962) establishes that investment in human capital is fundamental for production processes and economic growth, in particular, because investment in education contributes to increased productivity in companies, which It also leads to increased income from the education of workers. In this sense, according to this theory, the skills that people acquire in school are a factor of relative importance in the accumulation of knowledge that leads them to obtain greater returns to education.

From this perspective, Mincer (1974), with the development of a human capital model, will refer that the incentives for investment in human capital, training in the workplace, years of work experience and age, lead to the employees to obtain increases in returns due to the level of schooling acquired, that is, higher wages; however, this leads to an increase in the wage gap between groups of workers with low and high education, by gender or even by racial characteristics. Currently, both theories have laid the foundations for the development of other approaches that study the relationship between technological change and the labor market linked to the education of the workforce, such as skill-biased technological change.

Regarding wage inequality between groups of low- and high-skilled workers, since the 1980s it has been observed that the effect of technological change on the labor market has led to an increase in wage inequality, due to the increase of the adoption of new technologies by companies that has prompted them to hire more specialized labor that can put them into operation.

One reason for the latter is that there is currently a greater demand for investment in technological equipment, induced by the fall in prices of information technologies and other technological advances since the 1970s[1]. This has made it possible, that in many workplaces, the use of technology is less costly (Greenwood et al., 1997).

However, with the advances of new technologies, capital has been made less expensive

[1] Since the 1970s, with the development of electronic technology and telecommunications, there has been a growing demand for computers, electronic components and semiconductors that can be used in offices or even autonomous machines with the aim of performing repetitive mechanical assembly tasks that are capable of reducing costs/schedules of operating time to increase the growth of the production of goods and services per worker.

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and more accessible to companies in various sectors. This has resulted in greater complementarity between technological capital and qualified labor, which has led to greater replacement of unskilled workers. Therefore, according to Krusell et al. (2000) this has allowed an increase in the wage premium for skilled work, defined as the wages of college workers in relation to the wages of non-college workers. In this sense, it has been emphasized that the decrease in wages of this last group of workers has been due to the fact that they have adapted less to the use of new technologies in the workplace. All of this has been accentuated by the polarization of income between groups of workers with different educational levels. Author et al. (2003).

On the other hand, there is the Hypothesis of Biased Technological Change (HBTC) presented by authors such as Katz and Murphy (1992), Autor et al. (1998), Acemoglu (1998, 2002), Card and DiNardo (2002) and other works by Lee and Shin (2017), Graetz and Michaels (2018), Buera et al. (2020), Bárány and Siegel (2020) and Acemoglu and Restrepo (2022), in general, have pointed out that with the development of technological progress, the cheaper information and communication technologies, the use of computers and the automation of industrial robots, in a variety of countries has led to more and more companies adopting them in favor of the capital factor, because by introducing them into production processes it allows them to be cost-saving, particularly in companies where the employment of labor force represents an important proportion of production costs.

The latter has to do with the fact that technologies can perform tasks with little human intervention to achieve high production standards per worker.

The facts suggest that there is a positive relationship between the adoption of new technologies and the demand for workers with higher skills. Acemoglu (2009) and Bárány and Siegel (2020) have estimated that technological progress has not been neutral as the theory of exogenous growth has explained, but that there is a propensity for technological change to be biased or directed more towards workers with higher education. In this sense, technological changes become endogenous within companies when they are developed from the need of companies to obtain greater profits (Vivarelli, 2014). The reason for this fact is that in efficient labor markets, capital that incorporates new technology becomes complementary to skilled labor.

With respect to the relationship between skilled work and occupations, Acemoglu and Autor (2010) in the canonical model of tasks, explain that the bias of technological change is possible because in companies and industries where there is a high development of technology, there is a one-to-one relationship between tasks and workers' skill level. The authors have found evidence for the United States that abstract tasks are related to high-skilled work, medium-skilled work to manual tasks, while low-skilled worker is linked to routine tasks.

Likewise, HBTC has emphasized that routine tasks are those that are most affected by the displacement that is carried out by the introduction of technological changes. Workers carrying out routine tasks have been easily replaced by the greater use of computer technologies, the automation of production processes and recently, by artificial intelligence, as mentioned by Webb (2020), Jaimovich et al. (2020) and Autor et al. (2003 p. 1280), because routine jobs "are accompanied by machines that follow explicit programming rules".

According to the latter, this led to an increase in demand in the lower categories, such as manual tasks that are less routine, which require the ability to adapt, and the higher ones that are abstract tasks where routine processes are null, due to because the ability to analyze, communicate, and cognitively solve problems are intuitive activities that do not require repetitive movements, so employees with high levels of education have these characteristics. This has given rise to the complementarity between highly skilled workers and new technologies, which the latter with manual and routine tasks.

In accordance with the above, HBTC analysis has suggested that technology has benefited those with a higher level of education and who are more qualified than those with a lower level of skills, therefore, the increase in capital that Incorporating new technology by companies that produce with analytical tasks is fundamental to increasing the supply of qualified labor and therefore increasing the wages of this group.

In summary, the literature establishes that the returns to education and experience are greater in the group of workers with more skills when they use new technologies in the workplace. For companies in the industry, to the extent that they introduce new technologies into production driven by the pressure of competition, it opens the possibility for the labor market to absorb the increase in the supply of qualified workers in abstract tasks. On the other hand, the low-skilled labor supply is assigned to manual tasks, even routine ones, where wages are low because it uses less information technologies.

b) Effects of technological change on employment in Mexico

There is a debate whether technological change has differential effects on the labor market in advanced countries and developing countries. Srour et al. (2013) have emphasized that developed countries already have their own technology imposed on the labor market, while many developing countries, in certain sectors, mainly technology-intensive ones, have had to import it and

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adapt it to internal production processes. , through trade, and through foreign direct investment, particularly industries specialized in exports such as many of the manufacturing companies in Mexico.

A fact that has been occurring since the 1980s in developed countries, is that digital technologies have affected the labor market, in such a way that they are changing the wage structure in many jobs in different economic sectors, in such a way that this is leading to a polarization of workers' wages, due to technological change biased towards skills. In such a way that technology has been complementary to workers with high skills, as Ballestar et al. (2020) and Gregory et al. (2019) have pointed out, so that new technologies in companies have achieved a growth in the demand for qualified workers, who have been favored by the increase in relative wages, while unskilled workers have received low wages, even other workers in routine positions have been displaced by automation, although simultaneously technology has also been creating new jobs due to the demand for new products.

In the case of Mexico, the relative supply of skills, some authors have pointed out, such as Calderón et al. (2017), Huesca et al. (2014), which has not been strongly associated with the increase in the relative wages of skilled to unskilled labor, but rather the wages of the most skilled workers have been falling. In this case, Huesca et al. (2014), using information from the 1999-2009 Economic Censuses for Mexico, found for this period that although there was a substantial increase in the supply of specialized labor, at the same time, there was a reduction in relative wages, they attribute it to an imbalance between supply and demand, due to the excess of skilled workers, therefore, other residual sectors such as the informal sector continue to be a market where skilled and unskilled workers are employed.

There is the argument then that the growing supply of skills does not correspond in the same proportion to the wage premium, but rather, skilled labor has not managed to be absorbed by the formal sector, which has led to the reduction of wages of skilled workers. This has the consequence that many workers find remuneration in the informal sector of the economy. Therefore, this could imply that the labor market has characteristics of weak skill-biased technological change[2].

In a paper by Ochoa and Torres (2020) for Mexico, where they use quantile estimates by type of task: abstract, routine and manual, with data for the years 2012 and 2018, they point out that the country has registered an increase in jobs increasingly routine. They highlight that in 2018, there was a reduction in the wage premium in all occupation groups, attributed to a low demand for technology presented by companies in the country for production processes.

On the other hand, Rodríguez and Mesa (2020) analyze the effect that technological change biased towards tasks has on gender job differentials in the labor market in Mexico, during the years 2000 and 2017. Their results show that women have better prospects in non-routine manual and cognitive jobs, while men tend to be employed in routine and routine cognitive tasks. They find that women earn less than men in all occupations by type of task and women's work experience is a factor that allows reducing the gender wage gap.

In summary, since the 1980s, due to the introduction of endogenous technological changes to companies, there is a one-to-one relationship between tasks and schooling groups. However, when studies for Mexico are reviewed, it is found that rather than an increase in the wage premium for skilled labor, it has been decreasing since the 1990s.

III. Method and Data Used

a) Method

In this section we develop a Vector Autoregressive (VAR) analysis, with the purpose of estimating the dynamic interrelation between technological change and the labor market.

The VAR approach has the characteristic that each variable is expressed as a linear combination of its own lags and the lagged values of other variables in the system of equations. In this way, the structure of the lags of all the variables in all the equations is the same (Johnston and Dinardo, 1997). In the present case, there are variables of real wage (W), labor supply (O), work experience (E), unemployment rate (D) and a set of occupations or tasks; abstract (A), manual (M) and routine (R), so the set of variables in the VAR model is $y_t = [W_t, O_t, E_t, A_t, M_t, R_t, D_t,]'$, In general with a lag the model can be described as follows:

[2] According to Acemoglu (2009), HCTS with a weak equilibrium occurs when high- and low-skilled workers are imperfect substitutes. This explains that when workers are hired by companies, to the extent that new technologies biased towards work with skills are added, it allows the use of technology to make them in different, this leads to non-compensation for the workers' skills, which reduces the wages premium.

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$$W_t = \alpha_1 + \phi_{W,W}W_{t-1} + \phi_{W,O}O_{t-1} + \phi_{W,E}E_{t-1} + \phi_{WA}A_{t-1} + \phi_{WM}M_{t-1} + \phi_{WR}R_{t-1} + \phi_{WD}D_{t-1} + u_{W,t}$$
$$O_t = \alpha_2 + \phi_{O,W}W_{t-1} + \phi_{O,O}O_{t-1} + \phi_{O,E}E_{t-1} + \phi_{O,A}A_{t-1} + \phi_{O,M}M_{t-1} + \phi_{O,R}R_{t-1} + \phi_{O,D}D_{t-1} + u_{O,t}$$
$$E_t = \alpha_3 + \phi_{E,W}W_{t-1} + \phi_{E,O}O_{t-1} + \phi_{E,E}E_{t-1} + \phi_{E,A}A_{t-1} + \phi_{E,M}M_{t-1} + \phi_{E,R}R_{t-1} + \phi_{E,D}D_{t-1} + u_{E,t}$$
$$A_t = \alpha_4 + \phi_{A,W}W_{t-1} + \phi_{A,O}O_{t-1} + \phi_{A,E}E_{t-1} + \phi_{A,A}A_{t-1} + \phi_{A,M}M_{t-1} + \phi_{A,R}R_{t-1} + \phi_{A,D}D_{t-1} + u_{A,t}$$
$$M_t = \alpha_5 + \phi_{M,W}W_{t-1} + \phi_{M,O}O_{t-1} + \phi_{M,E}E_{t-1} + \phi_{M,A}A_{t-1} + \phi_{M,M}M_{t-1} + \phi_{M,R}R_{t-1} + \phi_{M,D}D_{t-1} + u_{M,t}$$
$$R_t = \alpha_6 + \phi_{R,W}W_{t-1} + \phi_{R,O}O_{t-1} + \phi_{R,E}E_{t-1} + \phi_{R,A}A_{t-1} + \phi_{R,M}M_{t-1} + \phi_{R,M}R_{t-1} + \phi_{R,D}D_{t-1} + u_{R,t}$$
$$D_t = \alpha_7 + \phi_{D,W}W_{t-1} + \phi_{D,O}O_{t-1} + \phi_{D,E}E_{t-1} + \phi_{D,A}A_{t-1} + \phi_{D,M}M_{t-1} + \phi_{D,M}R_{t-1} + \phi_{D,D}D_{t-1} + u_{R,t} \quad (1)$$

In the system, the variables on the right side of each equation are the same. In matrix form the model can also be expressed:

$$\begin{bmatrix} W_t \\ O_t \\ E_t \\ A_t \\ M_t \\ R_t \\ D_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \\ \alpha_7 \end{bmatrix} + \begin{bmatrix} \phi_{WW} & \phi_{WO} & \phi_{WE} & \phi_{WA} & \phi_{WM} & \phi_{WR} & \phi_{WD} \\ \phi_{OW} & \phi_{OO} & \phi_{OE} & \phi_{OA} & \phi_{OM} & \phi_{OR} & \phi_{OD} \\ \phi_{EW} & \phi_{EO} & \phi_{EE} & \phi_{EA} & \phi_{EM} & \phi_{ER} & \phi_{ED} \\ \phi_{AW} & \phi_{AO} & \phi_{AE} & \phi_{AA} & \phi_{AM} & \phi_{AR} & \phi_{AD} \\ \phi_{MW} & \phi_{MO} & \phi_{ME} & \phi_{MA} & \phi_{MM} & \phi_{MR} & \phi_{MD} \\ \phi_{RW} & \phi_{RO} & \phi_{RE} & \phi_{RA} & \phi_{RM} & \phi_{RR} & \phi_{RD} \\ \phi_{DW} & \phi_{DO} & \phi_{DE} & \phi_{RA} & \phi_{DM} & \phi_{DR} & \phi_{DD} \end{bmatrix} \begin{bmatrix} W_{t-1} \\ O_{t-1} \\ E_{t-1} \\ A_{t-1} \\ M_{t-1} \\ R_{t-1} \\ D_{t-1} \end{bmatrix} + \begin{bmatrix} u_{W,t} \\ u_{O,t} \\ u_{E,t} \\ u_{A,t} \\ u_{M,t} \\ u_{R,t} \\ u_{D,t} \end{bmatrix} \quad (2)$$

In its standard form a VAR(1) of (2) is written in the form:

$$y_t = \alpha + \Phi_1 y_{t-1} + u_t \quad (3)$$

where, y_t is the vector of endogenous variables, α the vector of intercepts plus Φ which is the coefficient matrix of the set of variables y lagged on the right side plus the vector of error terms u_t that are composed of shocks of the set of variables equal to

$$u_t \sim N(0, V) \quad (4)$$

The error term u_t is normally distributed, with zero mean and constant variance, and individually, they are not serially correlated. By considering B_0 and B_1 two matrices of structural parameters, the system is expressed in its reduced form:

$$B_0 y_t = A + B_1 y_{t-1} + e_t$$
$$y_t = B_0^{-1}A + B_0^{-1}B_1 y_{t-1} + B_0^{-1}e_t \quad (5)$$

where, $B_0^{-1}A = \alpha$ $B_0^{-1}B_1 = \Phi$ and $B_0^{-1}e_t = u_t$, so that (5) is expressed as in (3)

$$y_t = \alpha + \Phi_1 y_{t-1} + u_t \quad (6)$$

In this standard VAR the parameters are linked to those of the structural model by $B_0^{-1}B_1$. Similarly, the vector of errors of the VAR are related to the errors of a structural VAR by $B_0^{-1}e_t = u_t$. A structural VAR takes into account the contemporaneous y_t variables on the right-hand side of equations (1), and in the reduced form the y_t variables are a function of their own lag and the lag of the other variables in each equation. With the purpose of analyzing the effects of tasks, unemployment and their own lags on variables considered labor supply, these being; experience of workers, wages and the supply of workers by type of qualification, only the first three regressions of the equations in (1) are presented.

b) Impulse response function

On the other hand, the Impulse Response Function (IRF) is shown, which is an alternative approach to the Granger causality test, which transforms the VAR into a Vector Moving Average (VMA). In general, the IRF studies the response of the variable explained in the VAR system to shocks in the error terms such as $u_{W,t}, u_{O,t} \ldots, u_{R,t}$ in (2). In this sense, if stationarity is assumed in the variables, the VMA of (3) is:

$$y_t = \mu_1 u_{t-1} + \mu_2 u_{t-2} + \mu_3 u_{t-3} + \mu_4 u_{t-4} + u_t + \cdots \quad (7)$$

and by taking the conditional expectation $E_{t-1}(y_t)$ over the period $t-1$, the forecast error for y_t is achieved, that is:

$$y_t = \mu_1 u_{t-1} + \mu_2 u_{t-2} + \mu_3 u_{t-3} + \mu_4 u_{t-4} + u_t + \cdots \quad (8)$$

Now for y_{t+1} and y_{t+2} the model is

$$y_{t+1} = \mu_1 u_t + \mu_2 u_{t-1} + \mu_3 u_{t-2} + \mu_4 u_{t-3} + u_{t+1} + \cdots \quad (9)$$
$$y_{t+2} = \mu_1 u_{t+1} + \mu_2 u_t + \mu_3 u_{t-1} + \mu_4 u_{t-2} + u_{t+2} + \cdots \quad (10)$$

From these expressions, by deduction we have that u_{t-1}, u_t, u_{t+1} affect y_t, y_{t+1}, y_{t+2}, respectively and so on continuously through the coefficient μ_1. In this order, the increase in the value of one standard deviation of $u_{W,t}$ in the first equation W_t of (1), the shock $u_{W,t}$ will affect W_t in the present and future period. But

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since W_t appears in O_t the second equation of (1), the change in $u_{W,t}$ also has an effect on O_t. Similarly, a change of one standard deviation in $u_{O,t}$ in the second equation of (1) has an impact on W_t. Therefore, following Gujarati (2003), the IRF studies the impacts of shocks from different periods in the future as expressed in equations (8)-(10).

c) Variance decomposition

We now present the variance decomposition analysis. Stock and Watson (2001) point out that the composition of the forecast error is the percentage of the error variance that is made in forecasting a variable, for example, W_t, due to a shock or error term, for example, from the equation O_t in (1) in a time horizon that can be 1, 4, 8 or 12 quarters. That is, variance decomposition deals with the conditional variance of impulse-responses.

From the equations in (1), we can measure, given a horizon of four quarters, how much of the percentage of the error in the forecast of wages (W_t) is attributed to labor supply shocks (O_t), worker experience (E_t), unemployment (D_t) and abstract (A_t), manual (M_t) and routine (R_t) occupations.

It is worth mentioning that before performing the VAR, *Augmented Dickey-Fuller* stationarity tests and *Phillips-Perron tests* are performed to reject the presence of unit roots. On the other hand, the Akaike (AIC) and Schwarz (SIC) information criteria are also used to choose the model lags. Likewise, Lagrange Multiplier tests are done to test autocorrelation; The null hypothesis is that there is no autocorrelation in the order of lags. Finally, once the described tests are done, the VAR model is carried out as in (1) jointly by estimating *Maximum Likelihood (ML)* in order to restrict the model (1) and obtain the Log Likelihood and test through *Likelihood-Ratio (LR)* the choice or not of the restricted model.

d) Data used

This study uses data from the National Occupation and Employment Survey (ENOE) provided by the National Institute of Statistics and Geography (INEGI). The survey collects information at the microdata level of large establishments in the manufacturing industry for the period from 2005 to 2021, which were converted to aggregate values in quarterly series. For the set of tasks, the Mexican Classification of Occupations (CMO) published by the INEGI is used.

Table 1 presents the tasks variables, according to Ochoa and Camberos (2016), following the same construction of tasks reported by the Mexican Classification of Occupations (CMO) of INEGI, which contains the task variables: abstract, manual and routine.

Table 1: Classification by type of tasks (CMO-ENOE)

Task	Occupation
Abstract	Professionals, technicians and art workers
	Education workers
	Officials and managers
Manual	Clerks
	Industrial workers, craftsmen and helpers
	Merchants
	Transport operators
Routine	Workers in personal services
	Workers in protection and surveillance
	Agricultural workers

Source: Own elaboration based on INEGI-ENOE-CMO.

According to the classification in Table 1 and following Acemoglu and Autor (2011), it has been argued that:

- Abstract tasks are activities that require problem solving, intuition and creativity, and the workers who are best suited to these activities are those who have high levels of education and analytical skills, because these tasks are complementary to the use of computers.
- Manual tasks are occupations that can be performed by workers with lower levels of formal education, since these activities require adaptation, use of certain language and interaction between people which require fewer skills.
- Routine tasks are repetitive activities based on codified rules that can be specified by instructions and executed by machines, these occupations require medium skills.

The data are obtained only for the Economically Active Population (EAP) between 16 and 65 years of age. The types of ability refer to the years of schooling achieved by the workers in the survey, which are constructed as follows: low qualification, for people with education between 0 to 9 years of schooling and high qualification, for people with 16 or more years of schooling. The first age range, according to Acemoglu and Autor (2011), corresponds to low-skilled work, which includes employees with up to high school level.

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The second education level group represents highly skilled workers; They are workers with college and postgraduate degrees.

For groups of low - and high-skilled workers, income is reported monthly, which is deflated to 2010 prices.

Information about workers' experience was also obtained; measures the background necessary to perform a job; this variable captures the experience of previous jobs by the people surveyed.

On the other hand, from the same survey, the unemployment rate variable is constructed, which is measured with data on the unemployed population and the EAP.

The size of the companies is represented by large establishments in the industrial manufacturing sector. Only private companies and businesses are considered, leaving out the informal sector and domestic work.

IV. Data Description

Table 2 shows the descriptive statistics that make up the complete sample that covers the period from the first quarter of 2005 to the fourth quarter of 2021. Based on the average of the sample, it is observed that of the set of worker demand variables that are tasks: abstract, manual and routine, manual occupations are those that, in proportion, represent the largest number of workers. In this order, during this period of analysis, abstract tasks follow and finally routine tasks.

Table 2: Descriptive statistics, manufacturing industry 2005-2021

Variable	Mean	Standard Deviation	Minimum Value	Maximum Value
Low-skills wages	65.56	19.76	37.90	103.74
High-skill wages	38.22	10.50	24.04	68.92
Supply of low-skilled workers	1.10	0.18	0.75	1.39
Supply of highly-skilled workers	0.33	0.10	0.19	0.53
Work experience	1.91	0.37	1.17	2.65
Abstract Tasks	0.25	0.08	0.14	0.42
Manual Tasks	1.82	0.46	0.21	2.53
Routine Tasks	0.06	0.01	0.04	0.08
Unemployment Rate	49.71	7.56	37.41	67.92

Source: Own elaboration with data from the ENOE-INEGI.
Note: wages, employment, and task values are in millions. Real wages are monthly income.

In general, the above indicates that the country's large manufacturing companies are intensive in manual tasks, however, the demand for employment for cognitive-type jobs begins to have an important position in the industry, particularly companies that produce goods and services with technology.

Regarding the supply of workers by type of skill, the average indicates that low-skilled workers are those who occupy the first position in proportion of workers, well above highly-skilled workers, which implies that the productive activities of sectors intensive in manual tasks are employers of low-skilled labor, which in proportion to the size of the labor market, are the main labor force in Mexico and receive wages above the aggregate wages of high-skilled workers.

Table 3 shows the proportion of occupations by type of task in the industry during the analysis period.

Table 3: Proportion of occupations in the manufacturing industry in Mexico, 2005-2021, values in percentage

(Quarterly average)

Year	Abstract	Manual	Routine
2005	9.1	86.8	4.1
2006	9.6	87.1	3.3
2007	9.7	86.9	3.5
2008	10.6	86.0	3.4
2009	11.0	85.8	3.2
2010	10.6	85.7	3.7
2011	10.8	85.6	3.6
2012	12.1	85.0	2.9
2013	14.1	82.3	3.6
2014	11.6	85.5	2.9

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2015	12.3	84.8	2.9
2016	12.3	85.3	2.3
2017	11.3	85.9	2.7
2018	12.0	85.8	2.2
2019	12.5	85.4	2.2
2020	13.2	84.6	2.2
2021	13.3	84.2	2.5

Source: Own elaboration with data from the ENOE-INEGI.

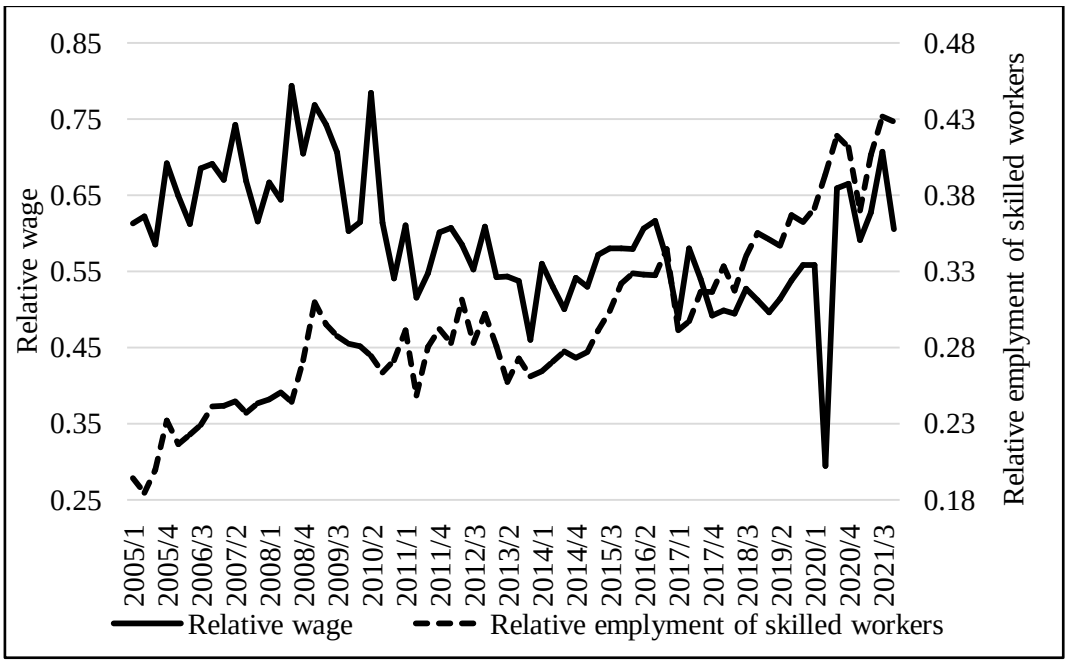
It is observed that the participation of manual occupations, occupies the first position of the set of tasks, then in this same order, abstract tasks follow and in third position are routine tasks. It is observed that the participation of manual and routine occupations has decreased from 2005 to 2021.

However, as shown, the participation of abstract tasks throughout the analyzed period has had a significant increase. The truth is that today large companies demand employment that they assign to abstract tasks to increase labor productivity, this to face the greater competitiveness that these firms face in an international context.

Figure 1 shows skill-biased technological change for the Mexican manufacturing industry. The figure analyzes the relationship between the relative supply of skilled workers and the relative wages of skilled workers. This relationship captures changes in the wage structure in the industry.

The figure shows that from the first quarter of 2005 to 2021 the relative supply of workers with skills increased significantly, however, there was a drop in the returns to education of college workers since the period of 2009, with a biggest drop in the COVID-19 pandemic period.

Empirical evidence establishes that the relative supply of workers with skills and the wage premium must have an increasing tendency, however, for the Mexican industry the relative wages from 2005-2009 increased, in fact they were above the relative supply of workers with skills. Thereafter, relative wages fell even though the supply of skills increased, this shows some reduction in the income gap between skilled and unskilled workers, which indicates some fall in income inequality.



Source: Own elaboration with data from the ENOE-INEGI.

Figure 1: Relative supply of skilled workers and relative wage of skilled workers

In general, the above indicates that the industry represented by large companies is intensive in manual tasks, although the participation of abstract tasks is beginning to have greater relevance. This shows that the relative supply of qualified workers had an increasing trend, but with relative wages in decline, right after the Great Recession of 2008. The above indicates that we must continue analyzing the relationship between tasks and work by type of skill in the industry now with empirical results.

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V. Results and Discussion

This section presents the results of the estimated equations of (1), the variance decomposition and the impulse response functions. For comparability purposes, in the VAR model the occupations of low- and high-skilled workers are separated to express equations by group of workers, with the purpose of observing how the labor supply variables are affected by variables that represent the demand for tasks.

We must mention that before obtaining the estimates, Augmented Dickey-Fuller and Phillips-Perron stationarity tests were performed and it was found that the variables were not stationary, except for the routine tasks, therefore, the first differences were obtained. This ensures that the variables do not have unit roots as shown in the appendix at the end of the text. On the other hand, lag order tests are carried out using Akaike tests, and it is indicated that one lag should be chosen for low skill equations and three for high skill equations.

Table 4 shows the results of the first three equations of (1) in a VAR that includes all the variables together, considering low-skilled occupations that are workers with up to nine years of schooling.

Table 4: VAR estimation results for the manufacturing industry in Mexico, 2005-2021 (Low-skilled occupation)

Variable	Low-Skills Wages	Supply of Low-Skilled Workers	Work Experience
	–0.2926*	–0.0030	0.0219**
Low-skills wages (-1)	(0.1753)	(0.0022)	(0.0087)
	35.1893**	0.4608**	–2.7282***
Supply of low-skilled workers (-1)	(18.0407)	(0.2287)	(0.8999)
	–19.2205**	–0.1557*	0.7148**
Work experience (-1)	(7.4031)	(0.0938)	(0.3693)
	0.8814*	0.0113*	–0.0730**
Unemployment rate (-1)	(0.4992)	(0.0063)	(0.0249)
	–7.4624	0.3970	–3.7411***
Abstract tasks (-1)	(24.9677)	(0.3165)	(1.2454)
	0.3494	–0.0164	–0.0841
Manual tasks (-1)	(1.6242)	(0.0206)	(0.0810)
	–113.1949**	–1.4224**	–2.7228
Routine tasks (-1)	(43.9538)	(0.5572)	(2.1925)
	8.1887**	0.0929**	–0.1638
Constant	(2.7341)	(0.0347)	(0.1363)
R-Squared	0.26	0.19	0.28

*Source: Own elaboration. Standard errors are in parentheses. The symbols *, **, and *** refer to significance levels of 10%, 5%, and 1% respectively.*

In the first column of table 4, the results show that real wages are significantly related to their own lag, labor supply, level of experience, routine tasks and the unemployment rate. With a lag, the results show that the supply of low-skill workers has a positive and significant effect on wages. It is observed that work experience is significant and presents the opposite sign than expected. Furthermore, it is shown that manual tasks do not reveal a significant relationship with the wages of low-skilled employees. A possible interpretation of this low association is that in the last decade, large companies and corporations in the manufacturing industry could be incorporating new technologies that are complemented more by specialized work than by less skilled work.

In the second column of table 4, where the dependent variable is the supply of low-skill workers, the results show that its own lag is positive and significant. In this same equation, the results show that as the unemployment rate increases with up to a lag, the supply of unskilled workers tends to increase significantly, which is understandable due to the fact that unemployment impacts a large proportion of low-skilled workers tend to be employed in companies that pay high wages. Although, on the other hand, the results show that the increase in routine tasks decreases the labor supply significantly. This may be because these types of occupations regularly pay lower wages.

In the third column, the results show that work experience is positively and significantly related to its own lag. Likewise, the results for this group of workers indicate that experience is positively related to real wages at a 5% significance level. Thus, as wages increase, this gives rise to an increase with even a lag in work experience.

On the other hand, the increase in the supply of unskilled labor tends to reduce the experience of workers at a 1% level of significance. This could be associated with the fact that the excess supply of labor decreases the experience of the workforce to the extent that there is saturation of the labor market.

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On the other hand, the unemployment rate has a negative and significant effect on work experience, which makes sense, because the unemployment of the group of unskilled workers, when it becomes persistent, makes it difficult to acquire additional experience in jobs where they can perform, that is, the increase in unemployment outdated the skills of an average worker. Note that the goodness of fit of the third model has an R^2 equal to 0.28, which is a high relative value with respect to the two previous equations.

Table 5 presents the results for high-skill occupations. The first column shows that the wages of high-skill workers with up to two and three lags have a positive relationship with work experience at the 5% level of significance, this indicates that the acquisition of previous experience with up to two quarters of time, a worker with high skills on average increases the monthly wage.

Table 5: VAR estimation results for the manufacturing industry in Mexico, 2005-2021
(High-skilled occupations)

Variable	High-skill Wages	Supply of highly-Skilled Workers	Work Experience
High-skill wages (-1)	–0.6713*** (0.1041)		–0.0080** (0.0035)
High-skill wages (-2)	–0.3832*** (0.1115)		–0.0066 (0.0044)
High-skill wages (-3)			–0.0096** (0.0048)
Supply of highly-skilled workers (-1)		–0.4433*** (0.1185)	1.2298 (1.2024)
Supply of highly-skilled workers (-2)		–0.0500 (0.0912)	
Work experience (-1)	5.8810 (12.0312)		–0.2721** (0.1150)
Work experience (-2)	24.5043** (11.3638)		–1.4158*** (0.3135)
Work experience (-3)	26.7206** (11.0890)		
Unemployment rate (-1)	–0.3472 (0.7393)		0.0177** (0.0073)
Unemployment rate (-2)	–1.4570** (0.7035)		0.0847*** (0.0185)
Unemployment rate (-3)	–1.7052** (0.6716)		
Abstract tasks (-1)		0.2205** (0.1085)	
Manual tasks (-1)	–2.3497 (2.3704)		
Routine tasks (-1)			1.6799** (0.8424)
Routine tasks (-2)	46.0362** (21.6114)	0.1363** (0.0521)	
Routine tasks (-3)			–1.0736* (0.6249)
Constant	–2.7451* (1.6411)	–0.0024 (0.0039)	0.0034 (0.0721)
R-Squared	0.39	0.24	0.34

*Source: Own elaboration. Standard errors are presented in parentheses. The symbols *, **, and *** refer to significance levels of 10%, 5%, and 1% respectively. The numbers in the parentheses of the variables are the corresponding lags.*

The results also indicate that the unemployment rate in the second and third lags decreases high-skilled wages at the 5% significance level. This shows that unemployment negatively affects the salary of a skilled worker more than that of an unskilled worker, because the skilled labor market is more sensitive to unemployment than low-skilled jobs.

With respect to the second column of table 6, the results indicate that with a lag, the supply of high-skill workers shows a positive relationship with abstract tasks

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for the industry at a significance level of 5%. Which proves the prevalence of skill-biased technological change during this period in these occupations. Since the increase in abstract tasks increased the supply of workers with skills, therefore, they were employed in this type of tasks. However, wages did not show a significant association with abstract tasks. Evidence shows that routine tasks have the ability to significantly increase the demand for skilled workers, however, in these occupations wages are often low.

On the other hand, the variance decomposition is an indicator that has predictive power on each of the variables analyzed. In the VAR it measures the percentage of the variance of the predicted variable attributed to the variables on the right side of equation (1) in different time horizons.

The results of the variance decomposition in table 6 are estimated in a complete VAR. Each predicted variable in panels A and B has four lags, both skill groups are low-skilled and high-skilled worker occupations. The values in each row are percentages of the variance attributed to the value of each variable on the right side and its own predicted variable. The variables are arranged in terms of labor supply variables (type of skill) and demand variables (type of tasks) which are made up of the percentage of the error in the forecast.

The results of panel A of table 6 show for the first row, the SLSW, 52.1% of the variance of the forecast error is attributed to the wages of low-skilled workers and 9.8% attributed to the set of tasks, in this way, routine tasks contributed a higher percentage of predictive power.

The second row that represents LSW, without considering its own predicted variable, the variables that have the greatest predictive power are the supply of low-skill workers, work experience and routine tasks, with a percentage value of 5.8, 6.7 and 6.6 of the forecast error respectively.

In the same panel A, the third equation captures work experience, in this, the variables that contribute the greatest to the prediction of the forecast error are the supply of low-skill workers with 10.2% and the wages of low-skill workers. 13.6%, in addition to the unemployment rate has a predictive power of 7.2% on EXP.

Table 6: Variance decomposition Percent of forecast error variance

Predicted variable	SLSW	LSW	EXP	AT	MT	RT	UNR
Panel A. Low-skilled occupations							
Supply of low-skilled workers (SLSW)	33.5	52.1	1.4	2.6	0.8	6.4	3.2
Low-skills wages (LSW)	5.8	75.6	6.7	2.0	0.1	6.6	3.1
Work experience (EXP)	10.2	13.6	57.6	9.0	1.1	1.4	7.2
Abstract tasks (AT)	2.0	9.4	8.2	68.4	4.6	0.9	6.5
Manual tasks (MT)	3.7	5.6	8.0	1.3	79.1	1.2	1.1
Routine tasks (RT)	2.0	11.9	13.3	2.7	0.7	67.8	1.7
Unemployment rate (UNR)	13.5	18.0	39.4	8.0	0.3	1.7	19.1
Predicted variable	SHSW	HSW	EXP	AT	MT	RT	UNR
Panel B. High-skilled occupations							
Supply of highly-skilled workers (SHSW)	90.6	2.9	0.4	4.3	0.0	1.6	0.0
High-skill wages (HSW)	0.1	94.6	0.5	0.1	1.3	1.5	1.9
Work experience (EXP)	11.8	5.0	65.8	1.1	1.2	4.4	10.8
Abstract tasks (AT)	33.1	11.2	0.7	51.3	0.1	3.3	0.1
Manual tasks (MT)	13.4	6.2	2.8	9.5	52.0	0.1	16.2
Routine tasks (RT)	3.6	39.4	8.3	9.2	1.4	30.9	7.2
Unemployment rate (UNR)	23.0	3.0	52.2	1.2	1.7	2.8	16.3

Source: Own elaboration with data from the ENOE 2005-2021.
Note: The values of each of the variables are percentages of the variance of the predicted variables of the first column in a time horizon of four lags.

Panel B of Table 6 shows the results for high-skill occupations. Similarly, for a horizon of four quarters, if the first equation for high-skilled labor supply SHSW is analyzed, the percentage of the error depends almost entirely on its own predicted variable. However, SHSW, in order of highest value, 4.3% of the forecast error is attributed to abstract task shocks and 2.9% to wages of high-skilled workers.

In the second row of panel B, the wages of highly skilled workers, without including their own predicted variable, of the variances with the highest value, 1.9% of the error in the forecast of wages is attributed to unemployment shocks and 2.9% to the set of abstract, manual and routine tasks.

Finally, it is observed that the EXP equation is explained for the most part in addition to its own predicted variable, with a variance of the forecast error due to the supply of highly qualified workers with 11.8% and the unemployment rate with a value of 10.8% and 4.4% routine tasks.

Therefore, based on this analysis, it can be confirmed that the future of the labor supply of low-

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skilled workers is due more to wage shocks and routine tasks than to other variables. While the wages of unskilled workers in the future are attributed more to the level of experience and routine tasks with up to four quarters in the past.

On the other hand, the future of high-skilled labor supply is attributed to shocks of abstract tasks and wages of high-skilled workers obtained in the past. Likewise, the results show that high-skilled wages are attributed to a high relative percentage of unemployment. In this same group, the experience in the future is attributed with up to a year of delay due to unemployment and skills shocks that persist in large companies in the manufacturing industry in the country.

Based on the significant results in Tables 4 and 5, the estimates of the impulse response functions are now shown. With the impulse-response functions of the analyzed variables, the effects of a shock on wages and the supply of low- and high-skilled labor are shown.

In each figure, the vertical axis indicates the quarterly impact on wages and labor supply of each skill group, due to labor supply and wage shocks for both occupations, tasks, experience, and unemployment rate. On the horizontal axis, the quarters followed by the shocks of these variables are shown.

Thus, the technological change in the variables is implicit in the type of tasks in the industry. In this case, abstract tasks are those that register the greatest technological change compared to manual and routine occupations that use technology to a lesser extent. So the effects of abstract tasks can be shocks of greater technological content on wages and supply of workers for low and high skills.

Figure 2 shows that a shock of one standard deviation on low-skilled labor supply has a positive effect on low-skilled wages until the third quarter, after the fifth quarter the effect is negative until it approaches its initial level.

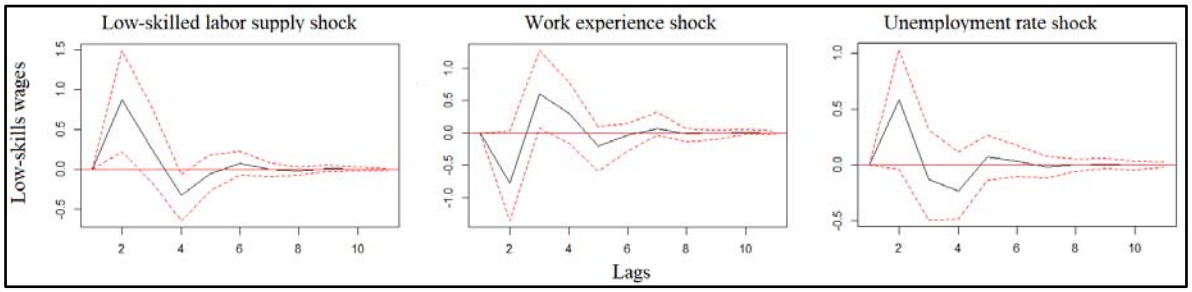
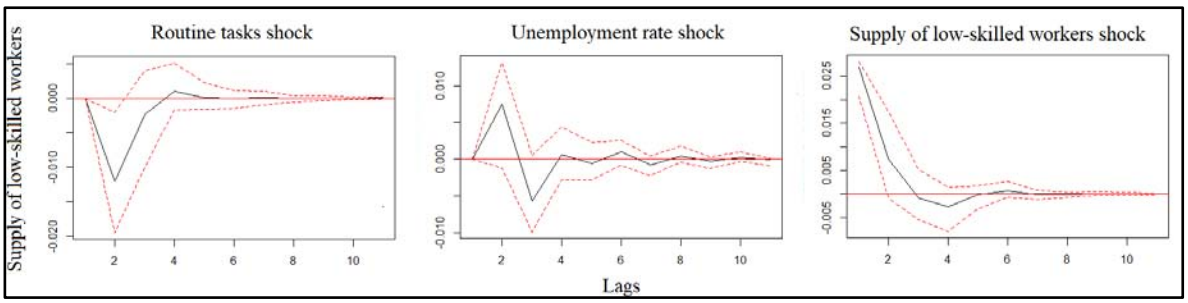


Figure 2: Response of low-skilled wages to low-skilled labor supply shocks, work experience and unemployment rate, Mexico 2005-2021

Likewise, the experience in terms of a shock initially has a negative impact on low-skilled wages, after the third quarter the impact is positive until stability is achieved starting in the fifth quarter.

Figure 3 shows that a demand shock for routine tasks until the fourth quarter has a negative impact on the supply of unskilled workers; however, it is seen that the effect is temporary and then returns to its initial place. On the other hand, the future of high-skilled labor supply is attributed to shocks of abstract tasks and wages of high-skilled workers obtained in the past.



Source: Own elaboration with data from the ENOE, quarters from 2005 to 2021.

Figure 3: Response of low-skilled labor supply to routine task shocks, unemployment rate and low-skilled labor supply, Mexico 2005-2021

Likewise, the results show that high-skilled wages are attributed to a high relative percentage of unemployment. In this same group, the experience in the future is attributed with up to a year of delay due to unemployment and skills shocks that persist in large companies in the manufacturing industry in the country.

Figure 4 shows that an unemployment rate shock can negatively impact the wages of high-skill workers until the fifth quarter and then reach the less oscillatory initial level.

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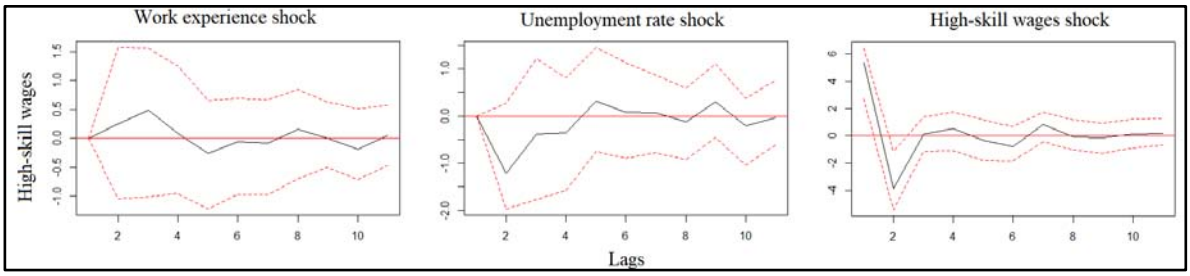
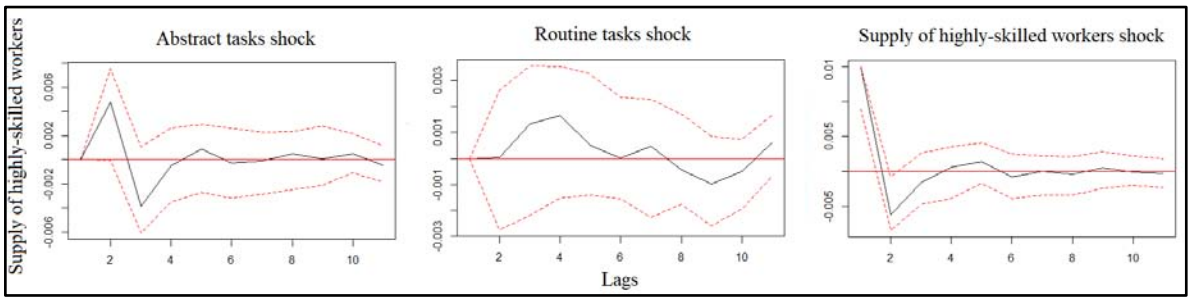


Figure 4: Response of high-skilled wages to shocks of work experience, unemployment rate and high-skilled wages, Mexico 2005-2021

Finally, Figure 5 shows that abstract task shocks have positive effects on the supply of high-skilled labor in the first two quarters and later in the fifth. After this peak the oscillation increases and decreases more slowly, until approaching the initial level. Likewise, the response of the supply of high-skilled labor to routine task shocks shows that the effects are positive until the seventh quarter.



Source: Own elaboration with data from the ENOE, quarters from 2005 to 2021.

Figure 5: Response of high-skilled labor supply to shocks of abstract tasks, routine tasks and high-skilled labor supply, Mexico 2005-2021

In general, the impulse response functions show that the effects of task demand, work experience, and unemployment shocks are not permanent but transitory on wages and the supply of workers in low- and high-skill occupations over the time horizon.

VI. Conclusions

The hypothesis of this research was to propose that the specific technological change towards abstract tasks shows a positive relationship with the supply of high-skilled work. While in low-skilled occupations, manual tasks present a positive relationship with the supply of low-skilled employment in accordance with the hypothesis of skill-biased technological change.

The biased technological change approach suggests that with the development of technological changes, companies tend to direct new technologies towards high-skilled work, which leads to increased productivity and wages. However, due to technology bias, unskilled workers tend to perform occupations related to little technological content.

To test the hypothesis, a VAR model was proposed for two equations; one for low-skilled occupations and another for high-skilled workers.

For high-skilled occupations, in large industrial companies, the results show that abstract tasks with up to a lag positively impacted the supply of high-skilled labor according to the HBTC of Acemoglu and Autor (2012). Which is consistent with the fact that the participation of abstract tasks has been increasing during the period of analysis, in addition to the demand for skilled workers, however, the demand for skills has not corresponded with the increase in relative wages for this group of occupations.

An important aspect that stands out is that work experience is a fundamental indicator that positively and significantly affects the wages of highly skilled workers. However, it is shown that when unemployment is persistent the experience decreases and the wages of this group of workers are significantly reduced. That is, unemployment causes skills to be lost, which is implicated in the decrease in income of skilled workers.

The analysis of the variance decomposition shows that the supply of highly skilled workers in future periods is assigned to abstract tasks and wages, which confirms the estimates made in table 5. Likewise, the results confirm that experience in the future is explained with up to a year of lag due to the unemployment rate that may persist in the labor market, that is, unemployment is detrimental to the experience of workers with skills because it tends to affect the wages of this work group for up to a period of two quarters as observed in the impulse response functions.

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For the group of low-skilled occupations, the results show that the supply of unskilled workers is not explained by manual or routine tasks. However, the industry during this period has experienced a positive and significant relationship between wages and supply of low-skilled workers as theory indicates. On the other hand, it was found that experience is an important variable for this group of workers, since as there are increases in wages, there is an increase in work experience in the order of one quarter. However, market saturation due to the excessive increase in the supply of workers together with the persistent increase in unemployment reduces the level of experience of workers in the industry.

From the analysis of the variance decomposition, it is concluded that the future supply of low-skilled workers is affected by shocks in wages and routine tasks. On the other hand, the future wages of this group of workers are affected to a greater extent by the level of work experience and routine tasks. Which makes it possible for the accumulation of experience to increase wages in the future, but low-skilled workers tend to concentrate in routine occupations.

In conclusion, with regard to high-skilled work, the future of the supply of high-skilled workers is predicted by abstract tasks, which confirms the presence of a task-biased technological change. However, the wages of skilled workers are negatively affected by persistent unemployment shocks in the future that may be leading to a weak equilibrium. While in low-skilled occupations, the supply of employment is related to the increase in wages and routine tasks, however, in the future the wages of less-skilled workers depend on work experience.

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Appendix

Unit Root Tests (Stationarity)

Variable	Augmented Dickey-Fuller		Phillips-Perron		Functional Form
	Lag 1	Lag 2	Lag 1	Lag 2	
Supply of low-skilled workers	–5.420 [–2.918] (0.0000)	–4.685 [–2.919] (0.0001)	–7.593 [–2.917] (0.0000)	–7.595 [–2.917] (0.0000)	Intercept
Low-skills wages	–7.093 [–2.918] (0.0000)	–4.898 [–2.919] (0.0000)	–7.937 [–2.917] (0.0000)	–7.947 [–2.917] (0.0000)	Intercept
Supply of highly-skilled workers	–7.482 [–2.918] (0.0000)	–5.582 [–2.919] (0.0000)	–10.605 [– 2.917] (0.0000)	–10.863 [–2.917] (0.0000)	Intercept
High-skill wages	–9.455 [–2.918] (0.0000)	–6.311 [–2.919] (0.0000)	– 12.994 [– 2.917] (0.0000)	–14.138 [–2.917] (0.0000)	Intercept
Work experience	–6.470 [–2.918] (0.0000)	–7.153 [–2.919] (0.0000)	– 9.639 [–2.917] (0.0000)	–9.745 [–2.917] (0.0000)	Intercept
Unemployment rate	– 5.346 [–2.918] (0.0000)	–6.296 [–2.919] (0.0000)	–10.891 [– 2.917] (0.0000)	–10.851 [–2.917] (0.0000)	Intercept
Abstract tasks	– 7.666 [–2.918] (0.0000)	–3.702 [–2.919] (0.0041)	– 11.360 [– 2.917] (0.0000)	–11.596 [–2.917] (0.0000)	Intercept
Manual tasks	–7.997 [–2.918] (0.0000)	–6.570 [–2.919] (0.0000)	– 13.152 [– 2.917] (0.0000)	–13.830 [–2.917] (0.0000)	Intercept
Routine tasks	–4.779 [–2.917] (0.0001)	– 4.211 [– 2.918] (0.0006)	–6.193 [–2.916] (0.0000)	–6.225 [–2.916] (0.0000)	Intercept

Source: Own elaboration.
Note: The values in parentheses are the probability of occurrence, the values in brackets refer to the critical value at the 5% level of statistical significance. All variables, except routine tasks, are in first differences.

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Criterion for the use of lags of occupations of low- and high-skilled workers

A. Use of lags for low-skilled occupations		
Lags	Akaike	Schwarz
1	-9.661	-7.723
2	-9.510	-5.876
3	-9.343	-4.018
B. Use of lags for high-skill occupations		
Lags	Akaike	Schwarz
1	-7.065	-5.1273
2	-7.772	-4.13824
3	-7.936	-2.60697

Source: Own elaboration.

Lagrange Multiplier Test (Autocorrelation)

Results by Occupancy Group

A. Low-skilled occupations		
Lags	Chi2	p-value
1	64.21	0.0712
2	41.09	0.7816
B. High-skilled occupations		
Lags	Chi2	p-value
1	56.33	0.2198
2	48.46	0.4950

Source: Own elaboration.

Eigenvalue stability condition			
Low-skilled occupations		B. High-skilled occupations	
Eigenvalue	Modules	Eigenvalue	Modules
-0.6714	0.6714	0.06411672+0.86984i	0.8722
-0.1516987+0.4340482i	0.4598	0.06411672-0.86984i	0.8722
-0.1516987-0.4340482i	0.4598	-0.3264933+0.8075064i	0.8710
-0.3604381+0.1716256i	0.3992	-0.3264933-0.8075064i	0.8710
0.3604-0.1716i	0.3992	-0.8638	0.8638
-0.117933+0.2516725i	0.2779	0.570062+0.5161317i	0.7690
0.117933-0.2516725i	0.2779	0.570062-0.5161317i	0.7690
		-0.733799+0.1396912i	0.7470
		-0.733799-0.1396912i	0.7470
		-.04290698+0.6069034i	0.7433
		-0.4290698-0.6069034i	0.7433
		-0.1342369+0.6702289i	0.6835
		-0.1342369-0.6702289i	0.6835
		-0.5433341+0.2425316i	0.5950
		-.5433341-0.2425316i	0.5950
		0.290594+0.4885347i	0.5684
		0.290594-0.4885347i	0.5684

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		0.5491506+0.07305788i 0.5491506+0.07305788i -0.1416888+0.2047537i -0.1416888-0.2047537i	0.5540 0.5540 0.2490 0.2490

Source: Own elaboration.
Note: Eigenvalues (roots) lie inside the unit circle. The VAR for each skill group meets the stability condition.

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Global Journal of HUMAN-SOCIAL SCIENCE: E
Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

Towards a Self-Reliant India: Closing the Saving Investment Gap

By Dr. Abha Agrawal
Govt. Post Graduate College

Introduction- For a developing country such as India, where the growth potential is high and the scope for poverty reduction is also significant; a policy that lifts the poor out of poverty by expanding the overall pie is preferable because redistribution is only feasible if the size of the economic pie grows rapidly. Therefore, achieving economic growth requires the government to adopt different types of policies such as promoting savings, stimulating investment, and increasing internal production (Rasmidatta, 2011).

Present piece of the study is an endeavor to find out the volume of gap between savings–investments in India and ways to reduce it up to zero size so that not only the burden of interest payment could be done away with, simultaneously growth process can be made sustainable in the long -run without sacrificing our sovereignty to external world. In a nutshell, growth process must be inner-engineered as the growth of individual. Decoupling or complete detachment from external world is essential for lasting happiness (Bhagwad Geeta) or welfare both for the individual and the economy.

GJHSS-E Classification: *LCC: HC435.3*



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Towards a Self-Reliant India: Closing the Saving Investment Gap

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I. Introduction

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Present piece of the study is an endeavor to find out the volume of gap between savings–investments in India and ways to reduce it up to zero size so that not only the burden of interest payment could be done away with, simultaneously growth process can be made sustainable in the long -run without sacrificing our sovereignty to external world. In a nutshell, growth process must be inner-engineered as the growth of individual. Decoupling or complete detachment from external world is essential for lasting happiness (Bhagwad Geeta) or welfare both for the individual and the economy.

यदा संहरते चायं कूर्म इव सर्वान् इंद्रियाणि आत्मने । तदा विमुक्तः सः प्रज्ञः सः स्थितः धीरे स्थिर इति ॥

"When he withdraws all his senses from their objects, as the tortoise withdraws its limbs into its shell, then he is said to be possessed of wisdom, and is tranquil in his mind."

II. Review of Literature

a) Theoretical Perspective

'Saving' this word was clarified by J.M. KEYNES (1936) as the excess of income over what is spent on consumption. Since he was concerned with wartime economies with urgent need to their revival; therefore, he advocated savings to be channelized into autonomous investment by the Governments in order to boost up demand by redistributing the income in the hands for generating the secondary and tertiary wave of income. According to him, savings are bane at the macro level while boon at the micro-level. Hence, investments must be equal to savings.

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Post-Keynesian economist Harold and Do mar emphasized on savings to keep the growth momentum unchecked. According to them, even a little imbalance in ex-ante and ex-post savings can lead to cumulative inflationary or deflationary economic situation. Neoclassical economists pulled up little pressure on economic growth rate by saying that savings can be adjusted up-to a specific range by bringing a change in incremental capital -output ratio.

b) Published -Research

Ismet GROCER, Tugba AKIN and Sedat ALATAS conducted the study, "The effects of saving-investment gap on economic growth in developing countries: A clustering and panel data analysis" using a sample of 65 developing countries for 1981-2014 period. Firstly, these countries were categorized into subgroups according to their saving-investment gap data by using clustering analysis. Then, panel unit root were performed for each cluster and overall panel, and panel coefficients were estimated. In conclusion; it was determined that while the effect of saving on economic growth is positive and statistically significant in developing countries which have savings overinvestment, this effect is negative and statistically insignificant in developing countries which have investment over savings. It was considered that this study will bring novelty to literature since it combined panel data analysis and clustering analysis together.

Mohsen Brahmani-Oskooee, Scott W. Hegerty and Harvey Wilmeth in his paper, introduce the "saving-investment" gap, which measures whether the need for financing is unmet, as another determinant of income inequality. They then apply time-series techniques in a study of 16 countries. Using the "bounds testing" cointegration method, in which variables in a given model can be stationary, non-stationary, or a combination of the two, They found varying results across countries. While these results highlight the need for further country-specific research, they indicate the benefits that external financing can provide.

Aytül Ganioğlu and Cihan Yalçın (2015) finds that Standard neoclassical growth models assume that foreign savings are perfect substitutes of domestic savings in financing domestic capital, thus growth rate is independent of domestic savings rates. However, these models fail to explain the divergence of growth rates between East Asian countries with higher domestic

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saving rates and other emerging economies. This study forwards the view that saving-investment gaps, if not domestic savings themselves, may explain to some extent the divergence of growth rates among those countries. They adopted the methodology of Aizenman et al. (2007) in calculating cumulative saving-investment gaps of 46 countries for the period of 1993-2010. Empirical analysis suggests that increasing the fraction of domestic savings in the financing of domestic capital, i.e. a rise in self-financing ratios, contributes to growth performance of countries. This finding is more pronounced for low-middle income countries and/or countries with lower self-financing ratios.

Assandé Désiré Adom, Nasr G. Elbahnasawy (2014): It is a challenge for most developing countries, especially in Africa, to mobilize domestically enough capital to meet their extensive investment needs because of two main reasons: the undeveloped nature of their financial system and the low rate of access of households to basic financial products. This study analyzes the impacts of persistent savings (S)-investment (I) gaps on economic growth using a sample of 5 developing countries in Africa - Egypt, Côte d'Ivoire, Ghana, Kenya and Nigeria. The methodology of this study is based on a Ramsey model within a general equilibrium framework, where consumption and savings are the determinant factors in a typical household's utility function. Calibrations and simulations indicate significant gaps between optimal and actual levels of savings and investment. Furthermore, the findings point out that these gaps are associated with relatively lower growth rates of actual output compared to simulated output, with the notable, but limited, exception to Nigeria until 2019. It accordingly becomes appropriate to suggest policies addressing both the structural and non-structural factors that limit the ability of these developing countries to effectively bolster households' deposits.

Sandri (2010) examines 62 episodes of growth spurts from 1960 to 2011 among non-OECD countries and shows that productivity growth across these episodes is combined with not only a rapidly rising investment rate but an even more steeply increasing savings rate. Carroll and Weil (1994), Attansio, Picci and Scorcu (2000) and Rodrik (2000) show that savings and growth are not only positively correlated but their positive correlation is even stronger than that between growth and investment. For a country such as India with an extremely young population, the role of demographics in fostering savings becomes crucial to understand possible crowding out due to government spending. Bosworth and Chowdorow-Reich (2007) show for Asia that both savings and investment rise with the proportion of the working population. Curtis, Luguaer and Mark (2011) find that jobs that pay meaningful wages drive savings rate in the economy. Lee, Mason and Miller (2000) and Bloom et al. (2007) show that savings increases as average life expectancy increases in a country. Thus, in an economy operating below full capacity, the supply of savings may grow from greater government spending through demand creation and thereby greater employment. This is because, as highlighted by recent research, favorable demographics – in the form of a large population of working age – would enhance savings through meaningful jobs.

III. Investment-Growth Nexus

Throughout the post-independence period, India has managed to maintain domestic saving and investment rates well above that of many other developing countries—not only those in a low-income category but also most of the middle-income countries in Latin America. However, in terms of growth performance, until the 1990s India remained a typical low-income country, with an average growth rate of around 3 percent. This incompatibility between saving/investment behavior and growth performance can be explained in terms of the nature of overall development policy stance. In the first three decades of the post-independence period and well into the 1980s, a highly interventionist trade and industry policy regime constrained the potential growth effect of domestic investment. Thus, investment levels, maintained, through macroeconomic stability and financial deepening simply enabled India merely to keep its head above water.

Liberalization reforms since 1991 have set the stage for transforming the investment-growth nexus by lifting import restrictions and dismantling India's industrial "license raj," thus lowering the relative price of capital goods, leading to more investment and the replacement of outdated machinery.

a) Saving and Crowding-out of Investment

The argument supporting higher debt leading to lower growth is as follows: higher levels of public debt are accompanied by more taxes in the future to pay for the debt, thereby, leading to lower lifetime - wealth, which may decrease consumption and savings, eventually, resulting in lower aggregate demand and growth rates. If higher public-debt (i.e. lower public-savings) is not accompanied by increase in private savings, it may also lead to lower total savings in the economy. This may put upward pressure on the interest rates, resulting in crowding out of private investment and thus, negatively impacting the growth rates. On the other hand, higher GDP growth leads to lower public -debt through the increase in the denominator, i.e. GDP.

Consistent with these arguments for crowding out, studies find no evidence of crowding out of private investment due to public investment in developing economies. Erden and Holcombe (2005) analyze the public and private investment in developing and developed economies, and conclude that while public

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investment is complementary to private investment in developing countries, the opposite holds for developed countries. Eisner (1994) argues that whether an increase in Government expenditure for goods and services 'crowds out' domestic private investment, may depend upon how close the economy is to full employment. BAHAL et al. (2015) find no evidence of crowding out in India over the period 1980-2012.

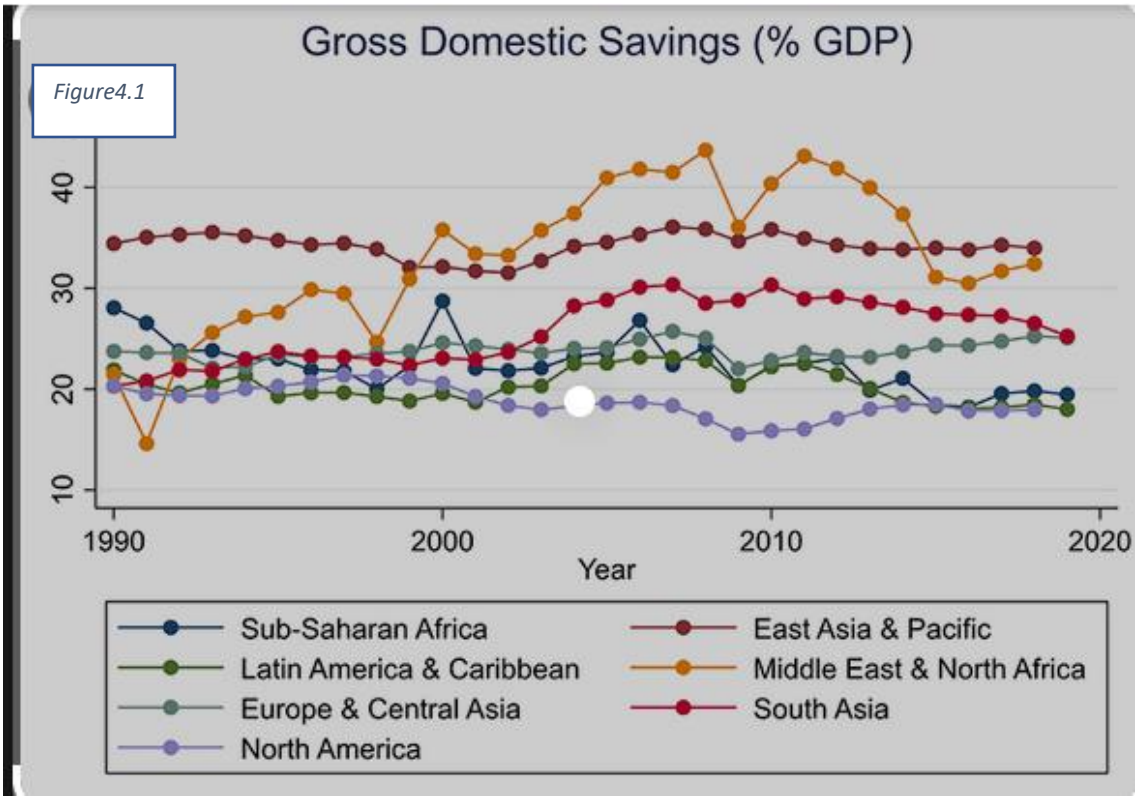
Recent research puts further doubt on the phenomenon of crowding out in rapidly growing economies by showing that the supply of savings is not fixed, but expands. (Economic Survey 2020-21 Volume 1 Income Growth).

Dilemma which should come first, saving or income growth? If economy is in the beginning or carved out has to borrow but when became as old as 75 years it needs a strong saving pattern across individuals.

IV. Global Scenario of Domestic Savings (1990-2020)

In the early 1960s independent India's saving rate (around 16 percent) was much higher than that of Korea, Taiwan, and Singapore, but from the early 1970s India's saving performance fell behind that of all these high-performing East Asian economies; by the mid-1990s, India's saving rate of 22 percent amounted only to a little over half their average rate. However, India's saving rate remained impressive by comparison to all other South Asian countries.

Global Scenario of Domestic Savings (1990-2020)



Source: https://www.encyclopedia.com/saving-and-investment-trends-1950 (fig.4.1)

Figure 4.1: Gross Domestic Savings (% of GDP) across Groups

Differences in saving performance between India and the East Asian high-performing countries is a reflection of differences in overall growth performance. India's success in providing an economic setting conducive to domestic saving and financial deepening is in some measure thanks to the nominal interest rate India has maintained, an administered price, changed only infrequently based on budgetary considerations. Unlike many other developing countries, India has not seen adverse movements in real deposit rates, thanks to the long-standing official commitment to an anti-inflationary macroeconomic policy. Thus, the incentive for saving has remained positive. Perhaps more important, the rapid spread of banking facilities, following the nationalization of commercial banks in 1969, played a pivotal role in increasing private financial saving. Bank density (population per bank branch) declined persistently from over 90,000 in the mid-1950s to around 14,000 in the mid-1990s.

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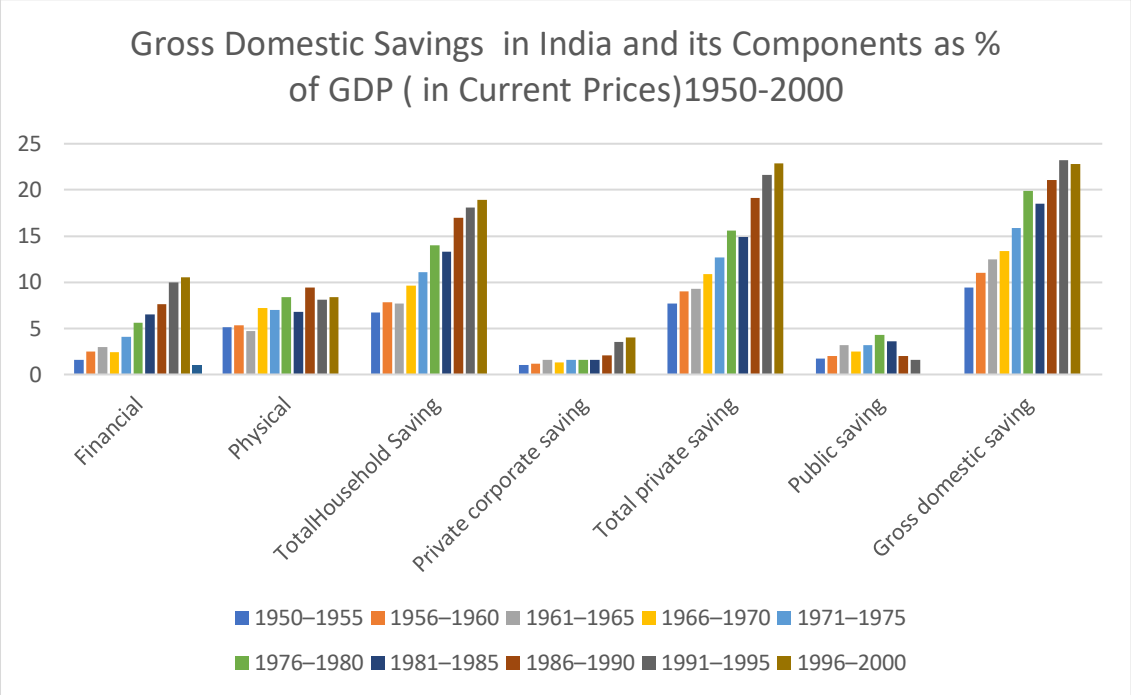
(Composition of Saving in India Pre-liberalization and Decade after)



Source: Compiled from Economic and Political Weekly Research Foundation, National Accounts Statistics of India, 1950–51 to 2000–01. (Fig.4.2)

Figure 4.2

In the post liberalization era (1986-2000) gross domestic saving of India has reached well above 20 % of GDP showing that India has taken off as far as stages of economic growth (Rostove) are concerned.

V. Investment and Growth

Domestic investment in India has been predominantly financed through domestic saving. Foreign capital inflows accounted for less than 1 percent of GDP. India has been a significant recipient of foreign aid, but total aid flows have remained negligible relative to the size of the economy. The role of foreign direct investment and other forms of private capital, portfolio investment, and bank-related flows has been even less important, reflecting the Indian government's unwillingness to invite foreign investment uncritically as well as the highly restrictive capital account regime. The saving-investment nexus has not undergone noticeable change, even after the reforms of 1991. The time pattern of the domestic investment rate has virtually mirrored that of the saving rate during the entire period.

The relative contributions of the public and private sectors to gross domestic capital formation have changed considerably from the early 1950s to the early 1980s. Public investment, which increased from about 30 percent to 50 percent, accounted for much of the total increase in investment. However, the rise in the investment rate after the mid-1980s can be attributed primarily to the increase in private investment. Private investment since the 1990s has mostly come from private corporate investment. The share of corporate investment in total private investment increased to over 45 percent in the 1990s. Relative to GDP, private corporate investment increased from 4.3 percent in the second half of the 1980s to 7.1 percent by the mid-1990s. (Household investment, on the other hand, fell from 9.3 percent of GDP to 8.5 percent.) Market-oriented reforms since 1991 have begun to play an important role in promoting corporate investment, reflecting the declining cost of capital brought about by import liberalization and favorable changes in investor perception.

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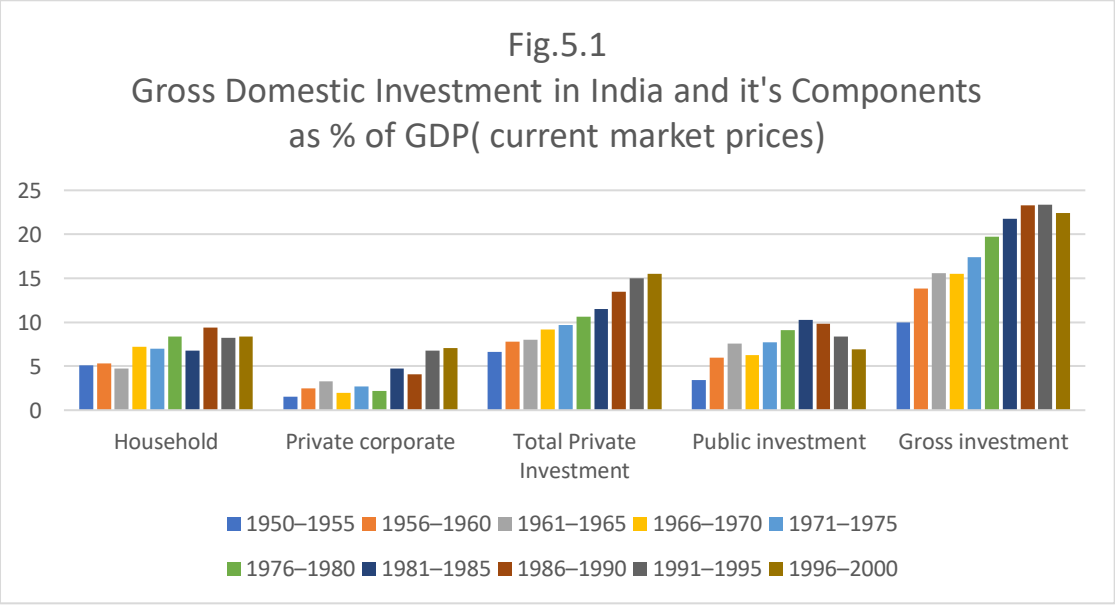
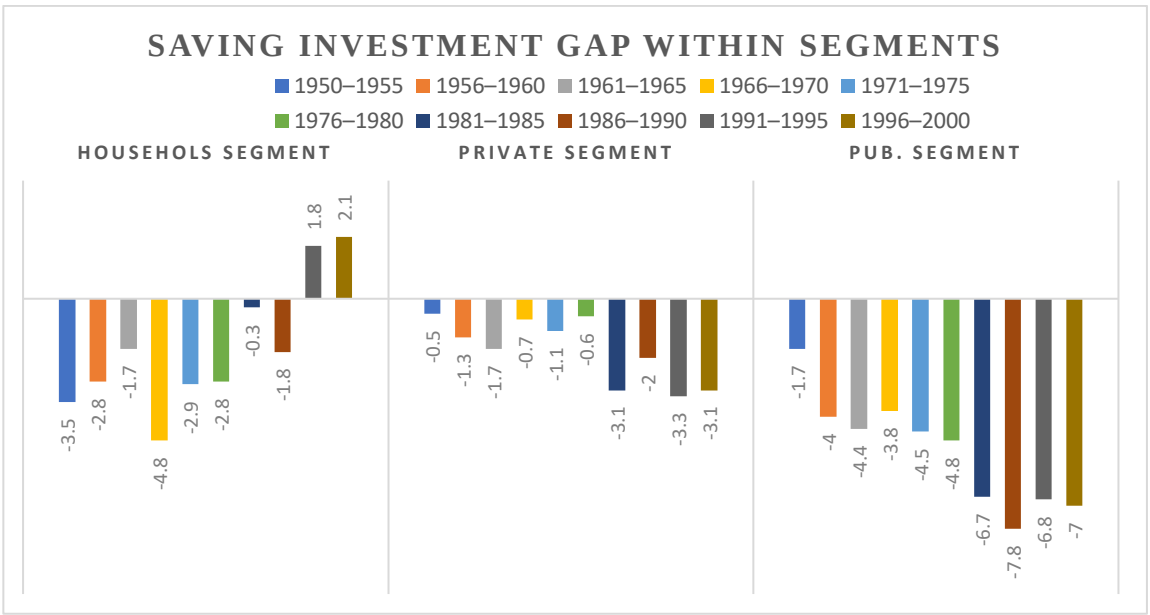


Source: Compiled from Economic and Political Weekly Research Foundation, National Accounts Statistics of India, 1950–51 to 2000–01. (Fig.5.1)

Figure 5.1: Gross Domestic Investment in India and its Components as % of GDP *(current market prices)*



Source: Derived from above Figures 4.2 & 5.1 (Fig.5.2)

Figure 5.2: Saving -Investment Gap within Segments (1950-2000)

The figure: (above) 5.2 gives a sharp picture of the gap between saving and investment within segments. As is well known, that period prior to 1991 is remarked as planned era in the economic history of India, with heavy reliant on public sector investment for infrastructural as well human resource development. Indian economy was characterized as mixed economy following three schedules for industrial investment viz. public-sector, private-sector and joint - sector. Since concentration was biased towards public-sector industries which were over-staffed, with inflated cost structure, excessively high capital - output ratio and undue delay in project clearance: this sector stagged with high deficit and monetary authorities were forced to opt path of deficit -financing and heavy reliant on external borrowings. Deficit financing always proved inflation prone due to infrastructural bottlenecks prevalent in the economy; this further led to high public - debt burden. Indian currency devalued several times to keep export competitiveness, since, our export and

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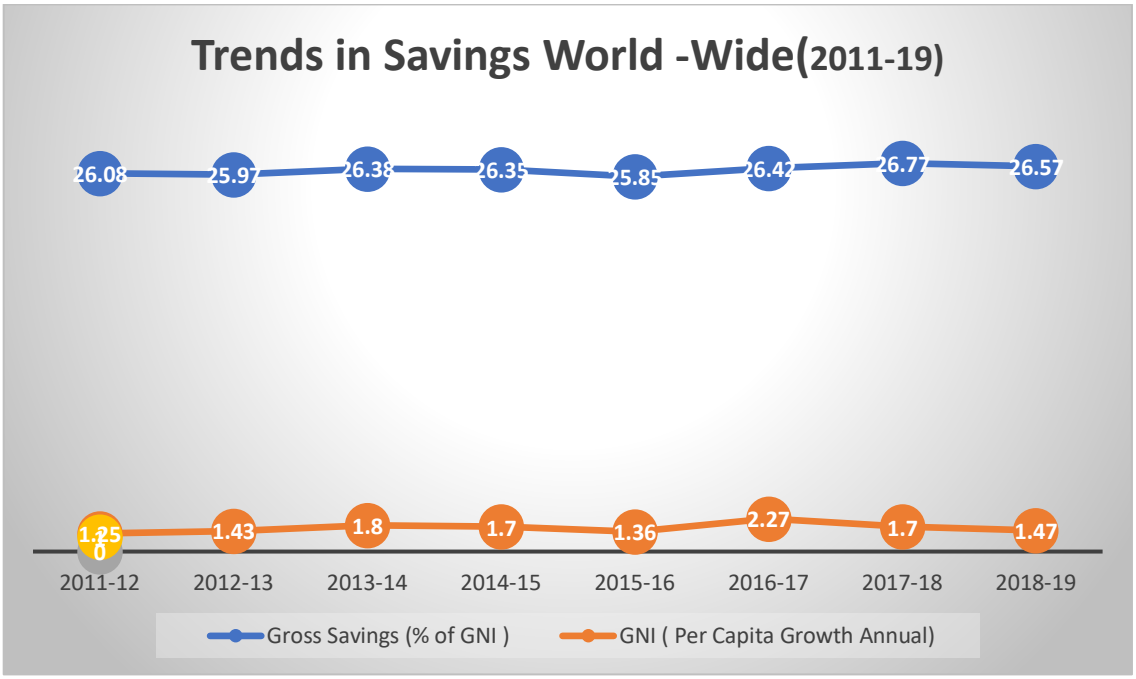
imports items both were relatively inelastic in nature; led to high current account deficit.

Faced with the highest inflation, external-debt and lowest foreign reserves which could fulfill only 6 months import requirements, the Govt. of India was bound to open its economic frontier for foreign – investors and move towards more privatization was started.

Above figure clearly shows from 1990 only, i.e. after gradual liberalization of the economy, some surplus in household segment was visualized, other two private and public-segments were excessively reliant on public and external borrowings due to high -investment and negative savings within and across segments up-to minus 20.2 and households savings could finance mere 3.9 % of this deficit in savings, so net saving -investment gap remained 17.7 % of GDP. After 30 years of liberalization, the scenario has totally changed. Overall saving investment gap has almost disappeared and excessive reliance on foreign borrowing has diminished.



Source: World-Bank National Account and OECD Account Data Files
Gross Saving: difference between GNI per Capita and Consumption (Pvt+Pub)+Net Transfers (Fig.4.3)

Figure 5.3: Trends in Savings World-Wide (2011-19)

The above figure (5.3) clearly establishes strong positive relationship between annual growth rate of per-capita income and growth in gross -savings world-wide.

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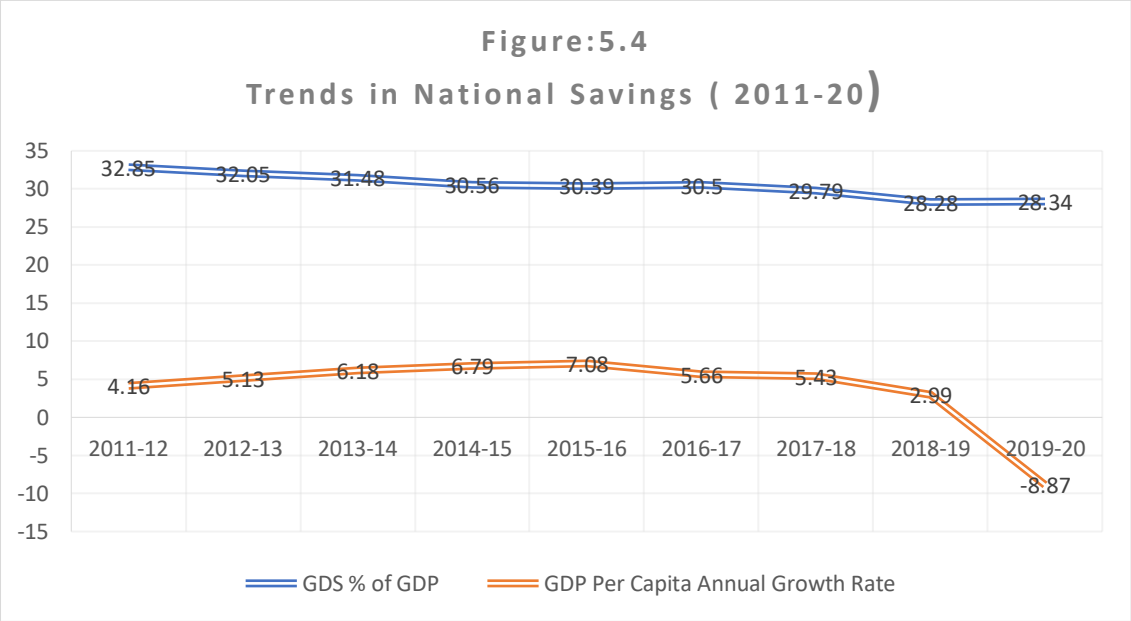

Source: World-Bank National Account and OECD Account Data Files
Gross Saving: difference between GNI per Capita and Consumption (Pvt+Pub)+Net Transfers (Fig.5.4)

Figure 5.4: Trends in National Savings (2011-20)

Figure (5.4) paints a little different picture in India's case; while per-capita income has grown throughout the period between 2011-12 to 2015-16 but showed a declining trend afterward till 2019-20, gross savings as percent of GDP has declined consistently according to World-Bank estimates. This structural change in income growth and saving rate may be partly attributed to rising inflation which has deeply eroded households' savings and income redistribution has turned its face towards private-corporate sector, that's why figure (5.5 below) shows size of orange bars on rise or insignificantly down.

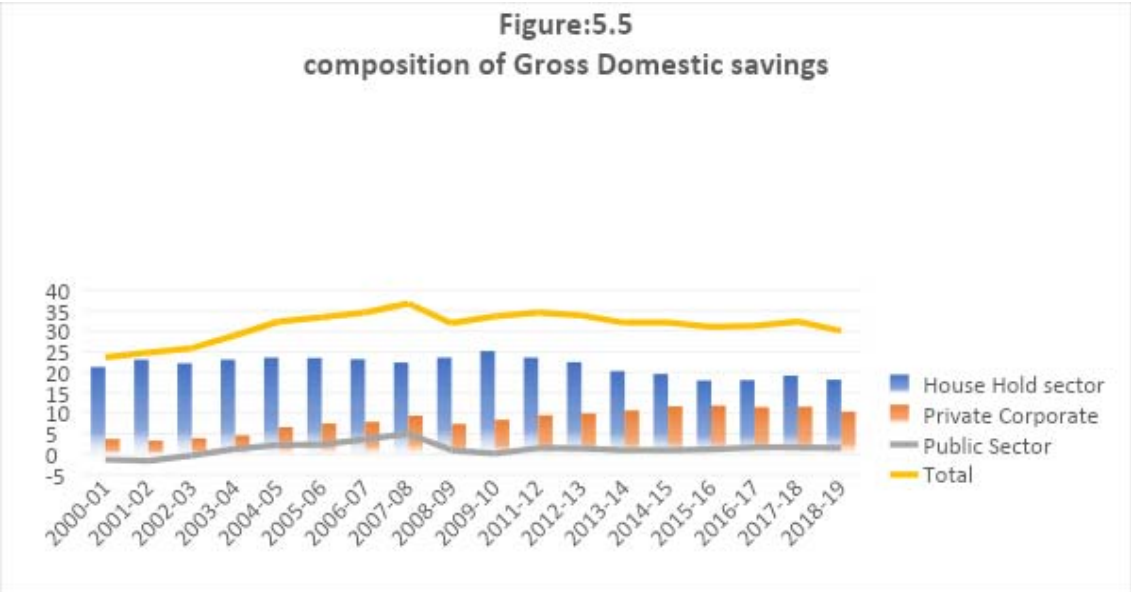

Figure 5.5: Composition of Gross Domestic Saving (Vertical)

Deeply watching the above figure (5.5.) it can be generalized that private sectors' saving rates are continuously on rise in post -liberalization period from 2000-2019 with little fluctuations in near covid-year i.e. after touching high to 11.9 % in 2015-16 it dropped slightly to 10.4 % in 2018-19.

Public sector's saving rate after reaching to the peak of 5 % in 2007-08 faced a sharp decline in 2018-19

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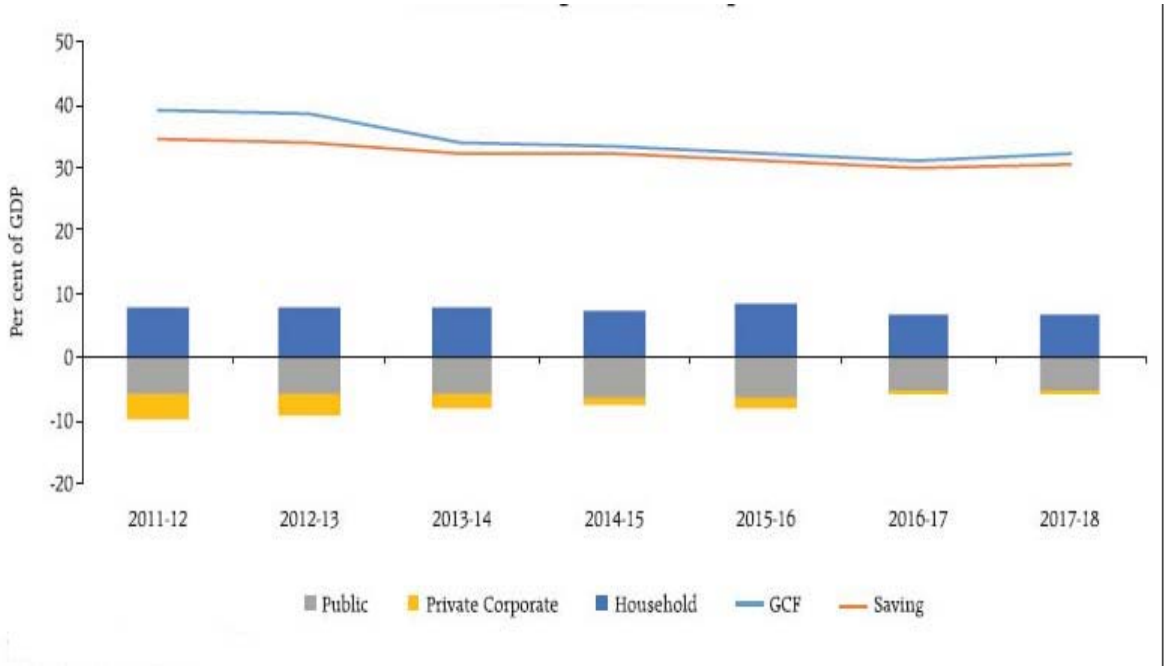
and touched to 1.5 % of GDP but certainly recovered from deficit in savings in the beginning of the second decade of liberalization.

As far as households' sector is concerned its saving rates have drastically improved; reaching to the peak of 25.2% in 2009-10 and remained above 20% of GDP till 2013-14 since then substantial declining trend is being perceived i.e. there is a gradual shift in saving pattern from financial towards investment in fixed assets or in jewelry.



Source: Central Statistics Office.

Figure 5.6: Savings and Investment Gap Horizontal and Vertical (2011-18)

Figure (5.6) depicts the actual saving-investment gap within the 3 saving-sectors of economy from 2011-12 to 2017-18; as can be seen, Indian households have become self-sufficient in financing their investment needs by cross movement of monetary resources through banks . That's why every time there is a phone call asking for the top-up requirement of existing loans, heavily advertising their (banks) loan-policies for purchase vehicles, homes, accessories moreover emerging middle class has started acquiring personal loans even to finance unproductive expenditure like marriage parties. One reason can be attributed to this self-sufficiency of households' sector is rising salary and wages after implementation of VII pay commission's recommendations.

Very plausible fact can be observed that the private corporate sector is reaching to near self-sufficiency (yellow area diminishing) in terms of its heavy investment requirements. That means although, this sector is profit -oriented and major driver of inflationary cycles in the economy; will not suffer from crowding -out of financial resources: and more funds shall be available for investing in public-welfare policies and creating (as well as maintenance) public-infrastructure which is of wide-range and extra-large.

Public Sector is under heavy-strain as far as saving - investment gap is concerned; since prevalence of a vast-population under poverty and unemployment together with continuously expanding population will never leave this sector under-invested and nonchalant towards public -welfare measures.

In this milieu role of household sector's savings becomes crucial not only to finance their own personal needs but to channelize resources even for private -corporate and public-sector for keeping and adding future comforts not for themselves but also for next-generations hence crowding-out of scarce monetary resources within the households' sector should also be kept in check to not let go interest -rates on loans very high and unaffordable. Because just like there is need to widen the tax-net to have more resources for public funding without putting much pressure on regular taxpayers ; also there is, equivalent, urgent need to keep check on this practice of financing unproductive expenses until entire population do not satisfy their housing and comfort needs.

The rate of gross capital formation improved nearly to 36.3 percent of GDP in 2017-18 from 35.2 percent in the previous year (Figure: 5.6.), mainly due to higher investment by private financial corporations and general government sector. The investment rate has fallen sharply over the years from a high of 39.7per cent in 2011-12, primarily due to fall in investment by households.

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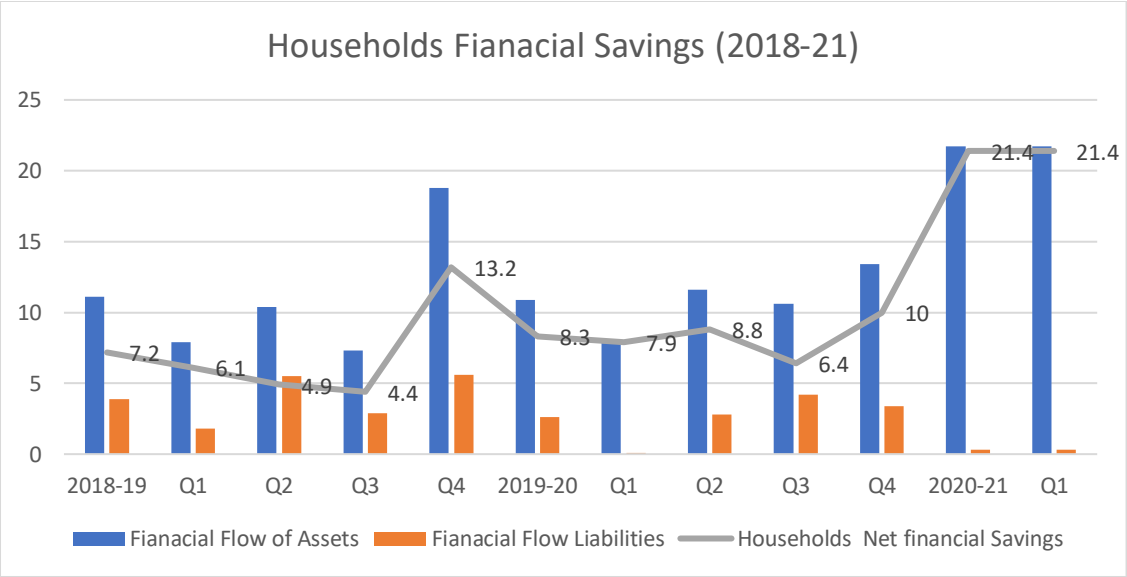
The saving-investment gap for the economy has come down over the years, thereby highlighting stronger macroeconomic fundamentals. The household sector remained the net supplier of funds to the private corporate and public sectors. However, in recent years, the private corporate sector's saving-investment gap has almost closed and most of its investment is financed through own saving, indicating a falling appetite for fresh investment. The public-sector drawdown on private savings (i.e., the saving investment gap), remained elevated.

In relation to growth, besides quantity of investment, what equally matters is the quality or the productivity of investment. The standard measure of productivity of investment is the incremental capital - output ratio (ICOR) which implies capital required to produce an additional unit of output. Productivity of investment has notably improved during the last five years when the average ICOR was 4.6 compared to the previous quinquennium (2009-10 to 2013-14) when ICOR averaged 5.9. Although yearly movement in ICOR has been volatile, it displayed an increasing trend from 2016–17 onwards. However, Government initiatives on affordable housing, rural infrastructure and roads are expected to boost productivity of investment going forward.



Source: RBI Bulletin 2020 (Fig.5.7)

Figure 5.7: (Households Financial Savings in India (2018-21)

Estimates presented in this figure (5.7) show a jump in household financial savings to 21.4 percent of GDP in Q1:2020-21, up from 7.9 percent in Q1 and 10.0 percent in Q4 of 2019-20.

It is likely that the propensity of households to save may have risen markedly during the pandemic on two counts. First, the households would have been forced to save more, being unable to consume up to their normal levels. The household consumption basket would have comprised a limited number of items relative to the pre-COVID period. Second, they may have raised their precautionary savings due to uncertainty about their future incomes, in large part flowing from cautious responses to reports of actual and potential job losses (RBI Bulletin 2020).

VI. Measures to Channelize Untapped Potential of Rural Savings

Although, since 2017-18 private corporate sector has been almost self-dependent with regard to generation of investible financial resources from their own class and pub-sector borrowing needs can be well met by households financial savings, but situation should not be as gross saving is equal to gross capital formation rather it should be kept on increasing in order to meet growing demand for investment by the government for touching to higher levels of development and bringing technological changes.

In this context, the present piece of study has been taken to explore the nature of saving behavior, and it's relativity with other parameters such as literacy level, age, nature of job etc. So as to affect their saving behavior in future for mobilization of more financial resources not only for their own economic security but also for the prosperity of the nation as a whole.

a) Model Specification

The objective of the study is to analysis rural household saving with respect to the characteristics of the household. The multiple linear regressions' method is used to study the relationship between a dependent variable and one or more independent variables. The generic form of the linear regression model id (Green, 2003).

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$Y = f(X1,X2,X3,X4.....Xk) + \varepsilon$

Where,

Y = Dependent Variable

Xi = Independent Variables i = 1,2,3....k

ε = Disturbance

The analysis was based upon the absolute income hypothesis. The model is based upon Keynesian theory, which relates household saving behavior with household income and other social-economic variables (Qian, 1988).

$S = \alpha + \beta 1Y + Z + ui$

Where -

S= Saving Y = Income Z = Other Socio- Economic Variables than Income

Further -

$Z = \alpha + \beta 1 (ATTR_AVG) + \beta 2 (AVRG_QLT) + \beta 3 (AVRG_AWR) + ui$

Thus:

$S (AVG_SAV_BHV) = \alpha + \beta 1 (ATTR_AVG) + \beta 2 (AVRG_QLT) + \beta 3 (AVRG_AWR) + ui$

OR

$S (V4) = \alpha + \beta 1 (V1) + \beta 2 (V2) + \beta 3 (V3) + ui$

Predicted (Saving Behavior) = 2.327 – (0.006) ATTR_AVG - (0.094) AVRG_QLT + (0.187) AVRG_AWR + ui

The study has analyzed the major determinants of rural saving behavior using cross-sectional blocks level multiple regression; assuming rural saving per household as independent variable. The analysis is confined to four village in USN i.e. Jaspur, Bazpur, Kashipur and Kichha. (Agrawal, 2022)

b) Research Methodology

From district Udham -Singh Nagar of Uttarakhand under study four blocks namely–Kashipur, Jaspur, Kichha and Bazpur were selected. Out of these four blocks 10 villages from each blocks were marked and from each village 10 rural households were randomly selected thus random proportionate sampling procedure was adopted. Thus sample construction is 400 rural households from the universe of 104847 rural households i.e. 38 households per one thousand formed the basis of sampling. Interview method was adopted while conducting the survey since mostly respondents were uneducated .For data analysis, regression approach was used using statistical software SPSS.

c) Hypothesis

Null Hypothesis (H_0) 1: Source of income effect has no impact on saving behavior of rural-households.

Null Hypothesis (H_0) 2: Economic infrastructure connectivity has no impact on saving behavior of rural households.

Null Hypothesis (H_0) 3: Attribute and Quality of Life have no significant impact on saving behavior of rural households.

Null Hypothesis (H_0) 4: Awareness about saving policies has no relationship with saving behavior of rural households.

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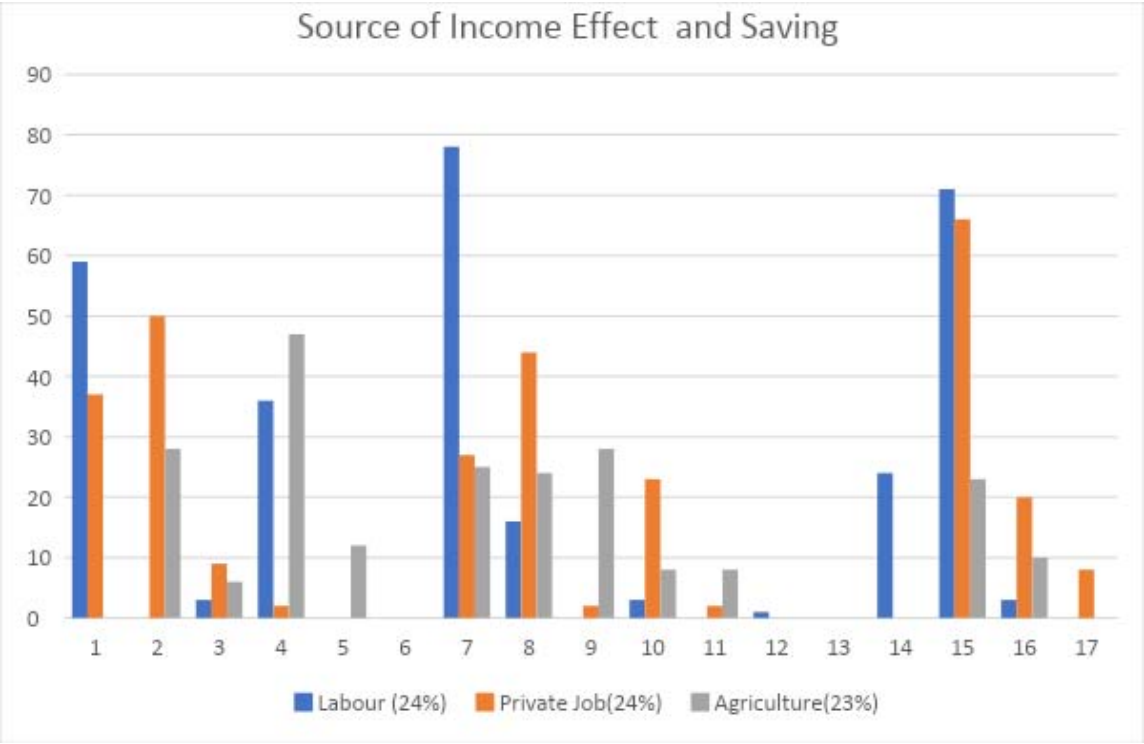
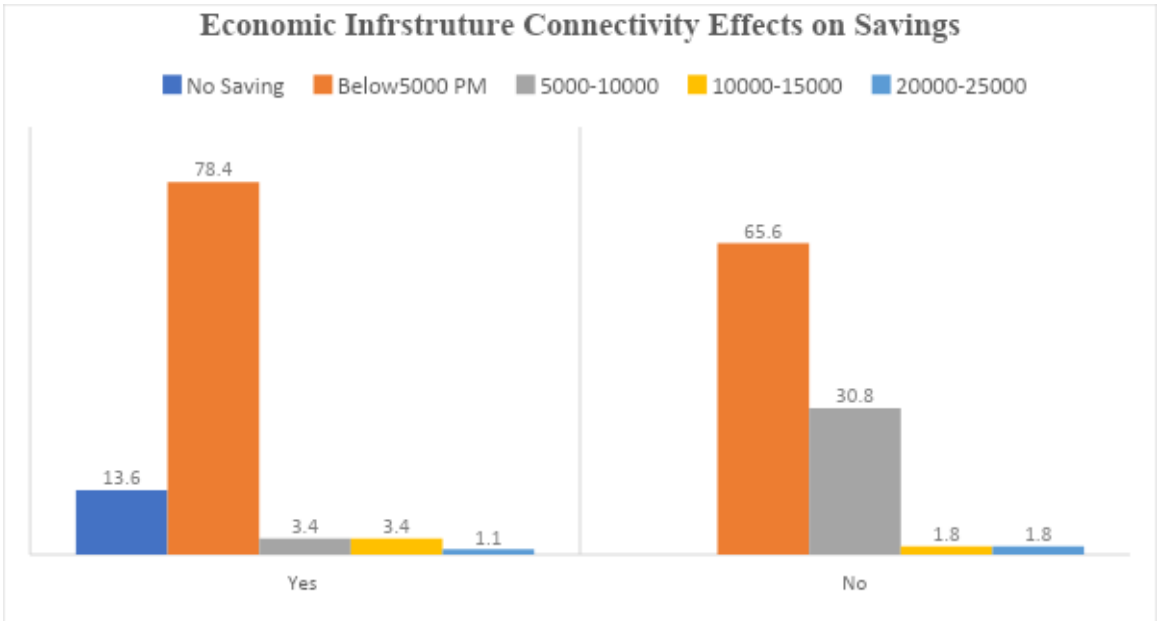
d) Result



Source: Primary Data Survey Report

Figure (6.4.1.): *Ho1:* Source of Income Effect on Savings

In this figure section c depicts heavy concentration of respondents who were dependent on private jobs and laborers saved less than LCU 5000 monthly in the study area. Labour class could not save above this amount. Hence it is evident that source of income has significant effect on saving.



Source: Primary Data Survey Report (Fig.6.4.2.)

Figure (6.4.2.): *Ho2:* Economic Infrastructure Connectivity Effects on Savings

Situation in Figure (6.4.2) looks indeterminate regarding their opinion so to arrive at appropriate conclusion a chi-square test was made whose values are given below:

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Table 6.4.2: Chi-Square Test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	205.129[a]	12	.000
Likelihood Ratio	267.611	12	.000
Linear-by-Linear Association	3.933	1	.047
N of Valid Cases	400		

a. 4 cells (15.4%) have expected count less than 5. The minimum expected count is .88.

H02: Pearson's chi-squared statistic is found to be 205. 129. The p-value of the pearson's chi-squared statistics is 0.000, which is less than 5 percent level of significance. This indicates that at 95 per cent confidence level, the null hypothesis is rejected thus it can be concluded that Economic infrastructure connectivity has a significant impact on saving behaviour of rural households. If they have proper access to; financial infrastructure such as bank, transports, road connectivity, health care facilities, *electricity, recreational activity, digital connectivity, rail - connectivity etc., are made easily accessible to the rural households they would be able to save more because it may curtail their expenditure cost which otherwise might be time and money consuming efforts.*

Ho3 & Ho4: Multiple regressions involve one continuous criterion (dependent variable) and two or more predictors (independent variable).

Table 6.4.3: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.327	.195		11.909	.000		
	AVRG_QLT	-.094	.038	-.146	-2.444	.015	.615	1.627
	AVRG_AWR	.187	.043	.251	4.306	.000	.644	1.552
	ATTR_AVG	-.006	.034	-.010	-.179	.858	.713	1.403

Source: Estimated (IBM-SPSS –Statistical version 20)

a. Dependent Variable: _SAV_BHV_of Households

b. K= 4 parameters to be estimated

c. A= 0.05, sig. p- value.

- Positive alpha, 2.327 exhibits their tendency to save due to their ability and will. It implies a deliberate decision behind their savings rather than residual over expenditure.
- The p-value 0.858 of the attribute (V1) is > significance level 0.05 hence model is statistically insignificant and Null hypothesis (Ho3) is accepted that attributes do not have any significant impact on their savings. Coefficient -0.006 shows that it has marginally negative impact on saving behavior.
- The p-value of quality of life 0.015 < 0.05 (significance level) hence there is sufficient and valid reasons to reject null hypothesis(Ho3) that quality of life has no significant impact on individual's saving behavior. And accept alternate hypothesis that quality of life i.e. status in the society , demonstration effect, fashion etc. are negatively impacting their saving behavior.
- The p-value 0.000 is significantly > than 0.05 (Level of significance) hence there is sufficient valid reasons to reject null hypothesis (H04) that awareness do not have any impact on saving behavior. Contrary to that spread of Government institutions, vigorous advertising of Government sponsored schemes like PMJDY, rate of interest etc., all have significant positive impact on their saving behaviour.

e) Discussion

It reveals that the maximum number of (262) households; out of 400 respondents, do not have agricultural land at all. These landless household are doing work as farm / daily wages laborers in rural area.

The income of these laborers is very less and uncertain. The disposable income left in hand at the end of a month/week is very less, thus adversely affecting the saving of rural household.

The farmers have subbed marginal land holdings. Out of 400 respondents, only 20 households have 3-5 acre and 118 household have 1-3 acre of land for cultivation. Moreover, the input cost per unit is higher than the output. Indiscriminate use of soil, pesticide, fertilizer and exploitation of groundwater has adversely

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affected soil fertility. Therefore, the farmers who are totally dependent on agriculture and do not have any other source of income are saving very less relatively.

Family dependency of the households is an important determinant of saving. It is seen from the analysis that larger the family-size and savable amount were inversely co-related.

Source of income has also influenced, a daily wages laborer; in comparison to equal income earned from other sources, spends his hard-earned money with utmost caution. So the saving amount is not touched by the daily wages laborer unless emergency.

f) Suggestions

i. *Saving Attribute*

Since Out of six attributes, marriage is forming one larger part of saving decisions. This kind of saving is in reality a loss of returns because dowry or marital expenses for the lower and lower middle-class people is a wasteful expenditure in the future. So people of this class should be motivated toward carrying court-marriages without pomp & show.

ii. *Economic Environment*

For securing them from life hazards intense awareness should be brought about insurance policies so that dependents can be taken into account in case of any emergency: like Risk -Cover offered by State bank of India, Health insurance should be promoted so that they can reap the benefits; of sum insured for their entire family , more than the sum invested out of forgone consumption like Arogya by State bank of India, Platina for retirement benefits.

iii. *Saving Capability*

To increase saving capability, income deepening methodology can change a lot in their lives. Since 50% were female respondents, it can be suggested that the teaching of home-science at all ladders of education should be made compulsory. Where following curriculum can be adopted:-Budget Making, Calorie Counting, Product Quantity and Calorie, Products and Calorie, Products and Price. Teaching of stitching for common clothes like school dress, trousers, kurta, waistcoat etc., should be imparted to all, to save money, at certain levels of income. Beauty is also one important part where girls can save money without sacrificing their physical appearance and confidence. For male counterparts it is the value-oriented education that will keep them away of all kind of non-senses right from alcoholism, tabaco-culture, demonstration effect out surpassing the income effect. While getting orthodox education they must be taught electrical repairing, electricity repairing, plumbing work these small trainings would pave and pay a lot to them.

iv. *Risk-taking Behavior*

Govt. agencies should attempt to bring rural low income-savers towards share-market, although this market is volatile but can fetch lucrative returns even on small savings like a share can be bought in 60 INR. Opening of D-Mat account and deepening of digitization can surely bring change in their saving behavior, i.e. a shift from risk aversion to risk taking behavior. Because to keep inflation under check, rate of interest on savings can not go much higher. Thus, they will be left with more to consume and resume security without thinking about the longevity of the life-expectancy.

VII. Conclusion

There is a significant drawback in the saving pattern of rural households. Rural households are found less diversified in their savings. The reason for this may be the lack of availability of saving services and low level of financial awareness in rural areas as compared to the urban areas. Most of the people get financial information from TV media, Social media sources or from the advice of their family and friends before opt to saving or investment.

Hence, Financial literacy apart from income augmenting practices may bring a significant change in households' saving behaviour and pattern. Such kind of informational change can be brought by changing curricula; which would be in lieu with the Earth Summit goal of education for sustainable development rural areas.

To reduce saving - investment gap a new approach of hefty increase in pay-brackets of government servants; particularly in higher education: may be planned, which will serve multifold objectives of raising wages (outsourcing of domestic work due to heavy participation of females in Universities and Degree colleges), financial savings, and consumption because marginal propensity to consume of this class is positive but quite less than one. As Keynes has suggested in his book on General Theory of Employment, Interest and Money in 1936, he advocated to channelize the public- money into economy through public -works program to generate employment for war-ridden economies . Now instead of generalized interest-rate mechanism and creating undue glut into the economy, money-supply can be increased by putting more money into the hands of teachers in higher education system through the path of raising their disposable-incomes. Because education for sustainable social and economic development can be imparted only through highly enlightened teachers and as is well known enlightenment comes through deep knowledge and thinking. So to attract thoughtful humans and knowledgeable brains into this system wage-structure should be reformulated in India. Because gravitational

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forces attract best minds towards more remunerative and performance rewarding jobs.

This policy would be transformed into either increased GST or domestic-savings or re-distribution of income in favor of bottom low people due to outsourcing of household-works due to heavy-workload put on their shoulders as compared to pre-covid era. Thus, trine objectives shall converge into vanishing the saving - investment gap.

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Appendices

The Measurement Problems

The interpretation of Indian saving trends is complicated by a number of weaknesses in the Central Statistical Office's (CSO) methodology for measuring both investment and saving. The most important shortcomings are:

The estimate for physical household saving is set equal to household investment, which itself is calculated only indirectly as a residual.

There are errors and omissions in the estimates of both savings and investment, but adjustments are made only to investment.

According to C S O: saving estimate is more reliable (based on the greater accuracy of public, financial, and corporate saving data) and therefore adjusts investment to equal the sum of domestic and foreign saving.

The commodity flow method used to estimate total investment—based on fixed production coefficients—has remained unchanged for decades. While it might still be useful for comparing investment in adjacent years, new technologies and the growing amount of investment in the informal sector are not adequately reflected in the estimates.

The estimates of corporate saving and investment are based on a small, unrepresentative sample, and rely largely on voluntary responses from enterprises.

The CSO estimates do not cover some assets preferred by households, namely jewelry and gold. Household saving in gold probably increased after import restrictions were liberalized in 1992, implying an increase in the underestimation of saving((Muhleisen, 1997)

Finally, there are differences in saving and investment estimates among Reserve Bank of India, CSO and Center for Monitoring Indian Economy(CMIE) based upon techniques used by them.

Table 6.4.4: Reliability Statistics

Constructs	Cronbach's Alpha	No. of item
Saving Behaviour (Infrastructure)	0.604	9
Attribute	0.729	12
Awareness	0.536	5
Quality of Life	0.885	5
		31

Source: Estimated by survey report (IBM-SPSS –Statistical version

Table 6.4.5: Model Summary (Main variables)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.360[a]	.130	.123	.32237	.130	19.654	3	396	.000

a. *Predictors: (Constant), ATTR_AVG, AVRG_AWK, AVRG_QLT*
b. *Dependent Variable: SAV_BHV_avg*
Table (5.4.5.) presents a measure of "explained variation". Result shows that R of 0.360 than the variability of Y-values around the regression line is 1-0.360 times the original variance, and value of adjusted R (0.123) exhibits the fact that present regression equation explains only 12% variation in saving behaviour rest of the occurrence may be affected by random terms.

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Global Journal of HUMAN-SOCIAL SCIENCE: E
Economics
Volume 24 Issue 2 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

The Development of the Digital Economy in 2024 - Facts and Figures

By Yuriy V. Lyandau & Dmitriy M. Ter-Ovanesov
Plekhanov Russian University of Economics

Abstract- The article examines the main features of the development of the digital economy in the developed countries of the world. Some aspects of the introduction of digital currencies, the impact of the digitalization process on the financial system and monetary policy of different countries are reflected, and the possibilities of legal regulation of the use of digital financial assets in developed countries of the world are highlighted. As a result of the research, a review of scientific, practical, statistical information was made, and the author's conclusions were given.

Keywords: *digitalization, asset, cryptocurrency, country, process, financial technologies*.

GJHSS-E Classification: *LCC: HC79.T4*



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I. Introduction

The modern world is going through an era of significant transformations, many of which are related to the process of digitalization. This phenomenon has a profound impact on various aspects of society, primarily on the economy. The digitalization process not only makes adjustments to existing business models, but also contributes to the creation of new structures, mechanisms and platforms [2, pp. 36-37; 10].

II. Relevance

Special attention should be paid to the fact that digitalization helps the economy to be more flexible and adaptive to changes. This creates prerequisites for sustainable development and the improvement of the quality of life of the population. Thus, digitalization not only changes the existing world, but also contributes to the transition to a new era of significant global transformations. In the era of digitalization, we are witnessing the transformation of the economic environment, which led to the formation of such a concept as the "digital economy" [11].

The purpose of the study is to consider the main features of the transition to the digital economy in the developed countries of the world.

III. Materials and Methods of Research

Analysis of scientific and practical, statistical information, generalization, synthesis of opinions, graphical interpretation of the results.

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IV. The Results of the Study

a) The development of financial technologies (Fintech) in different countries

The development of Financial Technology not only contributes to the creation of new value, but also plays a key role in the transformation of traditional financial institutions into their digital counterparts. The essence of Finance is to optimize financial processes, which leads to increased revenue and reduced costs.

The main aspects and advantages of Fintech include:

1. *Transformation of material institutions*: Financial technology allows banks and other financial institutions to move to a digital platform, providing faster and safer services.
2. *Value creation:* Innovations in the field of financial technologies are aimed at increasing efficiency, which leads to increased income and reduction of unnecessary expenses [4].
3. Fintech helps small businesses turn large amounts of information into manageable and understandable data.
4. Fintech provides access to a new type of service.
5. The use of Financial Technology allows you to significantly expand the financial capabilities of organizations.
6. The use of Financial Technology allows you to automate accounting procedures.
7. Many fintech applications simplify the process of creating accessible e-commerce websites for small businesses, allowing them to offer their products globally [10].

The development of Financial Technology is bringing significant changes to the financial services sector, which is confirmed by a number of studies. Research shows that over the past four years there has been a significant increase in interest in Fintech startups, which is reflected in the volume of investments. The highlights of these studies include:

- Financing of Financial startups in the world has increased by more than 39%.

In 2023, the global financial technology market experienced a significant decrease in investment activity, as shown by data published by Innovate Finance on January 10, 2024. The amount of investments in this sector fell to $51.2 billion, which is

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48% less than $99 billion in 2022. The decrease in the number of transactions also turned out to be significant. This change in the market may be related to various economic factors, including macroeconomic instability and changes in regulatory policy, which will require further analysis to understand long-term trends. The top 10 countries leading in terms of investments in Finance are shown in Figure 1 (Figure 1).

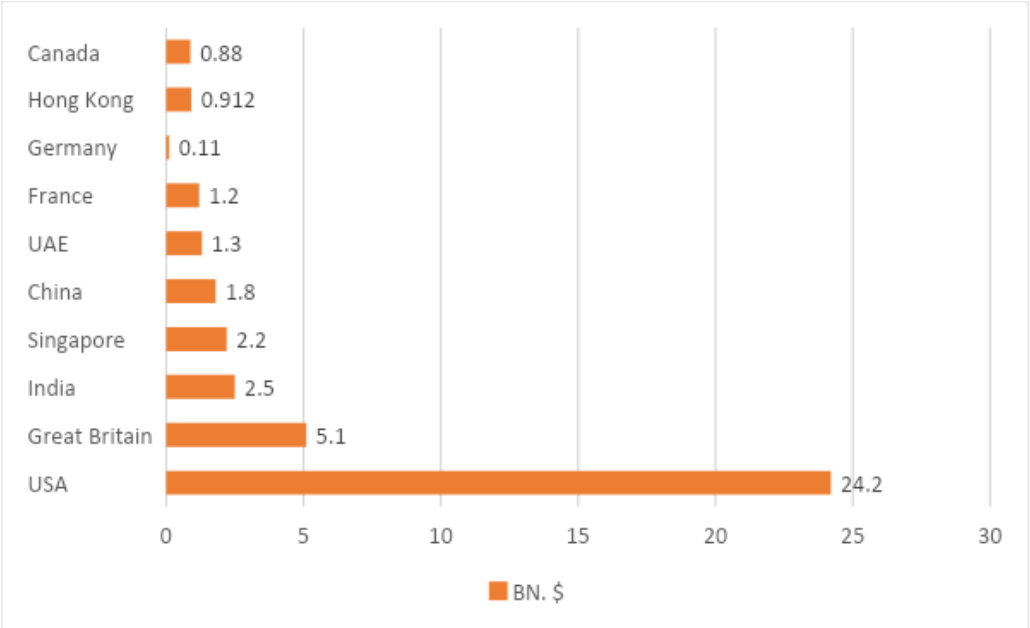

Figure 1: The volume of investments in Finance by developed countries [9]

b) *The development of digital currency in developed countries*

The digital currency, which appeared quite recently, has already established itself as an important tool in the work of financial systems. In different countries of the world, it has received various statuses: from full recognition at the state level to a limited or even prohibited status. This diversity of approaches to digital currency regulation highlights their complexity and novelty for traditional financial systems. Central banks in various countries have begun to adapt their strategies for managing the monetary fund, taking into account the opportunities and challenges presented by digital currencies. Therefore, their introduction, although a relatively new phenomenon, has already had a significant impact on the market environment [6].

c) *Analysis of the impact of digital currencies on the financial system and monetary policy of different countries*

The introduction of a central banking digital currency (CBDC) represents a significant step in the evolution of the modern financial system. This new form of money, due to its unique characteristics, can radically change the approaches to conducting monetary policy. The issue of the potential possibility of accruing interest on the central banking digital currency is becoming particularly relevant, which could attract more users and increase its popularity among economic agents. Consideration of such an aspect as the accrual of interest to holders of digital currencies is becoming one of the key tasks in the process of developing and implementing a central banking digital currency. This function can play an important role in determining the degree of demand for this type of asset in the market. Depending on how interest charges are arranged, digital currencies can either stimulate economic activity or put pressure on traditional banking services.

The impact of a central banking digital currency on the financial system of developed countries will depend on many factors, including its acceptability and ease of use for the public and businesses. As different models and approaches to its management are approved and implemented, different impacts on the market environment can be expected. This, in turn, will have consequences for the regulatory structures and monetary policy of the state. To support economic activity and strengthen financial stability during periods of economic downturn, Central Banks of developed countries actively apply monetary policy measures, including both conventional and innovative approaches. In these circumstances, they seek to regulate interest rates to stabilize the financial system and reduce economic risks. This time is often characterized by a decline in the creditworthiness of financial institutions, which underscores the importance of moving to the full use of digital transformation opportunities.

d) *Development of digital financial assets in the USA, Russia and other countries*

Recently, the digital asset industry, in particular cryptocurrencies, has faced significant difficulties,

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described as a "crypto winter", which has stimulated analytical speculation about its future. However, an interesting reason for this decline is that the actions of regulators, who accused key figures of fraud, unexpectedly contributed to the identification of organizations seeking to offer real and practical solutions. This process was most often typical for the United States. It seems that the future of digital assets will be determined by: acceptance into the digitalized financial system, the reliability of the products offered and strict compliance with regulatory requirements.

Currently, in developed countries (USA, Russia, China, etc.), there is an increasing trend of integration of decentralized finance (DeFi) with long-existing financial systems (TradFi) on the market. In the past, traditional financial institutions were extremely skeptical about cryptocurrencies, but over the past year there has been a noticeable jump in their interest in blockchain technologies. An example of this is the actions of BlackRock, which applied to create ETFs for bitcoin, Ethereum and HSBC, while starting cooperation with Metaco to develop custodial services for tokenized securities.

In the run-up to 2024, the emergence of bitcoin as an institutional asset is becoming more and more obvious. Global financial institutions, including major players such as JPMorgan Chase, Morgan Stanley and Goldman Sachs, are actively forming teams specializing in cryptocurrencies and blockchain technology, which indicates the strategic nature of their interest in this sector. They strive not only to satisfy customer needs, but also to expand their own influence in the market. This process is not limited to the impact only on the United States, as financial institutions around the world are actively exploring the possibilities of Digital Assets. The expectation of Bitcoin ETF approval from the SEC also helps to strengthen the confidence of many global communities in Central Asia at the institutional level [8].

e) Analysis of the legal regulation of Digital Assets

From 2019 to 2024, the introduction of a new legal approach in the field of digital tokens in some countries began, including the development of specialized procedures for their issuance, storage and exchange using DLT technologies. Subsequently, in 2020, the European Commission presented an initiative to introduce regulations for the experimental application of distributed ledger technology in the financial infrastructure, which provides for the circulation of shares and bonds with registration through DLT. This practice has been actively investigated in Europe since 2021, including Germany, where appropriate electronic legislation has been introduced.

In Switzerland, the DLT registry has begun to be used to issue limited liability shares and debt obligations, including bearer bonds.

In the United States, cryptocurrencies can be classified in different ways, depending on their use: as a means of payment, as property, or as an exchange commodity. At the federal level, the main focus is on legislation aimed at countering the legalization of criminal proceeds, while existing legal norms are applied to other aspects. Issues related to the specific application or the complete prohibition of cryptocurrencies are left to the discretion of the legislatures of individual states.

Since 2021, a new Federal Law No. 259-FZ has been in force in Russia [12]. According to Federal Law 259-FZ, "digital financial assets are digital rights, including monetary claims, the possibility of exercising rights under equity securities, the right to participate in the capital of a non-public joint-stock company, the right to demand the transfer of equity securities provided for by the decision on the issue of DFA."

It allows the creation of digital assets similar to securities. The definition of the DFA under paragraph 2 of Article 1 includes not only monetary claims, but also opportunities related to equity securities, including participation in the capital of closed joint-stock companies and the right to demand the transfer of these securities. Currently, two ways of tokenizing assets are regulated in Russia: firstly, by issuing DFAs for existing securities, and secondly, by issuing shares in the DLT system, where such shares are recorded and stored without the need to contact traditional depositories.

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Table 1: Comparison of CFA regulation in Russia and the world [13]

Legislation of the Russian Federation	An analogue in the foreign market
DFA (Part 2 of Article 1 of the DFA Law)	Security tokens Digital analogues of securities or financial instruments. Certify the rights to own shares in the company, participate in management and/or receive income (dividends, profits). Regulation of the securities market is applied. Issuer: relevant: company or its authorized partner. Example: Tokenized TBILL Treasury bonds.
DFA (Part 2 of Article 1 of the DFA Law)	Asset-backed tokens They are provided with real liquid assets: both services and goods, for example, oil or gold. The issuer guarantees that one token corresponds to a certain amount of a real asset and owns the required amount of this asset. Example: A Pax Gold token (PAXG) backed by gold stored in LBMA's London vaults.
DFA (Part 2 of Article 1 of the DFA Law) Hybrid Digital Rights (Article 6, Article 1 of the Federal Law on DFA) = DFA + accounting and system cryptocurrency platforms	Stable coin (backed by flat money and real assets) Some of these tokens are backed by real assets, such as metal, while others may be linked to cryptocurrencies. In the first case, they are more correctly attributed to asset-backed tokens, and in the second — to payment tokens.
Hybrid Digital Rights (Article 6, Article 1 of the Federal Law on DFA) = DFA + accounting and system cryptocurrency platforms	NFT Non-interchangeable tokens can be used to create, trade and exchange unique digital objects, for example, objects of digital art. Example: NFT based on Gucci Ghost graffiti, Cryptokitties.

Digital financial assets can be divided into five types:

- Monetary requirements.
- The possibility of exercising rights on equity securities.
- The right to participate in the capital of a non-public joint-stock company.
- The right to demand the transfer of equity securities. Hybrid digital financial assets.

In accordance with the law, digital financial assets are not a means of payment, but at the same time, any actions provided for by the Civil Code of the Russian Federation can be performed with the DFA: buy, sell, exchange, mortgage, donate, inherit.

DFA issuance and repayment are carried out by information system operators (ISO), and their secondary handling of settlements within the framework of the platform is carried out by DFA exchange operators. An OIS differs from an exchange operator in that it can issue (issue) DFA and organize their trading on its platform, and does not have the right to trade DFAs issued by another ISO. The exchange operator, on the contrary, can organize the trade of DFAs that were previously issued by other market participants, but does not have the right to issue DFAs. At the moment, ten information system operators are included in the register of the Central Bank of the Russian Federation: Alfa-Bank JSC (A-token), Atomize LLC, Sberbank PJSC, Lighthouse LLC, Distributed Registry Systems LLC (Masterchain), Tokens LLC (Tokeon), EUROFINANCE MOSNARBANK JSC, SPB Exchange PJSC, LLCBlockchain Hub", NPOs of JSC "NSD". The exchange operator is only one organization - PJSC Moscow Exchange [14].

The DFA market is at the initial stage of development and is many times inferior in volume to the market of traditional financial instruments. However, since the release of the first deals in August 2022 to the present, the total volume of DFA issues has already amounted to over 74 billion rubles, which confirms the dynamic development of the digital finance segment and the growing interest from investors and market participants.

V. Conclusion

Thus, according to the study, the digital transformation of the financial sector and the modernization of monetary policy around the world can be described as a multi-level and complex process. It includes the following key aspects:

1. Development of high-tech digital solutions.
2. The introduction of information technology in various spheres of life.
3. Integration of technological innovations into the national development of all industries.

In the economic sphere, the process of digitalization causes structural changes that can be observed in the following areas:

- Optimization of production processes.
- Personalization of products and services.
- Improve customer engagement through digital platforms.

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- Introduction of Digital Assets and modernization of monetary policy.

The article considered the main aspects of the transition of developed countries to the stage of information modernization. The study reflects the features of the introduction of digital currency, the impact of Digital Rights on the Financial system and monetary policy of different countries, highlights some provisions of the legal regulation of the use of Digital Assets in developed countries of the world.

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Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

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7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

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Tips for writing a good quality Social Science Research Paper

Techniques for writing a good quality homan social science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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ISSN 975587

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