IMAGE: A MAP OF THE STARS OF THE ORION CONSTELLATION

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INTRODUCTION

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Given the impossibility of providing certainty to this scenario, the role of the Law stands out to protect trust in the relationships and operations established in the capital market - an indispensable requirement for its existence and proper functioning. This means that confidence in the market, as well as security over its operations, occurs due to the functioning of its coordination mechanisms, as well as in the performance according to the rules and means of supervision of the competent entities.

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Compliance: Between Theory and Practice. Regulation and Self-Regulation in the Brazilian Capital Market

Adrienny Rúbia de Oliveira Soares[α], Bárbara Simões Narciso[σ], Brenda Dutra Franco[ρ] & Caroline da Rosa Pinheiro[Ω]

I. INTRODUCTION

According to Coleman, "few sectors of the capitalist economy possess such extensive self-regulatory capacity as capital markets"[1]. Contemporaneity has been marked by growing complexity and uncertainty arising from technological development, which has consequently enabled the development of transnational markets, especially the capital market, where risk and return establish a directly proportional relationship (TEIXEIRA FERRAZ, 2012).

Given the impossibility of providing certainty to this scenario, the role of the Law stands out to protect trust in the relationships and operations established in the capital market - an indispensable requirement for its existence and proper functioning. This means that confidence in the market, as well as security over its operations, occurs due to the functioning of its coordination mechanisms, as well as in the performance according to the rules and means of supervision of the competent entities.[2] This highlights the relevance of trust in attracting investors to developing countries in globalized economies.[3]

In this context, market coordination refers to the State's power of supervision in relation to economic activities, since, by express imposition of article 173 of the constitutional text, direct exploitation by the State is only admitted when necessary to the imperatives of national security or to relevant collective interest. Being, therefore, assured the free private initiative, the State reserves for itself the function of exercising the control of the market.

In this sense, this study aims to offer a non-exhaustive overview of the forms of market control - regulation, self-regulation and compliance, in particular - and the relationship between their respective competent entities in the Brazilian capital market, in order to subsidize the understanding of the analysis of the objective parameters determined by - environmental law, consumer law,

[1] COLEMAN, W. D. Keeping the Shotgun Behind the Door: Governing the Securities Industry in Canada, the United Kingdom, and the United States apud MOREIRA, Vital. Auto-Regulação Profissional e Administração Pública. Coimbra: Livraria Almedina, 1997, p. 86.

[2] In fact, for Teubner and Gáscon, the relevance of law is intrinsically related to social and economic processes, as can be seen from the excerpt: [...] For me law has only a supportive role to play and the important things are social and economic learning processes within the corporation that may be supported by legal rules. TEUBNER, Gunther; GASCÓN, Ricardo Valenzuela. Constitutional sociology and corporations [s. l.], 1997. In the same sense, Aragão points out: Thus, for this thinker, it is not the Law but the market that creates its own means of communication, which are protected and applied by the State. The Law, in his opinion, does not give them the content, but only the forms. ARAGÃO, Alexandre Santos. O conceito jurídico de regulação da economia. In: JURUÁ (org.). Revista de Direito Administrativo & Constitucional. no 6ed. Curitiba: [s. n.], p. 59-74, 2001.

[3] For further understanding on the effect of legislative changes in creditor and shareholder protection on attracting investment in transition economies: (PISTOR, K. *et al*). Law and Finance in Transition Economies. Economics of Transition. [s.l.] Vol. 8, p. 324-368

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competition law, sanctioning law, labor law, among others - addressed in the second part of this work for the evaluation of the integrity programs of the companies listed in the Novo Mercado segment.

We discuss the hypothesis that the requirement of integrity programs as a requirement to enter the Novo Mercado segment[4] demonstrates the binding nature of the documents and their use as means of supervision and control exercised by B3, a self-regulatory entity, over the capital market and the referred segment. To this end, the methodology was based on the inductive method from the bibliographic study on the forms of market control, the rules of competence of CVM and B3 on the adoption and development of compliance programs.

Finally, this article presents, in addition to this introduction, 4 sections: Market Control, which in turn comprises the subsections entitled Regulation and CVM, Self-regulation and the Intersections between regulation and self-regulation: the roles of CVM and B3; Novo Mercado and compliance; Integrity programs: binding instruments?; and Conclusive Considerations.

II. MARKET CONTROL

The theme of market control refers to the economic policy applied by a State. In other words, the political and economic choice on how to exercise economic activities generates to a greater or lesser extent the need for control, that is, the elaboration of standards, the practice of supervision and the imposition of sanctions (ARAGÃO, 2001). Considering the current constitutional order and the prevailing economic policy in Brazil, the regulatory scope is essentially to allow the development of the market and, concomitantly, to promote constitutional interests, given the subsidiarity of state intervention (MARQUES NETO, 2011).

The ownership of the controller may change according to the coordination modality employed in the market sector in focus. In the following sections, regulation, self-regulation and compliance will be presented as forms of market control.

2.1. Regulation and CVM

The term "regulation" is often used as a genre, referring to market coordination. However, as a kind of market coordination, the term refers to the control exercised by the State when drafting rules, their application and supervision of the exercise of economic activities by private agents (ARAGÃO, 2001).

In the Brazilian legal system, a general theory of regulation has not been formulated.[5] This is because it is related to the functions assumed by the state - sometimes diametrically opposed: direct interference in the economic sphere and mere supervision of the activity carried out by private

[4] Art. 31 The company must prepare and disclose a code of conduct approved by the board of directors and applicable to all employees and managers that includes, at least: I- the principles and values of the company; II- the objective rules related to the need for compliance and knowledge about the legislation and regulations in force, in particular, the rules for the protection of the company's confidential information, fight against corruption, in addition to the company's policies; III- the duties in relation to civil society, such as socio-environmental responsibility, respect for human rights, and labor relations; IV- the channel that enables the receipt of internal and external complaints, regarding non-compliance with the code, policies, legislation and regulations applicable to the company; V- the identification of the body or area responsible for investigating complaints, as well as the guarantee that they will be anonymized; VI- the protection mechanisms that prevent retaliation against the person who reports an occurrence potentially violating the provisions of the code, policies, legislation and regulations applicable to the company; VII- the applicable sanctions; VIII- the provision of periodic training for employees on the need to comply with the provisions of the code; IX- and the internal bodies responsible for the application of the code. B3 S.A. - BRASIL, BOLSA, BALCÃO. Novo Mercado Regulation. Available at: http://www.b3.com.br/data/files/3A/60/99/CC/038CF610761CABF6AC094EA8/Regulamento%20do%20Novo%20 Mercado%20-% 2003.10.2017%20 (Sancoes%20pecuniarias%2020).pdf Accessed on: 14. Jan. 2021.

[5] In this article, the term "regulation" relates specifically to capital market regulation.

individuals; the provision of public services and market surveillance (SALOMÃO FILHO, 2011). For this reason, it is assumed that the term regulation not only has a broad meaning, allowing for the study of its different conceptions and influences in Brazilian law, but it also represents the due process clause in economic matters (SALOMÃO FILHO, 2015).

According to Cross and Prentice, the Law restricts and regulates while allowing the market to function.

The law represents the rules created and enforced by a nation's governmental authority. The law implies the use of this government authority and power to impose and enforce certain rules. By its nature, this is a constraint on the purely voluntary transactions of a laissez faire market. The legal restrictions placed on the firm are inevitably controversial in a fundamentally capitalist society. (CROSS; PRENTICE, 2007, p. 1)

In order to understand the basis for this restriction of the Law to the purely voluntary market, this section will outline the general notions of the theories of regulation: the Public Interest Theory, the Neoclassical Economic Theory or School and the Institutional Theories.

According to the Public Interest Theory, the purpose of regulation is the realization of the public interest, understood as the interest of the community (MITNICK, 1980). Thus, in an interface with Administrative Law, this theory faces the difficulty of conceptualizing public interest, since, as already indicated, this task is directly related to the functions assumed by the State and the very concept of public service, which vary according to the political and economic context.

The Neoclassical Economic Theory or School, in turn, contradicts the previous theory by stating that the purpose of regulation is the need to correct market failures so that it freely obtains better results. Thus, this theory starts from the notion that the ideal market is one in which agents act rationally in favor of their interests and coordinated by a price system (MEIRELLES, 2010). When there are failures in this system or the need to direct it to objectives accepted by the legal system, regulation is necessary (ARAGÃO, 2001).

Finally, in explaining the relationship between institutions and the development of society, the Institutional Economics Theory defends the existence of a link between the members of institutions embodied in a common interest. In this sense, the institution brings together and subordinates individuals with common interests, who, once voluntarily adhering to the institution, begin to act in accordance with institutional arrangements. Also according to this theory, institutions develop in order to avoid uncertainties and reduce the risks and costs generated by the asymmetry of information between agents. For this reason, it is turned not only to Economics, but also to the study of institutions in other Social Sciences.

From this brief exposition, it is possible to conclude that the main difference between these theories comes from the approach to the relationship between public and private and between government and market. Nevertheless, in this article, regulation is understood as an economic policy option in which the State does not directly exercise economic activity, but holds the competence for its planning and supervision (DIAS, BECUE, 2012).

Thus, regulation comprises two ideas: the establishment and implementation of rules and the restoration of the balanced functioning of a system (MOREIRA, 2008). The justification for this interference is due to the assumption of the existence of market forces, which hinder free market activity and cause risks to the community (DIAS, BECUE, 2012). Calixto Salomão Filho (2011) summarizes regulation as the autonomous institutional guarantee of market correction and balance, with the purpose of conferring material equality to the players.

In this context, to exercise the regulatory role over the capital market, the Brazilian Securities and Exchange Commission (CVM) was created. Similar to the regulatory agencies typical of the common law tradition, the CVM - created by Law No. 6.385/76 - consists of an autarchy linked to the Ministry of Finance, with its own assets and legal personality, endowed with independent administrative authority, absence of hierarchical subordination, fixed mandate, stability of its directors and financial and budgetary autonomy, aimed at regulating the Brazilian capital market. Therefore, within its attributions is the regulation focused on the supervision of publicly-held companies[6] and the achievement of the public interest in the activity of stock exchanges[7] (EIZIRIK *et al*, 2019).

According to the current law, CVM is responsible for (i) the issuance and distribution of securities in the market; (ii) trading and intermediation in the securities market; (iii) trading and intermediation in the derivatives market; (iv) the organization, operation and operations of stock exchanges; (v) the organization, functioning and operations of commodities and futures exchanges; (vi) portfolio management and custody of securities; (vii) auditing of publicly-held companies; and (viii) securities consultant and analyst services. In addition, CVM establishes that its purpose is to ensure the efficient functioning, integrity and development of the capital market, promoting a balance between the initiative of agents and the effective protection of investors.[8][9]

In view of the complexity of the capital market and its constant variations in the economic scenario, in addition to the little flexibility, the regulation exercised by the autarchy is added to the self-regulation exercised by the stock exchanges[10][11] and the coordination of the market itself through competition - this will not be addressed in this article.

Currently in Brazil, the discussion about the CVM's powers and their possible expansion is being debated by Bill nº 2529/2023. The bill is seeking "to give the CVM greater institutional strength to

[6] Art. 8 - It is incumbent upon the Securities Commission to: I - regulate, in compliance with the policy defined by the National Monetary Council, the matters expressly provided for in this Law and in the Corporations Law. BRAZIL. Law No. 6385 of December 7, 1976. Provides for the securities market and creates the Securities and Exchange Commission. Available at: http://www.planalto.gov.br/ccivil_03/leis/L6385compilada.htm. Accessed on: 04 Jan. 2021.

[7] In this article, the use of the expression "stock exchange" considers the physical space and the trading system - normative attributes that make up the economic concept of the term and characterize it as a species of the genus "securities market".

[8] Available at: https://www.gov.br/cvm/pt-br/acesso-a-informacao-cvm/institucional/missao-valores-e-objetivos-estrategicos. Accessed on 04. Jan. 2021.

[9] In order to fulfill its institutional function, CVM is also responsible for supervisory and sanctioning activities. In order to investigate the exercise of these powers, the Center for Studies in Financial and Capital Markets of FGV Direito -SP prepared the report "Beyond the numbers of the CVM: enforcement in the Brazilian capital market" in which it analyzed the quarterly reports released by the autarchy on the subject. Avaiable at: https://5ad2dfdf-fdcf-4d2e- bad8-f0771e6e8846.filesusr.com/ugd/b5264b_32bdb3eef0954eef9cdf7f2a603de720.pdf?index=true. Accessed on: July 02, 2021.

[10] In practice, the development of information technologies has enabled the globalization of financial markets, so that their coordination now goes beyond national borders to also take into account international regulatory aspects: [...] it also denotes a world where regulation is increasingly a hybrid of different systems of control, where statist regulation coevolves with civil regulation, national regulation expands with international and global regulation, private regulation coevolves and expands with public regulation, business regulation coevolves with social regulation, voluntary regulations expand with coercive ones and the market itself is used or mobilised as a regulatory mechanism. LEVI-FAUR, David. Regulatory Capitalism. In: Regulatory Theory: Foundations and applications. Peter Drahos (org.), p. 293, 2017.

[11] The complementarity between market coordination exercised by the public and private entities is not an uncontroversial issue. Lebaron and Rühmkorf point out that self-regulation can weaken public regulation, as shown in the following excerpt: *While it has become commonplace to argue that public and private labour governance mechanisms can be complimentary, and that 'public and private regulatory efforts need to work with and build off on one another' (Locke, 2013, p. 177), our study highlights the possibility that the integration of private governance into public legislation can undermine and weaken effectiveness. There is a need for further study of this phe- nomenon, not only in home state legislation, but in relation to public governance of labour standards more generally*. LEBARON, Genevieve; RÜHMKORF, Andreas. Steering CSR Through Home State Regulation: A Comparison of the Impact of the UK Bribery Act and Modern Slavery Act on Global Supply Chain Governance. Global Policy, [s. l.], v. 8, n. 3, 2017, p. 26.

deal more efficiently with its responsibilities relating to the matter dealt with here and to the capital market in general[12]" and expand its power to carry out investigations, inspections, search and seizure requests to the Judiciary.[13].

2.2. Self-Regulation

Self-regulation, also understood as a type of market coordination, differs essentially from regulation because it is exercised by the market agents themselves. In view of this distinct ownership,[14] it is necessary to address the reasons, advantages and risks of this form of coordination.

Self-regulation encompasses three characteristics (BECUE, DIAS, 2012): (i) the imposition of rules developed by the regulated themselves; (ii) the collectivity of the phenomenon, since it is the result of an organization established for the purpose of self-regulating the group; and (iii) the private character, since it does not derive directly from the State. According to Luciana Pires Dias (2005), the term refers to "[...] the set of self-binding rules that a given group imposes on itself, either spontaneously or by determination of the State". For Calixto Salomão Filho (2011), self-regulation aims to create an environment similar to perfect competition, in order to correct the market.

According to Ferraz (2012), self-regulation and regulation are not confused. This is because:

In reality, regulation and self-regulation are two forms (species) of economic coordination, and this term should be broadly understood as the act of methodically organizing, structuring and ordering the economy, with the aim of keeping it synchronous and harmonious. Thus, self-regulation cannot be a species of regulation, since it is a form of "non-state" coordination, carried out by the economic agents themselves through private professional entities. In other words, self-regulation activity is outside the scope of the State and cannot be a type of regulation (according to the concepts presented in this paper) (TEIXEIRA FERRAZ, 2012, p. 69).

Considering the concept of self-regulation, the role of expertise in the market coordination process is notorious, since the insertion of the regulator in the regulated's praxis tends to lead to higher quality and precision standards, which results in greater legitimacy and adherence and, consequently, greater effectiveness (EIRICK et al, 2019; SUTINEN, KUPERAN, 1999). This characteristic gives greater credibility to self-regulation compared to regulation, since the size, inefficiency and structural complexity of the State can favor political, economic and bureaucratic elites (STIGLER, 1975; MARQUES NETO, 2011).

Moreover, self-regulation processes also tend to be faster, which is an essential element for capital markets. At the same time, the reduction of costs arises from its internalization by the self-regulator,

[12] See: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra?codteor=2284015&filename=PL%202925/2023. Accessed on: Oct. 06, 2023.

[13] The Commission will also be delegated the possibility of modifying minimum participation percentages in order to to legitimize the filing of lawsuits and the approval of transactions aimed at closing liability lawsuits, as well as allowing the use of as well as allowing the use of parameters other than share capital as a reference, taking into account the dynamics of the taking into account the dynamics of the capital market. On the subject, see: arts. 27-G, 27-H, 27-I.

[14] The fact that market agents themselves securitize self-regulation leads to questions about maintaining the unity of the legal system. For Reimer (2016), since the rules that authorize and encourage self-regulation are valid in the legal system itself, there is no need to speak of an exception to the unity of the system. REIMER, Philipp. "L'État, c'est le droit!" - On the Actuality of Hans Kelsen's Theory of the State in the Face of the Metamorphosis of State Power. Cadernos do Programa de Pós-Graduação em Direito - PPGDir./UFRGS, Porto Alegre, v. 11, n. 1, p. 50-79, 2016. On the other hand, according to Marques Neto (2011), the self-regulation of market systems constitutes normative plurality and breaks the vertical structure of the norm, thus shaking Kelsen's pyramid. MARQUES NETO, Floriano de Azevedo. State Regulation and Self-regulation in the Contemporary Economy. Journal of Public Law of Economics, Belo Horizonte, year 9, n. 33, p. 79-94, 2011.

reducing state expenses, the possibility of duplication of standards and the need for supervision, in favor of legitimacy and adherence to standards (DIAS, BECUE, 2012).

In addition to the practical advantages of self-regulation compared to regulation, such a model is also justified by allowing the incorporation of collective interests and democratic guarantees to the coordinating measures of individuals, in addition to enabling the correction of market failures by the sector with the necessary expertise and the pursuit of its legitimate interests (DEFANTI, 2018).

As for its modalities, according to Ferraz (2012), self-regulation can be classified as (i) legally based or (ii) voluntarily based. The first is marked by the delegation by the State of regulatory competence, such as the Stock Exchanges. The second, in turn, is marked by the exclusive initiative of individuals who adhere to the rules imposed by the private regulatory body, such as integrity programs or codes of conduct. In Brazil, it is understood that the two modalities coexist within the scope of B3 and the Novo Mercado segment, as will be discussed in section 3.

The division between regulation and self-regulation, however, raises significant questions about the ability of self-regulatory instruments to actually bind business activity - a topic on which there is still no consensus in the doctrine. According to Ferraz (2012), the binding force is only conferred to the self-regulation of legal basis, because it is imposed or recognized by law, in addition to being applied the legal regime of Public Law. For Otávio Yazbek (2007), the distinct private nature of self-regulation does not imply the horizontality of the relationship between the parties, but a subordination sustained by the typical instrumentality of the relations between private agents. This issue will be addressed in section 3, when integrity programs will be addressed.

Despite the distinctive features presented, regulation and self-regulation also share obstacles, such as the constitution of a regulator; the constant changes in the market; the management of the coordination process; the activities that ensure the inspection and repression of infractions; and the relationship of cooperation between regulatory and self-regulatory agents (DONAGGIO, 2016).

In view of the limits of these forms of market coordination, some measures are necessary to make them more effective, such as supervision by the state regulator, accountability to society and the self-regulator's responsibility for its actions and omissions (DONAGGIO, 2016).

On the other hand, it is possible that self-regulation presents risks of conflict of interest, affecting not only the clear definition of its objectives, but also the rigor of application of the rules. In other words, self-regulation, due to its private nature, may favor the interests of the class that establishes it. Dias and Becue (2012) also point out that it can be a preventive measure against severe state regulation. There is also the risk that self-regulatory standards are strictly imposed with the purpose of eliminating competition, or to cover the self-regulatory entity and the regulated ones with a good reputation before stakeholders (DIAS, 2005). In view of the peculiar reasons that lead to self-regulation, Marques Neto (2011, p. 89) conceptualizes it as the "form of regulation that arises from the interest of the economic actors acting in a given subsystem, seeking the preservation of the conditions of economic exploitation, the closure of this system to new entrants or the annulment or absorption of external interferences, of state origin or not".[15]

[15] Such risks acquire greater proportion in view of the de facto monopoly exercised by B3 in the capital market, despite the absence of legal restrictions on competition and the doctrinal dissonance regarding the deleterious effects of the monopoly. In view of this reality and the relevance of the self-regulatory activity of the capital market for the development of the Brazilian economy, the need for careful state supervision and coordination is undeniable - which is why the research embodied in this work is justified. On the subject, see: PEREIRA FILHO, Celso Roberto; MAFUD, Pedro Darahem. "A New Stock Exchange: who cares". Availableat:http://conteudo.cvm.gov.br/export/sites/cvm/audiencias_publicas/ap_sdm/anexos/2013/sdm0513-manifestacaoPedro-MafudeCelso-Pereira_22-06-2013.pdf. Accessed on: July 02, 2021.

In view of these aspects of self-regulation, we will analyze the architecture of CVM and B3 as regulatory and self-regulatory agents of the capital market, seeking to ensure the independence of self-regulation and the efficient functioning of the market.

2.3 Intersections between regulation and self-regulation: the roles of CVM and B3

As discussed in section 2.1, the CVM, as an autarchy linked to the Ministry of Finance, supervises the administration of the securities market carried out by B3, which is private in nature.[16][17] CVM Instruction 461/2007 makes explicit the distinction between the roles of the regulatory agent and the self-regulatory agent, since, by delegating competence over the discipline of the markets, the autarchy reserves not only its competence to define a minimum normative content, but also to approve rules and require any necessary changes.[18]

B3[19] carries out activities related to the administration and self-regulation of registration, trading, clearing and settlement systems of the securities market. Thus, the stock exchange plays a dual role. This is because it simultaneously enables the maintenance and supervision of operations in the secondary securities market, aimed at fast and secure transactions between investors, and preserves ethical trading standards through regulation and inspection (EIZIRICK et al, 2019).

At the same time, the companies listed on B3 seek to comply with the regulations of the regulator and self-regulator to operate regularly in the capital market. From this angle, as will be discussed in the next section, compliance programs are configured as strategies adopted for company compliance.

[16] Regarding the legal nature of the Stock Exchanges, the considerations of Ary Oswaldo Mattos Filho (1986, p. 12) are relevant for this article, according to which [...] the Stock Exchanges are subordinate to the extent of the power granted by law to the market regulatory authorities, while in the other sectors they behave and govern themselves as civil associations equal to the others. They are distinguished from other civil associations to the extent of their loss of autonomy in view of the power of control created by law and granted to the State; however, such loss of a slice of autonomy does not transform them into exercisers of services delegated by the State. MATTOS FILHO, Ary Oswaldo. A natureza jurídica das atividades das Bolsas de Valores. Revista de Administração de Empresas. Rio de Janeiro, v. 26, n. 1, 1986, p. 12. However, the demutualization of the stock exchanges and their current entrepreneurial nature, exercised in the form of a corporation, should be noted, notwithstanding the public interest in private activity and the consequent state attention.

[17] It is noteworthy that CVM, in the context of an instruction, addressed the problem of the conflict of interests of a private entity as administrator of the securities market, as can be seen from the excerpt: [a] management entity of an organized market must maintain a balance between its own interests and the public interest it must serve, as responsible for the preservation and self-regulation of the markets it manages. BRAZIL. Normative Instruction 461, of October 23, 2007. Disciplines the regulated securities markets and provides for the constitution, organization, operation and extinction of stock exchanges, commodities and futures exchanges and organized over-the-counter markets. Diário Oficial da República Federativa do Brasil, Brasília, DF, 23. Oct. 2007. Available at: http://conteudo.cvm.gov.br/export/sites/cvm/legislacao/instrucoes/anexos/400/inst461consolid.pdf. Accessed on Jan. 16, 2021.

[18] Ibid. Art. 15. It shall be incumbent upon the managing entity to approve rules for the organization and operation of the markets managed by it, covering, at least, the following: I - conditions for admission and permanence as a person authorized to operate in the markets it administers, including in the condition of partner, when required, observing the provisions of Art. 51, paragraph 2; II - procedure for admission, suspension and exclusion of persons authorized to operate in the markets it manages, including as a partner, when required; III - definition of the classes, rights and responsibilities of persons authorized to operate in the markets it manages; IV - definition of the operations allowed in the markets it manages, as well as the structures for monitoring the business carried out; V - conditions for admission to trading and maintenance of the authorization to trade securities on the markets it administers, as well as the hypotheses of suspension and cancellation of the authorization to trade; and VI - creation and operation of the self-regulation department, pursuant to Section II of Chapter IV. Sole Paragraph. The CVM may refuse to approve the rules or require amendments, whenever it deems them insufficient for the proper functioning of the securities market, or contrary to a legal or regulatory provision, observing, as to the requirement for amendments, the procedure described in Chapter VIII.

[19] Merger between BM&FBovespa and Cetip creates B3, 5th largest stock exchange in the world. Available at: https://agenciabrasil.ebc.com.br/economia/noticia/2017-03/fusao-entre-bmfbovespa-e-cetip-cria-b3-5a-maior-bolsa-de-valores-do-mundo. Accessed on 13. Jan. 2021.

Given the concomitance of CVM and B3 in the architecture of capital market control in Brazil, questions arise as to B3's commitment to self-regulation as a public limited company invested in its profit-making purpose. In other words, given that the company is responsible for both the economic function of enabling market negotiations and the coordinating function of the market, the possibility of conflict of interest is evident. For example, there is the cutting of expenses related to the regulatory function, the application of soft penalties and the omission of inspection (EIZIRIK et al, 2019).

In order to avoid the embarrassment of self-regulation and the risk of conflict of interest, CVM launched Public Hearing Notice No. 06/2007 through which it sought to improve the discussion regarding the demutualization of stock exchanges and the consequent possibility of conflict of interest in self-regulation. Considering the manifestations obtained in the referred public hearing, the autarchy dealt with the theme in Instruction no. 461/2007, whose chapter IV (articles 36 to 49), entitled "Self-regulation of the Organized Securities Markets", specifically addresses: i) the functional or structural independence of the self-regulation system; ii) the requirements for the composition of this system; and iii) the relationship between the penalties imposed by CVM and B3. Therefore, we will now address these conditions.

The separation - functional or structural - established by IN 461/2007 in the composition of B3 provided for in articles 36 and 37, has the purpose of ensuring its independence[20] and to preserve the efficient functioning and credibility of the market. The agency, in article 41, imposes the requirement to approve a specific code of conduct for the members of the Board and the Self-Regulation Department, corroborating the independence of self-regulatory structures. In compliance with the requirement, the self-regulatory role within B3 is exercised by BSM's Supervisory Board [21].

Regarding the composition of the Self-Regulation Department, paragraph 1 of article 38 is explicit in prohibiting the participation of members of the Board of Directors and the Executive Board, as well as employees and agents who perform other functions in the company, with the exception of the Director of the Department. That said, it is inferred that there is a shield between those responsible for self-regulation and those who will be supervised.

In addition, it should be noted that there is no possibility of appeal to the CVM against decisions issued by the Self-Regulation Board, which reinforces the independence between the competences of each form of capital market coordination. Nevertheless, article 49 and paragraphs allow the investigated party to request that the penalty imposed on him, or the installment agreed in a term of commitment entered into within the scope of self-regulation, be submitted to the agency as a basis for entering into a term of commitment. CVM is also allowed to reduce, when judging infractions within its competence, the penalties already applied under self-regulation. If the penalty is related to the same facts, the fine provided for in article 11, paragraph 1 of Law 6,385/1976 is limited to the sum of the penalties of the same nature imposed by self-regulation and that applied by the agency. Thus, it is

[20] According to the provisions of ABNT NBR ISO 37301, independence means the absence of any interference or pressure, or both, with the compliance function. In this context, it is essential that investigation processes are conducted without conflict of interest and that the personnel competent for the function have direct access to the governing body.

[21] BSM's Supervisory Board [...]acts in the inspection and supervision of the markets managed by B3, being responsible for inspecting and supervising its participants and the Exchange itself; identifying violations of current legislation and regulations; initiating and conducting disciplinary administrative proceedings; and administering the Loss Reimbursement Mechanism (MRP). PIMENTA, Guilherme. BSM: a court on the stock exchange. JOTA, Brasília, June 26, 2018. Available at: https://www.jota.info/especiais/bsm-um-tribunal-na-bolsa-de-valores-26062018. Accessed on: 14. Jan. 2021.

evident the effort to avoid *bis in idem*[22] and *reformatio in pejus*, in view of the judgment and application of penalties by both CVM and B3.

Having presented the role of CVM as a regulator and the requirements in relation to the self-regulatory entity, we now turn to the self-regulation exercised by B3, specifically with regard to the Novo Mercado segment in the capital market.

III. NEW MARKET AND COMPLIANCE

As a consequence of the self-regulation carried out by B3, to be authorized to access the securities market, the company must comply with the rules of B3's Access Regulation[23],which essentially encompass the organization and the human, financial and technical resources of the applicant, as well as the suitability and professional aptitude of the persons acting on behalf of the company. It is also worth mentioning the agreement to submit to the rules of the self-regulatory agent. After the granting of the access authorization, the listed company becomes the holder of rights and duties before B3. Among the duties, we highlight the compliance with the decisions of the self-regulatory agent, subject to penalties applied by BSM, including suspension and revocation of the access authorization.

When applying for access to the securities market, the company chooses the market segment in which it intends to enter, which differ in terms of legal requirements and corporate governance practices, which gives investors the choice of where to allocate their capital according to the standards that interest them - standards that are higher than those already required by Brazilian law. This system encompasses the market segments called Level 1, Level 2 and Novo Mercado. The latter, of which B3 S.A. itself is a member, consists of the highest level of corporate governance and is based on three pillars, according to Salomão Filho (2011): (i) complete information; (ii) reinforcement of minority shareholders' equity guarantees; and (iii) structural protections (existence of only common shares and conflict resolution through arbitration).

According to Salomão Filho (2015), price is commonly the main element of information transmission to the market. However, the author points to the social efficiency of the product as an appropriate index for demonstrating the commitments and impact of the activity on society. The creation of the Novo Mercado segment, due to the differentiated governance standard, exemplifies the relevance attributed to parameters other than price for investors' decision-making.

In summary,

The basic premise guiding the creation of the Novo Mercado, BOVESPA's special listing segment for companies committed to adopting high standards of corporate governance, was that a reduction in

[22] Similar controversy regarding the competences of the CVM and the Central Bank. It is suggested to read: PIMENTA, Guilherme. CVM: concurrent competence with BC does not hurt the principle of non bis in idem. JOTA, Brasília, March 05, 2018. Available at: https://www.jota.info/justica/cvm-competencia-concorrente-com-bc-nao-fere-principio-do-non-bis-in-idem-05032018#:~:text=Guilherme%20Pimenta&text=O%20colegiado%20da%20Comiss%C3%A3o%20de,do%20non%20bis%20in%20idem. Accessed on: July 2, 2021.

[23] B3's Access Regulation lists the requirements for granting and maintaining access authorization and also explains the possibility of changing the access requirements and conditions and suspension (article 26) or even revocation of authorization (article 11, paragraph 5). Among the requirements set forth in article 11, for the scope of this work, adherence to B3's regulations and submission to the rules and procedures of inspection, supervision and audit by B3 and BSM are highlighted. In addition, according to the regulation, when deciding on granting access, B3 must ensure the control and management of risks, security, integrity and credibility of the trading system, the clearing house, the central depository, the registration system and the loan contracting system managed by B3, in view of its exposure and that of its participants (article 18). B3 S.A. - BRAZIL, STOCK EXCHANGE, OVER-THE-COUNTER. B3's Access Regulation. Available at: file:///C:/Users/Lenovo/Downloads/ Regulamento%20de%20Acesso%20da%20B3_20201207%20(1).pdf. Accessed on 13. Jan. 2021.

investors' perception of risk would positively influence the valuation and liquidity of shares. Specifically, the Exchange considered that the perception of lower risk would occur thanks to additional rights and guarantees granted to shareholders and a reduction in information asymmetry between controllers/managers of companies and market participants [24]

Teixeira Ferraz (2012) systematizes the obligations assumed by companies in the segments mentioned according to the following categories: (i) additional requirements for quarterly information; (ii) additional requirement for the reference form; (iii) annual calendar; (iv) securities trading policy; (v) code of conduct; (vi) duty to inform; (vii) minimum percentage of outstanding shares; (viii) arbitration; (ix) voting limitation; (x) provisions of the bylaws; (xi) contracting the disposal of control of the company; (xii) exclusive issuance of common shares. Level 1 encompasses measures (i) to (viii), while Level 2 adds measures (ix) to (xi) to those obligations. The Novo Mercado segment, in turn, is characterized by adopting all of these measures.

The preparation and disclosure of codes of conduct are among the requirements for entry and permanence in the Novo Mercado segment[25]. These compliance programs refer to the set of procedures adopted by a business company aimed at optimizing compliance with legal rules, regulations and policies established by the organization, in order to guide business management and mitigate risks and responsibilities (ALVES, PINHEIRO, 2017; PARKER, NIELSEN, 2017).

The definition of compliance according to the Administrative Council for Economic Defense is as follows:

Compliance is a set of internal measures to prevent or minimize the risks of violation of laws arising from the activity practiced by an economic agent and any of its partners or employees. Through compliance programs, agents reinforce their commitment to the values and objectives set out therein, primarily with compliance with legislation. This objective is quite ambitious and therefore requires not only the elaboration of a series of procedures, but also (and mainly) a change in corporate culture. The compliance program will have positive results when it succeeds in instilling in employees the importance of doing the right thing. Since these employees may have different motivations and degrees of risk tolerance, the program's role is to dictate common values and objectives, ensuring their permanent observance. Compliance programs can cover several areas related to the activities of economic agents, such as corruption, governance, tax, environmental and competition, among others, independently or aggregated. (BRASIL, 2016, p. 9)

In this sense, integrity programs highlight not only a commitment to compliance with legality, but also seek to provide legal certainty to the company in a true control of the risks inherent in each sector of business activity. In addition, the existence of integrity programs has been recognized as a factor that attests to the seriousness of the economic agent (ALVES; PINHEIRO, 2017) and its commitment to ethical duties (GÓIS, 2016), which translates into a positive valuation by stakeholders and

[24] SANTANA, Maria Helena. The Novo Mercado. In: Novo Mercado and its followers: Case Studies in Corporate Governance Reform. Focus 5. 2006, p. 1. Available at: https://www.ifc.org/wps/wcm/connect/45b36361-1d58- 4c1b-98f1-999c15dd76bd/Novo%2BMercado%2Btext%2Bscreen%2B4-21-08.pdf?MOD=AJPERES&CVID=jtCwuvI. Accessed on: July 02, 2021.

[25] (op. cit.) Art. 1 These regulations govern the activities: I. of B3, as the stock exchange market administrator: a) in verifying that the companies meet the minimum requirements to enter, remain in and leave the Novo Mercado; and b) in supervising the obligations established in these regulations and in applying any sanctions.(...)

Art. 84 The provisions of these regulations do not imply any liability for B3[...].

Art. 85 Admission to the Novo Mercado does not characterize a recommendation of investment in the company by B3 and does not imply the judgment or responsibility of B3 about the quality or veracity of any information disclosed by it, the risks inherent to the activities developed by it, the performance and conduct of its shareholders, members of the board of directors, officers, members of the fiscal council or any committees or advisory bodies to the board of directors referred to in these regulations, employees and agents, or its economic and financial situation.

consequently greater insertion in the market. In addition, it can also indicate to the regulatory agent, or self-regulator in this case, a change in behavior of the regulated agent (DIAS; BECUE, 2012).[26]

In addition to the competitive and business advantage, Law 12.846/2013 (Anti-Corruption Law) also positively values the existence of integrity programs when dosimetry of the penalty. In addition, in relation to the normative imposition, CVM, through Instruction 586/2017, which amended Instruction 480/2009, established the obligation to i) define strategies that consider social and environmental impacts; ii) periodic risk assessment; iii) definition of values and ethical principles and zeal for transparency; and iv) annual review of the corporate governance system. In addition, it is required to maintain an Audit Committee, or equivalent, responsible for risk management and compliance, and the Board of Directors is responsible for ensuring compliance with integrity programs.

In short, the adoption of integrity programs translates into the incorporation of the public interest into business culture and activity and its consequent limitation:

[...] corporate actors have no motivation at all to change toward self-limitation. The natural tendency is expansion of the activities of the corporation, expansion of production, market share, power, profit. On the other side, outsiders, i.e. social movements, public opinion, political actors, possess a lot of motivation for limiting corporate expansionism but there is a lack of competence (TEUBNER, GÁSCON, 1997, p. 8-9).

As an example, the independence of an internal sector to the corporate structure aimed at implementing and monitoring the program, the creation of reporting channels and the instruction of employees are necessary and common measures in the application of integrity programs (OLIVA, SILVA, 2018).

Due to the relevance and complexity of the application of compliance, so that the program materializes and does not constitute a mere tabula rasa, ABNT NBR, in the document ABNT NBR ISO 37301, recommends parameters for action, planning, execution and checking of programs and the culture of compliance according to the nature and risks faced, highlighting the commitment of senior management, the registration of procedures, the monitoring of the measures taken.

The Novo Mercado Regulation, in turn, touches on the structure and content of compliance by establishing the independence of compliance functions in relation to operational activities[27]and the minimum content to be covered by the codes of conduct, including reference to standards for the protection of confidential information and the fight against corruption, duties towards civil society, ombudsman channels and internal competent bodies. [28][29]

[26] Given the breadth of compliance procedures, explicit references to the terms integrity programs or compliance programs are not uncommon. Therefore, an interpretative effort by program operators and control agents is indispensable when identifying the object of compliance.

[27] *(op. cit.) Art. 24 The company must implement compliance, internal controls and corporate risk functions, being prohibited from the accumulation of operational activities.*

[28] See footnote 3.

[29] As an example, an analysis of B3's Compliance and Internal Controls Policy according to the parameters recommended by ABNT NBR ISO 37301 and the Novo Mercado Regulation reveals gaps regarding an essential aspect of compliance: fostering a culture of integrity. In other words, the policy of the self-regulatory body lacks the explanation of the social interests related to the company's activity contemplated by the policy. In addition, it does not mention the existence and operation of ombudsman channels, nor the responsibilities and measures adopted by Senior Management. Nevertheless, the document clarifies the broad scope of compliance, the concepts used and the competencies of the bodies and boards included in the program's actions. It is also noted that this document is integrated by the other policies and the Code of Conduct made available by B3. This, in turn, highlights the public values incorporated by the company, the ombudsman channels and the support of Senior Management. At the end, it expressly establishes the binding nature of the documents analyzed here: In view of the commitments assumed by B3, as already highlighted, we maintain continuous monitoring of possible violations of the Code and other internal policies and rules of B3. Available at: https://ri.b3.com.br/pt-br/governanca-corporativa/estatutos-codigos-e-politicas/. Accessed on: July 02, 2021.

Nevertheless, chapter 11 of the Regulation determines as 'general provisions' "11.1 The listing of the Issuer on B3 or the admission of its securities to trading on the Organized Markets managed by B3 does not characterize an investment recommendation by B3 and does not imply B3's judgment or responsibility regarding the quality or veracity of any information disclosed by the Issuer, the risks inherent in the activities developed by the Issuer, or its economic and financial situation". This provision seems to indicate that B3 does not consider the content of the information present in the compliance programs of listed companies[30].

The binding nature of the document, however, remains a matter of debate, as set out below.

IV. INTEGRITY PROGRAMS: BINDING INSTRUMENTS?

As already discussed, one of the major issues surrounding integrity programs as self-regulatory instruments is their binding nature and consequent enforceability. Ultimately, the binding nature of the integrity program implies the attribution of a legal value to the document through the obligation of its observance and the consequent inspection and sanction in the event of non-compliance.

According to Teubner (2020), codes of conduct have reversed the hierarchy between hard law and soft law[31]. For the author, state rules should be qualified as non-binding and soft law, while private rules embodied in codes of conduct should be qualified as hard law and therefore binding. For Cross and

[30] On January 27, 2020, the members of the EDRESP research group met virtually with the educational sector of B3, after several attempts to contact them. The purpose of the meeting was precisely to understand the agency's position on the use of compliance as an instrument to assist in the control and supervision of Novo Mercado companies. Despite the kindness and cordiality with which the researchers were treated during the meeting of 01/27/2021, many questions were not answered. At the time, the educational professionals asked for the questions to be forwarded by email, pointing out that - probably - the Compliance sector of B3 would respond and/or make contact for a new meeting. However, until the conclusion of this work, there was no return. The questions forwarded to B3 are worth mentioning:

ON B3'S INSTITUTIONAL ROLE

1) How does the body understand its performance in relation to the market? Does B3 perform a public function?; 2) Does B3, as a self-regulatory entity, acting in a monopolistic manner, submit to the Access to Information Law?; 3) On the nature of compliance: for the inclusion and/or permanence of a company in the Novo Mercado segment, does B3 consider compliance as a binding instrument or as a merely declaratory instrument? 4) Does B3 consider that compliance is a parameter to be considered by the body for companies to enter its listing segments? 5) Does B3 consider that compliance is a parameter to be considered by the body for companies to remain in its listing segments? 6) How is the compliance of companies listed on the Novo Mercado evaluated by B3? If B3 does not evaluate the content, we kindly request the presentation of the reasons. If it does, how often?

ON THE USE OF COMPLIANCE AS A YARDSTICK TO BE CONSIDERED BY B3

7) How does B3 understand that it should consider a weak compliance program, fallacious and with the potential to mislead the investing public? 8) Considering that Title II, Chapter I, Section VIII (Supervision and Control), Article 24 of the Novo Mercado Regulation determines that companies must implement compliance functions; Considering that Section X (Company Documents), Article 31, item II determines the preparation of a code of conduct that includes objective rules related to the need for compliance and knowledge about the legislation and regulations in force; Whereas Chapter IV, Section I (Hypotheses of Application of Sanctions), in its article 47, item I determines that B3 is responsible for applying sanctions to the company and its managers and shareholders who fail to comply with the requirements and obligations established in this regulation; Whereas the regulation of the new market is a legal document and determines the basic guidelines for companies to enter this segment and, therefore, follows technical-legal language, which sanctions are applicable: 8.1) to companies that do not present minimum compliance parameters in accordance with technical-legal doctrine and legislation? 8.2) to shareholders and managers who deliberately implement a façade and non-operational compliance program?; 8.3) that allow adequate enforcement of the governance rules provided for companies in the new market?; 9) In the perception of B3, compliance should serve as an enforcement instrument for the Novo Mercado rules? 10) In the perception of B3, as a self-regulatory entity, should the compliance of the companies in the new market have, among its parameters, an investigative and sanctioning procedure? 11) What is the agency's interpretation of the sole paragraph of art. 31 of the Novo Mercado Regulation that establishes as optional and not mandatory the binding of third parties, such as suppliers and service providers, to the company's code of conduct?

[31] The understanding of Philipp Reimer (op. cit, p. 56) is adopted here, according to which hard law is the positivized legal norm and soft law, "proclaimed or agreed texts through which their authors explicitly do not intend to establish legal norms."

Prentice (2007), in countries where regulation is inept, integrity programs often embody stricter standards than those required by the regulator in order to attract investors[32]. In this perspective, corroborating the hypothesis of this article, it is the private actors who decide on the elaboration, content and application of codes of conduct, so the freedom to institute such a document implies its mandatory observance, since they deal with matters of public relevance, such as consumer, labor and environmental obligations.

On the other hand, as a rival hypothesis, the argument for non-bindingness consists of the freedom of internal organization of companies through codes of conduct, which aim not to submit their internal rules to judicial control. Acting in contradiction to the provisions of the codes of conduct can also be legally qualified as *venire contra factum proprium*, since the disclosure of these documents as internal rules to the company and the argument that they are mere statements about the company's intentions are contradictory.

The content of public relevance addressed by the codes of conduct, among which are consumer, labor and environmental obligations, is also noteworthy. For this reason, it is understood that the value of codes of conduct is not restricted to corporate governance[33] (PINHEIRO, 2017), i.e. internal rules aimed only at the management of internal conflicts, because

[...] codes of conduct serve to pursue public interest objectives, bringing the economy back to society. This happens, however, not through external state intervention, but through re-entry: the internalization of social demands in business decisions (TEUBNER, 2020, p. 11).

In addition to the subject matter and function of codes of conduct, the language used and the publicity given to the code are also factors that influence the delimitation of its binding nature or not. Regarding language, the more specific it is, with the description of conduct and sanctions, for example, the greater the chance that the code will be considered, in court, a binding contractual instrument (REVAK, 2012). On the other hand, the use of generic expressions and the lack of concrete hypotheses of incidence and legal consequences lead to the conclusion that the code of conduct would be non-binding, as it would only describe guidelines to the company and its stakeholders.

Regarding publicity, the disclosure and distribution of the document, especially to employees, indicates the company's intention to bind the recipients of the document to its provisions. Understanding codes of conduct as voluntary documents, imposed by the companies themselves and also coordinated by themselves, it would be possible to conclude that there is no state supervision.

From the perspective of competence, it should be noted that the self-regulatory entity requires the preparation and disclosure of integrity programs as a condition for entry into the Novo Mercado segment. In other words, only those companies that comply with the obligation in question are authorized to operate in the capital market in this segment. Therefore, for the integrity program to be a condition for access, it is logical to infer that it is given a legal value, as it would be inconsistent to require a document in which obligations are assumed in a non-binding manner. In addition, B3, when making an admissibility judgment for admission to the Novo Mercado, ratifies compliance with the

[32] In the view of Cross and Prentice (op. cit., p. 53) the profit-making vocation of companies can lead to the unnecessary regulation: *The existence of voluntary private disclosures, thus, would be considered evidence that the law is unnecessary and possibly inefficient. Private companies will go beyond legal requirements in dis- closing in order to attract capital, and they would presumably do so at the optimal level without making unnecessary disclosures, which inevitably add cost for the company.*

[33] On the relationship between governance and compliance, see: FRAZÃO, Ana. Governança corporativa e compliance como mecanismos para a superação da shareholder theory. JOTA, [s.l.] 02 de outubro de 2019. Available at: https://www.jota.info/opiniao-e-analise/colunas/constituicao-empresa-e-mercado/governanca-corporativa-e-compliance-como-mecanismos-para-a-superacao-da-shareholder-theory-02102019. Accessed on: July 02, 2021.

relevant requirements, attributing legitimacy to the information provided. Thus, in view of the interest in uniformity and the trust of stakeholders[34], pressupõe-se a vinculatividade dos programas de integridade admitidos.[35]

In view of the arguments surrounding the binding nature of integrity programs, it is possible to conclude that the effectiveness of the programs is not limited to enforcement, but essentially requires the institutionalization of the interests contemplated by the program, in addition to admitting monitoring by interested organizations:

It is the internalization of public interests – societal interests but also interests of different social actors – within the profit-maximizing corporation. We talk about workers' participation and the involvement of other stakeholders. An important element is institutionalization of certain departments within the firm that are responsible for the ecology, for labor, or for compliance, or for the public interest of course, the "codes of conduct". This is an important institutionalization. And here again we have this ambivalence code of conduct that can be just a pure window dressing without any effect whatsoever on the behavior of the firm. Just selling them as green or something. So again, the role of outside pressure is so important, so monitoring of codes of conduct by the NGO or a public interest litigation before that state's courts in order to check whether those codes of conduct are realized or not. This is an important thing to institutionalize self-limitative structure in the firm (TEUBNER, GÁSCON, 1997, p. 10).

V. CONCLUSIONS

The Brazilian economic order restricts direct state action to specific hypotheses, relegating economic activity to private actors and reserving its coordination. The relevance of the capital market for national economic development is undeniable and a prerequisite for the study undertaken in this work. In this sense, this chapter set out to ascertain whether the theoretical and normative framework related to the control of the capital market would point to the binding nature and consequent enforceability of the integrity programs of the companies listed in the Novo Mercado segment. To this end, it inductively analyzed the solid bibliography on the themes of regulation, self-regulation and compliance and the normative instruments related to the research object: CVM Normative Instruction 461/2007, Normative Instruction 480/2009, B3 Access Regulation and the Novo Mercado Regulation.

In addition, the broad concept of regulation was adopted, considering the intrinsic relationship with the economic policy adopted. As for self-regulation, the reasons and risks pertinent to this type of control were presented. Entering the field of self-regulation, the definition of compliance was outlined, the parameters for its implementation according to ABNT NBR ISO 37301, its requirement and minimum requirements in the Novo Mercado and the problem regarding the binding nature of

[34] Cross e Prentice (*op. cit.*, p. 66) highlight investor confidence as a commodity in the market: Uniform legal requirements, such as those of mandatory disclosure, can serve to enhance affective trust. Such legalization can transform trust into a "commodity"that serves as an "entity that is familiar and subject to pres- sure to conform to established standards" and serves as a "dependable anchor for easier and more trusting relationships as trust becomes routinely and predictably available, formalized, and standardized."74 Once the nature of the disclosures and the government enforcement system become regularized, investors need not expend the time, effort, and resources to fully understand the scope of the disclosures and their remedies for oppor- tunism, thus substantially reducing the transaction costs of individualized investments.

[35] *[...] considering the impact that they have on the confidence of the regulated - sometimes it is enough that a "manual of good practices" has the regulator's logo to be internally perceived by the regulated as quasi-law - and also considering the interest in uniformity and omission of conflicts of guidelines, their creation presupposes, as seen above, an express legal permission.* LOPES, Pedro Moniz. Fontes de direito regulatório: da "hard law" à (alegada) "soft law". In: GOMES, CARLA AMADO. PEDRO, RICARDO. SARAIVA, RUTE. MAÇÃS, Fernanda. (org.). Garantia de direitos e regulação: perspectivas de Direito Administrativo**.** Lisboa: AAFDL EDITORA, p. 316, 2020.

the instrument.From such analysis, it is concluded that the compliance program is inserted in the context of market coordination and is referred to as an instrument of integrity by the coordinating entities.

In addition, the regulatory framework not only highlights the existence of market surveillance and control structures, but also the maintenance of access and listing requirements as conditions for permanence, suggesting continuous control over the integrity program in the Novo Mercado. In addition, given the purpose of encouraging investors by offering a segment with a higher standard of corporate governance, the non-binding nature of the required practices would be a fallacy, since the justification of the segment and the requirement of integrity programs implies the analysis of their content and quality. In other words, the objective of protecting investors and other stakeholders would be undermined if the binding nature of integrity programs were neglected.

Thus, the hypothesis tends to be confirmed. Thus, it is understood that the requirement of integrity programs for listing in the Novo Mercado segment leads to two basic implications: i) the commitment of companies to be bound by the rules established by it; ii) the duty of inspection and sanction of the self-regulation regarding compliance with the rules stipulated in the compliance program.

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Keywords: phygital environments, smart stores, emotional customer experience, ECX.

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I. INTRODUCTION

Innovative smart retail technologies enable brick-and-mortar retailers to differentiate themselves from online providers through new customer experiences. These so-called "phygital" (physical + digital) providers, which offer customers a physical environment with digital elements and vice versa, enable customers to shop more efficiently and conveniently (Fauser et al., 2023). While traditional retail stores have functional aspects, their prices, the environment of the store or interactions with employees represent the main benefits for the customer; phygital concepts create novel benefits for customers in the retail sector, such as time saving or seamless and personalized shopping experiences (Chang et al., 2023).

This trend results in concepts such as smart stores, which embrace this phenomenon and use smart technologies to save customers from waiting in queues, while also obtaining behavioral data and customer purchase histories (Denuwara, Maijala, and Hakovirta, 2021). Amazon Go is considered a pioneer in the field, having opened the first smart store in Seattle, Washington in 2016. This store is based on the "just-walk-out" concept and allows customers to make their purchases and leave the store without interacting with a cashier or scanning the selected products (Suk et al., 2022). This process is enabled by artificial Intelligence, which is anchored in the store and uses various sensors and cameras to track the customer's movements throughout. The customer then receives an invoice via their previously registered Amazon account and automatically pays for the products, completely digitally (Grewal, Roggeveen, and Nordfält, 2017).

Functionality is often given the highest priority, but emotions play an extremely important role in new phygital environments when it comes to increasing customer satisfaction and loyalty. As a result, everyday experiences can become special and touch the customer emotionally (Chang et al., 2023). There are scant studies that deal with the perceived emotions in such a phygital environment. Surprise, joy, and enthusiasm are emotions that can occur in the customer, especially during initial contact with these novel concepts. However, the study of negative emotions during the phygital customer experience has been neglected. Technology bugs, long loading times, mediocre images, pixelated augmented reality and weak Wi-Fi signals are examples that can evoke negative emotions (Batat, 2022). Accordingly, the different emotions experienced during a phygital customer experience require additional study to avoid negative emotions, enhance positive ones, and determine the appropriate context for smart retail. Further, a better understanding of the emotional triggers and the resulting customer behaviors is needed to optimally design phygital customer experiences.

1.1 Objective

This study investigated the emotional customer experience (ECX) in a phygital environment. It examined emotions that occur in customers through the experience in a smart store. Specifically, the study assessed the triggers underlying these emotions and the resulting customer behavior. This study assessed these issues with a review of the literature, customer reviews, which were examined for emotions, triggers, and behaviors using a nethnographic analysis. The following research questions emerged: What impact do innovative smart retail technologies in novel phygital concepts such as Amazon Go, have on the ECX? Which smart store-related emotional triggers cause specific emotions in the customer? Which emotions caused by smart store-related triggers are perceived and which customer behaviors result from it?

II. BACKGROUND

The following sections provide relevant terms and theoretical background derived from the relevant literature; this overview provides the rationale for the design and implications of the current study.

2.1 Customer journey

As emotions can occur throughout the entire journey, the customer journey concept was determined as an important theoretical concept. New technologies and phygital concepts continue to influence and change the customer's journey by creating new touchpoints (Roe et al., 2022).

The existing literature includes various definitions and terms from "customer journey", "consumer journey" or "customer decision journey". Based on Towers and Towers (2021), the term "customer journey" was used due to the greatest frequency of the expression in relevant literature. This customer process illustrates the connection between the customer journey and the customer experience as it represents the totality of all stages. It depicts the different customer experiences (previous, current, and future) with the respective stages (pre-purchase, purchase and post-purchase), as well as the corresponding touchpoints and resulting behavior (Lemon and Verhoef, 2016).

Thus, the concept indicates that a single customer experience consists of three stages. In each stage, the customer interacts with the company, resulting in certain behaviors, such as the search for information in the pre-purchase stage, the actual purchase process, and the use of the product in the post-purchase stage. Current experiences, together with previous experiences, form customer feedback, whereby experiences are examined and evaluated to determine whether future contacts with the company will take place. If this feedback is deemed negative, the customer may switch companies. Positive experiences increase the likelihood of future contacts, eWOM, and future experiences with the

company (Harrington, et al., 2019). A totality of these customer experiences forms the customer journey; it should be noted additional behaviors such as choosing alternatives (pre-purchase), contacting the company (purchase) and reflection (post-purchase) may be part of this journey (Dellaert, 2019).

While the traditional customer journey model appears to assume a relatively linear process, additional phases or stages are often described in the literature, such as (1) search, (2) purchase, (3) experience, and (4) reflection (Dellaert, 2019), as well as the division of the decision-making process into awareness, consideration, evaluation, and action (Farah and Ramadan, 2017). However, these subdivisions of the various phases appear to differ primarily in terminology. In this context, touchpoints are described as all direct and indirect firm-customer interactions throughout the customer journey (Boyd, Kannan, and Slotegraaf, 2019) and divided into brand-owned, partner-owned, customer-owned, and social/external/independent (Lemon and Verhoef, 2016). These interactions can be directly influenced by the company (e.g., brand-owned, and partner-owned) or indirectly by the company (e.g., customer-owned, and social/external/independent). These touchpoints can take place in a physical/offline, a digital/online, or a phygital environment. For companies, it is critical to understand the key touchpoints to optimize them.

2.2 Evolution and definition of customer experience

While diverse customer experiences form the totality of the customer journey, the evolution of this process was elucidated due to studies of the construct for several decades in marketing, retailing and service management (Lemon and Verhoef, 2016). A unique or positively designed customer experience is of enormous importance for companies, influencing differentiation and other positive effects such as satisfaction and loyalty, positive word-of-mouth, more frequent visits or higher profits (Bagdare and Jain, 2013). Conversely, a negatively designed customer experience can lead to company switching, negative word-of-mouth or consumer complaints (Harrington, et al., 2019).

Pine and Gilmore (1998, p. 97) described the experience as the "fourth economic offering" above commodities, goods, and services. Experiences are perceived individually by the customer, which creates a higher degree of differentiation. In addition, it adds an emotional, spiritual, and intellectual level to the experience. This experiential marketing perspective described the customer as a rational as well as emotional buyer. Schmitt (1999) defined a multidimensional approach, which included the five experience types: sensory, affective, creative cognitive, physical, and social-identity to define the customer experience. Brakus et al. (2009) described the four dimensions as sensory, affective, intellectual, and behavioral, whereas, Bagdare and Jain (2013) described emotional dimensions as joy, mood, leisure, and distinctive.

Thus, various scholars and practitioners have established definitions, and many include cognitive, emotional, behavioral, sensory, and social components (Brakus, Schmitt, and Zarantonello, 2009). The *cognitive dimension* deals with cognitive processes that are intended to evoke creative and problem-solving experiences in the customer (Brun et al., 2017). Companies create this by surprising, intriguing, and provoking the customer (Schmitt, 1999). Perception through the senses (sight, sound, touch, taste, and smell) form the *sensory dimension*. Stimulation of these senses is sought by companies to encourage buying behaviors (Schmitt, 1999; Hermes and Riedl, 2021). The *behavioral dimension* aims to show the customer different behaviors, lifestyles or habits that can be adopted. These are intended to show the customer alternative solutions and enrich the experience (Schmitt, 1999; Brun et al., 2017). Social interactions with other individuals, such as customers, employees, or friends and relatives, constitute the *social dimension* of customer experience (Brun et al., 2017). This concept is tied to the concept of co-creation with staff-consumer interactions as well as co-creating retail innovations (Roberts and Darler, 2017). These interactions strengthen customers' social behavior,

create a sense of belonging, and sustain or perpetuate links between companies and consumers (Nasermoadeli, et al., 2013). The *emotional dimension* (referred to as the affective dimension) (e.g., Schmitt, 1999; Brun et al. 2017) describes the emotions experienced by the customer throughout the customer journey, their triggers, and the resulting customer behaviors.

Accordingly, a holistic conceptualization of the customer experience can be defined as a multidimensional construct that focuses on a customer's cognitive, emotional, behavioral, sensory, and social responses to a company's offerings throughout the customer journey (Lemon and Verhoef, 2016). This includes both direct and indirect interactions with the company, its products, services, or individual parts of the organization and applies to service and product providers (Wu and Gao, 2019). The framework conditions of the customer experience should also include items such as the existing technology that the customer uses (McCarthy and Wright, 2004) as these technologies influence and transform the individual dimensions of the customer experience, implementing new touchpoints and re-configuring existing ones (Roe et al., 2022).

2.3 Emotional customer experience (ECX)

The emotional customer experience (ECX) is eminently important as a part of the overall experience with a significant influence on performance indicators such as satisfaction, loyalty intentions or willingness to buy (e.g., Bustamante and Rubio, 2017; Ou and Verhoef, 2017). These emotions can be directly evoked during the customer journey through stimuli in both direct and indirect ways. As a result, the experience can be positively influenced by positive emotions but can also be negatively influenced by negative emotions. According to Lemon and Verhoef (2016), the "ECX" is one of the five dimensions of the general experience sometimes referred to as the affective dimension. The different definitions of the customer experience use different terms such as "emotion", "mood" or "affect" to define the dimensions of the customer experience (Johnson and Stewart, 2005). According to Bustamante and Rubio (2017), slightly positive or negative moods become more intense positive or negative emotions. Scholars define customer emotions as a mental state related to a specific reference point such as an object, event, or person. Moreover, these emotions are experienced in relation to situations or goals, which has an impact on the person's well-being or personal goals (Johnson and Stewart, 2005). In the customer experience, Lemon and Verhoef (2016) divided the touchpoints by type (brand-owned, partner-owned, customer-owned, and social/external/independent) with only a certain number of touchpoints that can be influenced directly or indirectly by the company. Emotions are often experienced in the short term and therefore frequently take place at the point of sale. They are perceived individually, situationally, and culturally dependent. Hence, targeted stimuli from companies also have different effects on different customers (Ou and Verhoef, 2017). The ECX is a holistic construct that encompasses positive and negative as well as ambivalent, mixed, and neutral emotions.

Emotions influence the information processing of customers, their well-being, and affect customer behavior (Gaur, Herjanto, and Makkar, 2014). Positive emotions such as happiness, joy and enthusiasm are loyalty drivers and lead to loyalty intentions in customers (Ou and Verhoef, 2017). They have a direct effect on the customer and on their intention to buy the company's product/service again. According to Iglesias et al. (2011), the affective/emotional dimension has the greatest impact on loyalty behavior, should be a high priority, and determines the affective commitment between brand and customer that triggers true brand loyalty.

2.3.1 Emotion classification

In the marketing and consumption context, three primary typologies of emotions have emerged. Izard (1977) described ten fundamental emotions (Anger, Contempt, Disgust, Distress, Fear, Guilt, Interest, Joy, Shame and Surprise) tied to Differential Emotions Theory. Plutchik (1980) suggested eight basic

emotions consisting of acceptance, anger, anticipation, disgust, fear, joy, sadness, and surprise. Russell and Mehrabian (1974) assumed three independent and bipolar dimensions: pleasure-displeasure, arousal-nonarousal, and dominance-submissiveness.

Building on these foundations, emotion classifications were adapted and modified for various industries. As a result, emotion sets for retail and grocery shopping have been established (Laros and Steenkamp, 2005; Richins, 1997; Suk et al., 2022; Wu and Gao, 2019) All emotions mentioned, as well as emotional phrases, appear likely to play a role when considering the ECX in phygital environments. The structure or hierarchy of the listed emotions is as follows: Superordinate level of emotions (in bold), including positive and negative emotions. Next are the basic emotions (in italics) and the subordinate levels with specific emotions/phrases (i.e., Laros and Steenkamp, 2005).

Positive/Pleasant Emotions: Contentment/contented, fulfilled, satisfied, pleased, cool*; *Excitement/excited*, eager, thrilled, enthusiastic, awesome*, fascinating*; *Gratitude/grateful*, appreciated; *Happiness/optimistic*, happy, proud, relieved, thrilled, funny*; *Joy*, joyful, delighted, cheerful; *Love/loving*, sentimental, warm-hearted; *Optimism/optimistic*, encouraged, hopeful, anticipated; *Peacefulness/calm*, peaceful, relaxed, relieved; *Surprise/surprised*, amazed/amazing*, astonished.

Negative/Unpleasant Emotions: Anger/angry, annoyed, contempt, frustrated, irritated, hostility; *Discontent/unfulfilled*, displease/displeased, unhappy, disgusted, dissatisfied; *Disappointment/ disappointed*, upset; *Envy/envious*, jealous; *Fear/scared*, afraid, panicky; *Loneliness/lonely*, homesick; *Sadness/depressed*, sad, miserable, distressed, helpless, nostalgia; *Shame/embarrassed*, humiliated, guilty, embarrassed, ashamed; *Worry/nervous*, worried, tense; Bad*, hateful*, concerned*, threatful*, tired*

*Note: * Represent emotional phrases that describe the customer's feelings, affect, perception or attitude.*

2.4 Phygitalization

New technologies and the resulting concepts create novel experiences, change existing touchpoints or create new ones. Due to ever-evolving digital technologies, the term "phygital" (physical + digital) has emerged over the last few years (Johnson and Barlow, 2021). It corresponds to an environment where a novel consumption experience is brought together from digital and physical elements (Batat, 2022). According to Ballina, Valdes, and Del Valle (2019), phygital is a symbiosis of physical and virtual space. Phygital allows the customer to interact simultaneously on- and offline, leveraging the strengths of both worlds (Banik, 2021) and generate a more holistic experience (Mikheev et al., 2021). This enables switching between physical and digital settings throughout the customer journey (Batat, 2022).

Well-known approaches that integrate phygital elements in retail are contactless payment systems, interactive touchscreens (Johnson and Barlow, 2021), digital concierge services (Batat, 2022), intelligent shopping carts, self-checkout systems, or augmented reality (Chang et al., 2023). These innovative technologies help companies enhance shopping and customer experiences, while improving business processes to reduce operational costs and increase revenue. In doing so, retailers can differentiate themselves from online suppliers and provide customers with new experiences. Johnson and Barlow (2021) separated phygital concepts into two ideal types, called *automated sensing technologies* and *simulated in-person experiences*. *Automated sensing technologies*, automate diverse processes of customers in physical environments, using digital sensory technologies (e.g., smart stores, such as Amazon Go). Here, the customer can complete their purchase without a traditional cashier or self-checkout, by downloading an app and creating an account to enter, select and exit the store with

their chosen products (Suk et al., 2022). Disruptive payment processes or long waits are primary sources of customer dissatisfaction in retail and are eliminated using digital sensing technologies and artificial intelligence (Johnson and Barlow, 2021). Augmented and virtual reality technologies import digital elements into the physical world and vice versa to create *simulated in-person experiences*. One example is trying on clothes via augmented and virtual reality technologies, which can take place from the customer's home. This can also refer to other products that are visually displayed; these new phenomena provide innovative customer experiences and modify the customer journey and experience.

2.4.1 Impact on the customer journey and experience

The phygital concept has an impact on the customer journey, the experience, and influences the individual perceptions of the experience, including the emotional dimension. Recent published studies have examined the basics of phygital and provide insights into its impact on existing customer journey approaches (e.g., Ngarmwongnoi et al., 2020; Mele et al., 2021).

Mele et al. (2021) considered the customer journey and experience in phygital concepts with respect to younger consumers. In this context, the emotional, behavioral, and social responses were considered particularly influential during the phygital experience. By switching between online and offline interactions, the boundaries between the physical and digital worlds become increasingly blurred (Mele et al., 2021). This process is leading to an evolution of the customer journey from a linear process to a very dynamic, fuzzy loop (Ngarmwongnoi et al., 2020). The customer journey becomes a dynamic process consisting of the following elements: connect, explore, buy, and use. This leads to an overlap of different touchpoints, replacing the formerly linear process. Innovative technologies and new concepts change how customers search for products or companies, how they select alternatives, use products, or how they carry out the payment process (Hoyer et al., 2020). As a result, emerging technologies create extended value for the customer through these emerging and reconfigured touchpoints. Mele et al. (2021) described the phygital construct as “phenomenological microworlds of events, interactions, relationships, and emotions”, which significantly influences customers' emotions and behaviors (p. 429). Batat (2022) extended this concept, suggesting a “holistic ecosystem and integrative framework” and summarized the phygital customer experience framework where customers move back and forth between physical and digital interactions (Batat, 2022, p. 11). In summary, driving forces, connectors, and pillars ensure that the tangible and intangible needs of customers can be better satisfied. Tangible needs describe the quality, price or functionality of the product or service, while intangibles are reflected by emotional needs.

Thus, the growing influence of phygital on the customer journey can be described as powerful. New technologies are creating new touchpoints by combining physical and digital dimensions. By switching between these dimensions, an extremely dynamic loop is created, which impacts the emotional and social experiences of customers. Emotions play a special role here, as they are particularly impacted by novelty.

2.4.2 Smart stores and Amazon Go

“Phygital” smart stores have emerged, using artificial intelligence (AI), big data, and the Internet of Things to create novel customer experiences (Suk et al., 2022). Smart retail describes an intelligent retail system with connectivity between smart technologies and humans in a physical store. In the front-end, this technology is used to redefine the customer experience through intelligent application shelves or smart hardware, such as interactive changing rooms (Roy et al., 2018). On the back-end, these technologies are used to mine customer data, capture behavioral data and purchase histories (Wu and Cheng, 2018; Denuwara, Maijala and Hakovirta, 2021). Examples for smart retail stores include Amazon Go, SmartMart, Metro Group Future store, Boekhandels Groep Nederland (BGN) (Chang et

al., 2023), and Lidl shop box (Fauser et al., 2023). Based on the recent reports, "the global smart retail market size was valued at USD 30.25 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 29.1% from 2023 to 2030" (Grand view research, 2023). According to Fan, Ning, and Deng (2020), smart retail stores can be defined as brick-and-mortar stores that use smart retail technologies to provide customers with a personalized, immersive, and interactive shopping experience (Chang et al., 2023). Smart retailing offers a sense of flexibility that traditional retail does not (Roy et al., 2018). For retailers, this offers the advantages of monitoring, controlling, optimization, and autonomy. For customers, this results in advantages such as time savings or greater flexibility.

Amazon Go is one of the first smart stores with their pilot project in Seattle, Washington in 2016. This smart store is based on the "just-walk-out" concept and operates with smart retail technology based on artificial intelligence (Suk et al., 2022). The smart technologies needed include: an app with location-based services, QR code IDs, integrated payment, image recognition, multiple sensors, artificial intelligence, machine learning, and one-click similarity to web shopping (Gregorczuk, 2022). The primary added value of Amazon Go is accessibility and time efficiency by eliminating tedious processes such as queuing or paying at a traditional staffed checkout (Suk et al., 2022). Customers need a smartphone with the installed Amazon Go application to enter the store with a QR Code. Computer vision, sensor fusion, and deep learning technologies automatically register when products are taken off the shelves or put back from the customer. Special algorithms ensure that products such as food and beverage cannot disappear and are assigned to a specific visitor at any time (Türegün, 2019). All selected products are simultaneously collected in a virtual shopping cart and debited from the stored Amazon account of the customer, when leaving the store (Grewal, et al., 2017). The customer leaves the store without any cashier-related interactions, resulting in no lines, no waiting, and no checkouts (Polacco and Backes, 2018). Shortly after leaving, the customer receives a notification via email or directly within the Amazon Go app, which contains all purchased items.

2.5 Emotion sources and customer behavior

Even with routine grocery shopping, emotions that occur during this customer journey can influence purchasing behavior and loyalty. While the ECX in service offerings is often influenced by the staff interactions or the physical environment, the factors influencing the affective level of customers in a grocery shop are different (Wu and Gao, 2019). These sources of emotion have been called emotional triggers; novel smart retail technologies can be seen as triggers. The novelty of these technologies can create positive emotions such as surprise, joy, or enthusiasm, while technological failures such as bugs, long loading times or weak Wi-Fi signals can create negative emotions (Batat, 2022).

Emotional triggers appear to be different in phygital concepts. Technologies in general appear to influence the individual dimensions of the customer experience and thus the emotional one (McCarthy and Wright, 2004). Due to a "lack of interpersonal communication in smart retail", human-machine interactions are increasingly taking place and can be seen as an emotional trigger (Fan, et al., 2020, p. 879). Fan, et al. considered self-service (based on innovative technologies) as a trigger for an ECX as it shortens the time customers spend in the shop, eliminates the need for the entire transaction process, and reduces mental stress for customers. Suk et al. (2022) described self-service as a smart store attribute that can be seen as an emotion trigger. This includes seamless service, capture, and no cash acceptance. In this context, the functionality that includes QR code scan, camera sensors or the app needed to enter the smart store are also mentioned as a dimension. Frictionless payment, checkout or staff replacement are summarized in the dimension "No Humanity" and similar to the human-machine interactions mentioned above. Shoplifting, data protection, facial recognition and ceiling monitor are combined as attributes in the "Privacy risk" dimension (Suk et al., 2022). When investigating the ECX

in smart stores, emotional triggers must be assessed to be able to concretely assign perceived emotions and evaluate them.

2.5.1 Customer behaviors

Earlier studies have analyzed the impact of ECX on customer behavior and found significant effects. In general, positive emotions lead to prosocial behaviors such as cooperation, helping and altruism (Bagozzi et al., 1999). Negative emotions lead to switching, avoidance, withdrawal, and destructive behaviors in customers (De Hooge, 2017). Customers who experience positive emotions during the customer journey tend to recommend the product/service or company to others and revisit intentions. Conversely, negative emotions can lead to complaints as well as a stronger memory of these negative emotions (particularly, if tied to core experience attributes) (Kim and Jang, 2016). While satisfaction, purchase behavior and loyalty are frequently studied, simple repurchasing is not considered as loyalty. Customer satisfaction is often seen as a precursor to loyalty intentions and is significantly influenced by the emotions that occur during the customer journey (Tsaur, Chiu, and Wang, 2006).

These relationships appear across many sectors with similar results. In phygital concepts, the literature does not provide sufficient detailed research concerning customer behavior. While in traditional retail, re-shopping or positive word-of-mouth are positive behaviors, in novel concepts behaviors can be the context specific as levers for eWOM, blogging or sharing creative images (Wu and Gao, 2019). To close this gap, the consideration of customer behavior in phygital concepts such as smart stores is essential to determine possible deviations from traditional retail concepts.

III. METHODOLOGY

This study applied an ethnographic approach; this form of research focuses on researching online cultures and communities (Kozinets, 2010). This approach examined online customer reviews to retrospectively examine the ECXs with Amazon Go.

Online review platforms such as TripAdvisor and Yelp provide a narrative and detailed description of the customer's store experience. These websites offer customers the opportunity to comment, share travel ideas/pictures and give reviews on businesses and destinations (Berezina et al., 2016). This process allows researchers to interpret customer emotions, their triggers, and any resulting behaviors, which are given in a natural setting (Kozinets, 2010; Wu and Gao, 2019). Moreover, review platforms provide an opportunity for alignment and adaptation with retail and grocery shopping (Yu, Li, and Jai, 2017; Wu and Gao, 2019). TripAdvisor and Yelp were selected for their relevance and their unique level of access and information; TripAdvisor is the largest virtual travel community and Yelp is the largest online community for small, local businesses (Xiang et al., 2017).

The study focused on the Amazon Go pilot project in Seattle, Washington, due to its opening date (2016) and the highest number of reviews (n=374) on TripAdvisor and Yelp. To ensure the most up-to-date information, reviews between 2016 and 2023 were analyzed. These reviews were aggregated with four additional elements. These four elements included the star rating, rating date, number of reviews posted and gender of the reviewer (if specified). Reviews without a detailed description of the experience and reviews that were written months after the actual experience were excluded, as these reduce the accuracy of the description (Lee, Law, and Murphy, 2011). Very neutral reviews without emotional phrases or perceived emotions were removed, as they did not represent the ECX in this study. After these limitations, 80.21% of the reviews (300/374 reviews) remained.

3.1 Data analyses

Using the integrated retail emotion set provided earlier (based on previous studies), concrete emotions and emotional phrases were used to examine customer reviews on the experience. This process considered emotions perceived by the customer during the experience, resulting emotional triggers, and customer behaviors (Wu and Gao, 2019).

Based on earlier studies (Fan, et al., 2020; Suk et al., 2022) and the data examined, the emotions triggered by the smart store experience were grouped into the following dimensions: Functionality, No Humanity, Self-Service, and Privacy. These contain smart store attributes and can be considered as emotion triggers (Wu and Gao, 2019). In this context, the "Functionality" dimension included properties of smart stores, such as tracking, automation, sensors, and scan. "No Humanity" included the components staff replacement, payment, checkout, and human-machine interactions, while "Self-Service" included all time saving aspects, as well as no lines, no waiting, and no cash. Surveillance, monitoring, shoplifting, data collection and privacy issues, form the "Privacy" dimension.

These four dimensions contain sub-dimensions based on the following procedure:

1) Customer reviews were converted into CSV format and analyzed for word mentions, sentiment analysis and word networks, using the text mining method in the programming language "R". Most frequent words, sentiment analysis and word networks are summarized in the appendix.
2) Reviews were classified into positive, negative, and ambivalent emotions based on sentiment analysis of the words and phrases present in the reviews, as well as a structured manual content analysis.
3) With the help of the sentiment analysis, word networks, and a structured manual selection, emotions were assigned to the respective reviews and various emotion triggers. The emotions were divided into basic and sub-emotions (Laros and Steenkamp, 2005). The trigger dimensions were formed into sub-dimensions. Seven different customer behaviors were evaluated and assigned to the respective reviews.
4) Coding of the results to ensure an evaluation of the most important results were organized into tables and diagrams for an overview; listed in the appendix.

IV. RESULTS

Among the reviews, the average star rating was 4.38 stars. Based on the number of reviews written by critics, it can be assumed that the vast majority are genuine (O'Connor, 2010). 131 were from male reviewers, 161 from female, and 82 with no indication of gender.

4.1 Received customer emotions

Amazon Go triggers emotions in customers throughout the customer journey. Emotions triggered by sources, that can be specifically assigned to Amazon Go are visually depicted in Figure 1. The perceived emotions were divided into positive, negative, and ambivalent (percentage represented by the inner ring). The outer ring shows the exact sub-emotions in the corresponding color (positive = blue; negative = red; ambivalent = green), with the respective percentages.

From a compiled emotion set consisting of 18 emotions, customers expressed positive emotions in 234 cases (78%), negative emotions in 30 cases (10%) and ambivalent emotions in 36 cases (12%). Ambivalent emotions describe mixed positive and negative emotions at the same time, which coexist and can conflict with each other; an example of this is pleasurable regret (Wu and Gao, 2019). The most frequent emotions were contentment (26.33%), surprise (13%) and happiness (11.33%). Other positive emotions were excitement (10.33%), love (9.33%), optimism, joy (with 3.33% each), and gratitude (1%)

in this context. Negative emotions of discontentment (2.67%), worry (2%) and anger (2%) were the most common, followed by fear (1.67%), disappointment (1.33%) and sadness (0.33%). Overall negative emotions were a comparatively low percentage.

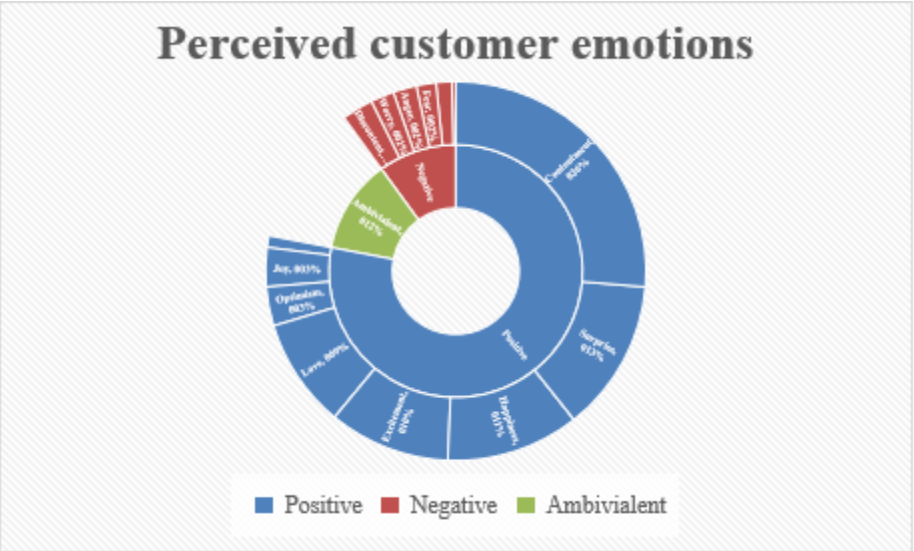

Figure 1: Amazon Go perceived customer emotions (figure by authors)

Emotions in the master list that were not present in the evaluations were peacefulness, shame, envy, and loneliness. This does not imply that these were not present, only that they were not present in the data analyzed. All perceived emotions are listed in summary form with values, percentages, and other relevant information in the appendix. For a more precise understanding, sample sentences of the respective emotions were also summarized in the appendix (Table 2).

4.2 ECX evoked by emotion triggers

As discussed earlier, the dimensions "Functionality", "No Humanity", "Self-Service", and "Privacy" were examined based on Suk et al. (2022), Fan et al. (2020), and others. These trigger dimensions were presented individually, with the corresponding resulting emotions (positive, negative, and ambivalent) and the breakdown into these basic emotions.

Among these, "Functionality" was the most frequently occurring dimension with 53% triggered by the functionality of the Amazon Go smart technologies, such as tracking, automation, sensors, and scan, or the perception of the overall concept. This dimension was followed by "Self-Service" trigger dimension at 23%; this includes all time-saving aspects. The third most frequent dimension (16%) was "No Humanity" (staff replacement, payment, checkout, and human-machine interactions). "Privacy" was the smallest with only 8%; surveillance, monitoring, shoplifting, data collection and privacy issues were the triggers for mostly ambivalent or negative emotions. In the following sections, the individual trigger and basic emotions are presented in more detail.

4.2.1 Trigger dimension: Functionality

"Functionality" was the most frequent emotional trigger dimension. Expressed in 160 cases, 91.25% were positive, 6.25% negative and 2.50% ambivalent emotions appeared to be triggered in customers.

Figure 2 shows the percentage distribution. Similar to the total number of emotions, contentment (34.38%) was the most frequent. Statements like "*...amazing! We couldn't believe it actually worked! Instead, it was all super easy. Amazon is light years ahead*" or "*The concept is great, and it works efficiently. I enjoyed the shopping experience*" show how positive the emotions were regarding the overall concept and functionality of Amazon Go. Happiness (14.38%) and Surprise (13.13%) were again the second and third most common. Negative or ambivalent emotions were hardly recorded. With three mentions each out of 160 cases, the negative emotions disappointment and fear (1.88% each) were the most frequent followed by anger and discontentment (1.25% each) with two mentions each.

Amazon Go's functionalities generated customer contentment through emotions such as surprise, excitement, or happiness. These results indicate that the smart store concept triggered positive emotions that were rarely experienced by customers before. While failures of these technologies can lead to negative emotions, the high percentage of positive emotions within this dimension supports a positive influence of the functionality on the ECX.

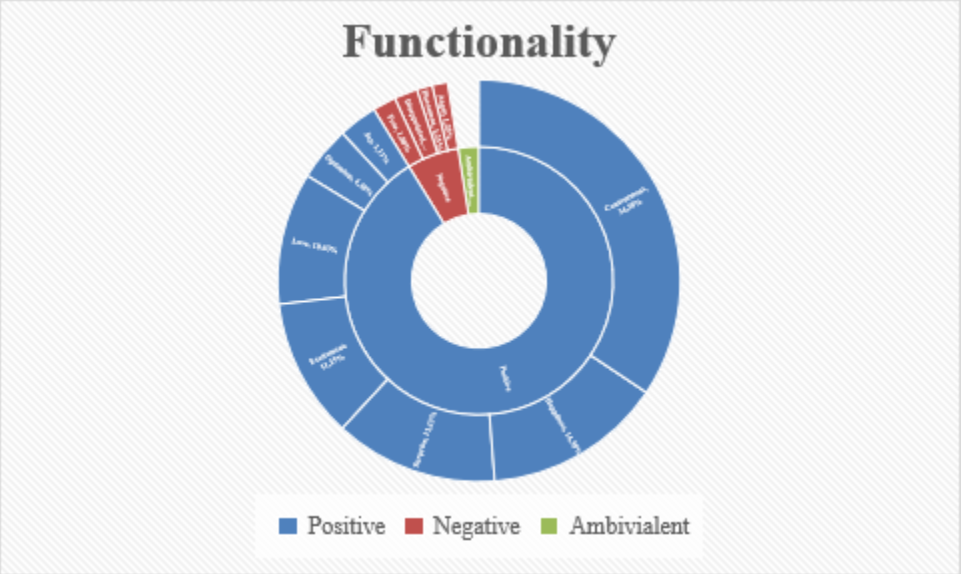

Figure 2: Emotion trigger: Functionality (figure by authors)

4.2.2 Trigger dimension: Self-Service

The "Self-Service" trigger dimension was the second most common dimension, with 69 cases. Here, a clear positive reaction can be seen with 82.61% positively triggered emotions. In comparison, negative emotions were triggered by self-service sources in 11.59% and ambivalent emotions in 5.8%. As shown, contentment (18.84%) and surprise (17.39%) were the two most frequent positive emotions in this dimension.

Many of the customers were positively surprised by the simplicity and the absence of queues: "*It is an amazing experience. The grocery store is so easy to shop with no lines*" or "*Not only the technology is cool but also saving time with cashless and no checkout line*". Similarly, the time saving ("just-walk-out" concept) positively reinforced the ECX within this dimension. Love and excitement were expressed in 10 cases each (14.49%), reinforcing this positive connection, followed by happiness (10.14%), joy (4.35%) and optimism (2.90%) as positive emotions. Negative emotions, anger, fear, or discontentment (2.90% each), were also perceived due to self-service: "*Not sure what all the buzz is about. I've really never waited in a convenience store line so not sure what the big deal is*". In addition, the negative emotions of disappointment and worry were apparent with 1.45% each.

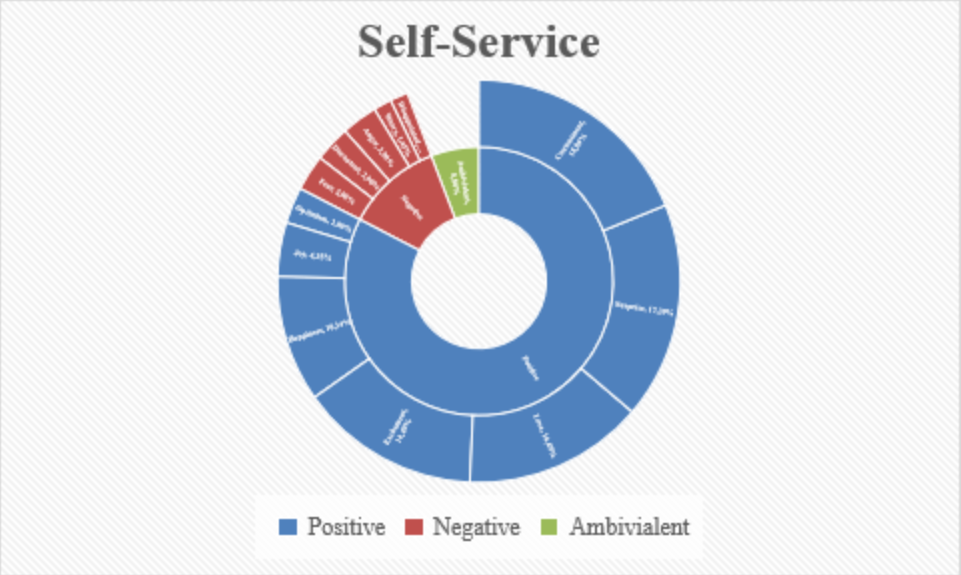

Figure 3: Emotion trigger: Self-Service (figure by authors)

Self-service attributes of Amazon Go were a trigger for a positive ECX. Particularly, aspects of saving time or avoiding traditional queues often triggered positive emotions such as contentment or surprise. Rationale provided were a seamless and personalized shopping experience that reduces customer journey friction.

4.2.3 Trigger dimension: No Humanity

Figure 4 provides an overview of the trigger dimension "No Humanity" with a higher variation in the ECX. 62.50% of emotions triggered were positive connected to the aspect "No Humanity", 16.67% negative, and 20.83% ambivalent. The higher percentage of negative and ambivalent responses indicated this trigger dimension cannot be clearly assigned to a positive or negative orientation of the customer experience.

Contentment (22.92%) and surprise (12.50%) in this dimension had the highest percentage. Overall, 48 cases were tied to aspects of this trigger dimension and considered to be the source of an emotion. Other positive emotions were gratitude, happiness, and excitement (6.25% each), and joy (4.17%). Love and optimism had the smallest share (one mention each). Negative emotions especially worry, and discontentment also occurred, reflecting 6.25% each. Anger and sadness were each perceived by 2.08%.

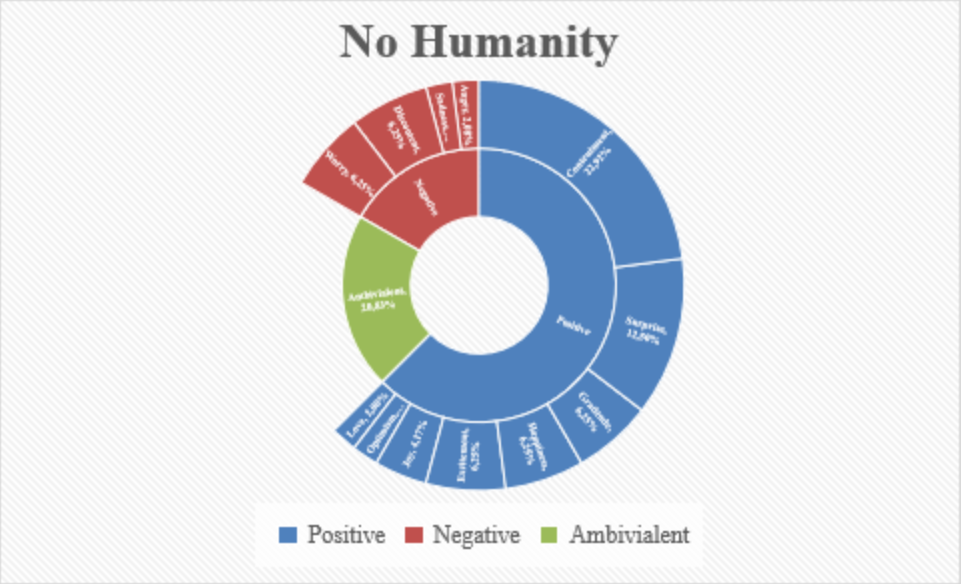

Figure 4: Emotion trigger: No Humanity (figure by authors)

Two contradictory statements show how differently aspects such as staff replacement influence the ECX. The concern about fewer human interactions was shown by statements "*... a lot of people will lose their jobs because of this kind of technology, which I don't want to support. Less human interactions with each other only turn us to alienate each other!*" Conversely, the satisfaction or contentment of avoiding interactions in retail were expressed "*the introvert in me LOVES this! Just walk in, take what you want, leave! No interaction*". This resulted in a high percentage of ambivalent emotions (20.83%) within this trigger dimension. Interactions with checkout staff in grocery stores were often seen as annoying, which creates a positive feeling with Amazon Go. However, this also triggered a kind of worry in customers, as no help was available in case of problems.

4.2.4 Trigger dimension: Privacy

With only 23 cases, the smallest trigger dimension was "Privacy" (Figure 5). A clear distinction from the previous trigger dimensions is apparent. Ambivalent emotions were perceived by 78.26% of customers. Negative emotions were perceived in 17.39%, while positive emotions were only experienced by 4.35%. Concern about the invasion of privacy was perceived by 8.70%, but made up the largest share of negative emotions; anger and discontentment each accounted for 4.35%. In total, only 4.35% positive emotions were reported in the "Privacy" dimension. The ambivalent emotions were revealed by statements like "*It's a strange concept not to pay as you walk out. It almost feels like you are stealing*" or "*Such a weird experience to feel like you're shoplifting and just walk out of the store*". The concept of "just-walk-out" may leave customers with an uneasy feeling. For many of the reviews, this was their first experience with a smart store like Amazon Go.

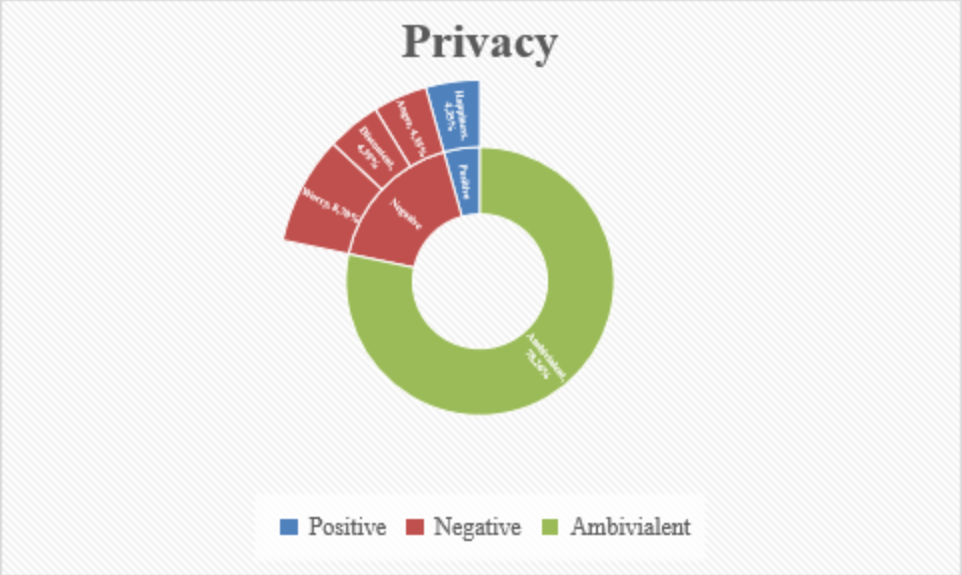

Figure 5: Emotion trigger: Privacy (figure by authors)

Privacy aspects within the Amazon Go customer journey can be assigned the lowest proportion of emotions. However, this trigger dimension should not be underestimated, as negative or ambivalent emotions within this dimension can lead to a negative ECX. Doubts arose with statements "*Amazon knows more and more of your behavior, records, and stores data of you, etc. I don't know yet, what exactly I should think about this…*" Additionally, the continuous monitoring by the cameras and sensors installed in the store caused mixed emotions and led to the high percentage of ambivalent received emotions.

4.3 Resulting customer behavior

Not all customer reviews studied had explicit resulting behaviors. Out of 300 reviews studied, 155 provided behavioral responses (shown in Figure 6). Seven behavioral intentions emerged: Active positive or negative recommendation, revisiting or not revisiting, expressed needs/problems, feedback for improvement, and the desire for a store in the vicinity.

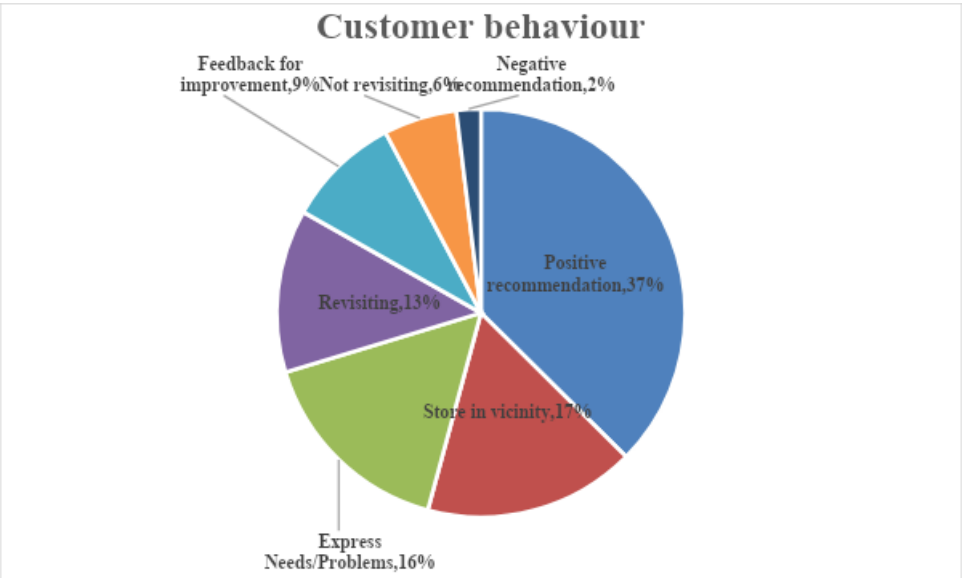

Figure 6: Resulting customer behaviors (figure by authors)

Table 1 illustrates the number of mentions of customer behaviors and shows which ECXs they connect with. Active positive recommendation was the most frequent behavior of customers (37%). 89.66% of this behavioral response resulted from a positive ECX. 26 reviewers would visit Amazon Go more often if available near their place of residence: "*Hope to see these everywhere soon!*" or "*It was a great experience, and I can't wait until they bring these stores out to Texas*". 92.31% of customer behavior followed a positive ECX, due to many of the reviews created by tourists who visited Amazon Go for the first time. 16% expressed needs or problems with the experience and 13% expressed active revisit intentions. Both behaviors show a positive ECX with 68% (store in vicinity) and 95% (revisiting) result from positively perceived emotions. Only 2% provided an active negative recommendation. Six percent of the behaviors consisted of "Not revisiting", resulting out of negative emotions (55.56%) and 9% provided feedback for improvement.

Expressing needs/problems and giving feedback for improvement were behaviors that mostly arose from positive ECXs, which was surprising. Expressed problems or needs often were tied to the Amazon Go app or checking in for friends and relatives. Accordingly, positive recommendation, store in vicinity, expressed needs/problems, revisiting, and feedback for improvement behaviors can clearly be assigned to a positive ECX with not revisiting and negative recommendations resulting from a negative ECX.

Table 1: Customer behaviors based on ECX

	Number of mentions	Positive ECX	Negative ECX	Ambivalent ECX
Positive recommendation	*58*	89.66%	1.72%	8.62%
Store in vicinity	*26*	92.31%	0.00%	7.69%
Express Needs/Problems	*25*	68,00%	20.00%	12.00%
Revisiting	*20*	95.00%	0.00%	5.00%
Feedback for improvement	*14*	78.57%	7.14%	14.29%
Not revisiting	*9*	33,.3%	55.56%	11.11%
Negative recommendation	*3*	0.00%	100.00%	0.00%

4.5 Comparison of the results with relevant literature

The results imply that smart retail technologies in phygital concepts can have a strong influence during the customer journey and thus on the ECX. Smart retail technologies act as triggers for mostly positive emotions, through excitement or surprise, which leads to overall contentment due to the functionality and self-service aspects of the "just-walk-out" concept. The privacy aspects or the lack of human contact can lead to ambivalent or even negative ECXs.

It can be stated that technologies, especially smart retail technologies, influence emotions and the ECX (Fan, et al., 2020; Lemon and Verhoef, 2016). The results confirm the occurrence of positive, negative, neutral, and ambivalent emotions during the customer journey, and the attribution of these emotions to technology-based trigger dimensions such as "Functionality", "Self-Service", "No Humanity" and "Privacy". Supporting earlier research, Suk et al. (2022) suggested a stronger perception of positive emotions/hedonic benefits compared to negative or ambivalent emotions during experiences in smart stores. This study also confirms that negative emotions can be caused by technological errors, such as scanning the QR code or bill delivery (Batat, 2022).

Consistent with Fan, et al. (2020), this study showed that human-machine interactions can positively influence emotional customer engagement. Inferentially, this finding found the absence of humanity to

be a predominantly positive emotional trigger. However, the dimension self-service (one of the biggest influences on the positive ECX) was primarily due to the aspects of time saving and the elimination of queues.

Results supported Johnson and Barlow's (2021) comment on new self-service, such as smart retail technologies, assisting to reduce the "pain of payment" and the associated negative emotions. Privacy risks were the most concrete source of negative emotional experience in smart stores due to constant targeting, tracking, and monitoring. Gregorczuk (2022) suggested a lack of transparency by the providers was one of the main causes. However, the our findings that the feeling of shoplifting evokes negative emotions in customers was something not demonstrated in previous studies.

The impact of the ECX dimension on customer behavior has received substantial investigation. Due to the gap of studies in the phygital environment, other industries (retail, tourism, hospitality, and other services) were applied. Significant impact was found between a positively designed ECX and loyalty intentions such as positive word-of-mouth, repeat purchases or a higher willingness to buy (Ou and Verhoef, 2017; Brun et al., 2017). Similarly, this study identified active positive recommendation or revisiting as two of the biggest behaviors of a positive ECX. In contrast, behaviors such as expressing the desire for expansion of smart stores and the high number of needs/problems expressed was an outcome of positive emotions (68% in this study). While these behaviors were previously thought to be based on negative emotions (Wu and Gao, 2019), this deviation could be the novelty of the concept, which causes unique needs for the customer. Behaviors based on a negative ECX can amount to switching companies, negative word-of-mouth, or complaints (Wu and Gao, 2019). Similar behaviors were found here, as negative recommendation and not revisiting were identified as the main behaviors for negative ECX.

When considering the totality of the customer experience, it should be noted that the emotional or affective dimension is only part of the totality (Grönroos, 2006). Other factors such as cognitive, behavioral, sensory, and social responses during the customer journey should also be considered (Lemon and Verhoef, 2016). Accordingly, customer outcomes and resulting behaviors cannot be based solely on perceived emotions.

The study's results indicated a predominantly positive emotional image of customers in relation to smart stores; however, this should not be taken as standard. The perceived emotions and their triggers should also be considered critically, as individual interactions and touchpoints can trigger multiple emotions throughout the entire customer journey (Wu and Gao, 2019). However, the study results found linear strands of triggers connected to particular emotions, which led to a particular customer behavior tied exclusively to customer perceived emotions. While cognitive, behavioral, sensory, and social responses were not tested directly (i.e., Grönroos, 2006), outcomes from this study should interpreted with consideration that emotions are perceived personally, situationally, individually, and culturally dependent (Ou and Verhoef, 2017).

V. CONCLUSION

Smart retail technologies such as artificial intelligence (AI) or the Internet of Things (IoT) can significantly impact the emotions of customers in a phygital environment. These technologies act as an emotional trigger and have a direct and mostly positive impact on the ECX by enhancing convenience, saving time, and improving the overall shopping experience. The novelty and fascination of these technologies, as well as the resulting "just-walk-out" concept often led to surprise and excitement among customers and tied to the expression of contentment. The mostly positive emotions were often triggered by the self-service aspects, functionalities of the technologies, and the overall concept (Fan, et al., 2020; Suk et al., 2022). Ambivalent or negative emotions arose from the omission of human

interaction or the threat to customers' privacy evoking emotions such as discontentment, worry or even anger. A positively designed ECX often resulted in behaviors such as positive active recommendation, the desire for more stores in vicinity, and revisit. A negatively designed emotional experience led to negative recommendations or the non-revisiting of customers.

In summary, smart retail technologies can create a positive customer experience through a novel/seamless process, time saving, and reducing friction during the journey, leading to emotions such as surprise, happiness, or excitement, which trigger overall contentment. Retail and other service providers should be cautious that the disruption of privacy or ignorance of existing technologies can lead to negative ECXs, expressed through worry or discontentment.

5.1 Implications

This study contributes to the literature on ECX in phygital environments. First, this study identified the specific emotions that occur in smart stores such as Amazon Go, which are divided into positive, negative, and ambivalent emotions. Specifically, the consideration of negative and ambivalent emotions in such an environment expands the existing literature, which so far has mostly focused on positive emotions. Second, the mapping of these perceived emotions to the smart store related trigger dimensions expands the current view of emotional triggers in a phygital concept. Finally, the identification of customer behaviors resulting from ECXs, whether positive, negative, or ambivalent, also contributes to these gaps.

Studies of this kind in the existing literature were mostly based on the totality of the customer experience (no consideration of the individual dimensions) and the findings in this study assist in creating a more complete framework (Batat, 2022), how it applies to younger consumers (Mele et al., 2021), as well as the observation of advantages/benefits and disadvantages/costs (Suk. et al., 2022) as recommended by earlier authors.

Online customer reviews can help managers better understand ECXs. These provide a critical, informative, and direct source for examining customer experiences (Wu and Gao, 2019). From this analysis, the customer journey can be experienced from the customer's point of view and the respective touchpoints, which are directly connected to the company, can be evaluated, and concretely improved.

In addition to providing cost savings in terms of reducing personnel costs (Polacco and Backes, 2018), these new technologies can greatly improve the service to the customer and lead to the generation of positive customer experiences. Avoiding negative emotions as well as creating positive emotions should be a primary target of every successful company (Batat, 2022) to increase positive customer behaviors, such as loyalty intentions or positive recommendation (Harrington, et al., 2019).

The implementation of smart retail technologies can help avoid negative emotions and create positive ones by eliminating unpleasant processes of the customer, such as waiting in queues. Through a better understanding of emotional triggers, negative emotions such as discontentment, worry or anger, as well as their triggers, such as low human interaction, and privacy risk can be minimized. Greater transparency in privacy can be an important factor for many customers (Gregorczuk, 2022). Low human interaction indicated a source of potential negative emotions, but this may be lower priority as the non-existent staff in smart store concepts was considered pleasant by many customers. The analysis of customer behaviors such as feedback for improvements or needs and problems of customers can provide valuable design insights. Accordingly, improvements via simplification can be made within the application or the entry for guests. These inconveniences need to be addressed by smart store providers, such as simplifying account opening or other technology-based challenges. An uncomplicated app as well as a general understanding of the concept are essential to not deter

customers before they even enter the store. By obtaining all customer and purchase data, customers can be addressed in a more individual and personalized way after the actual purchase to generate repeat purchases.

The positive aspects/emotions should not be ignored; firms should not only strive for negative emotions avoidance but also for the enhancement of the positively emphasized elements to enhance the elements of surprise and delight to preserve positive emotions. Insights from this study can assist managers to positively integrate smart technologies into a phygital concept with an understanding of positive trigger dimensions (functionality, self-service and partially no humanity) while improving the negative aspects such as privacy. In the future, these technologies can be implemented in a holistic concept as well as partial or hybrid in a variety of settings (i.e. hospitality, tourism, retail and other service contexts).

5.2 Limitations and future research directions

This study is not without limitations. Firstly, only single store reviews were inductively assessed. Future research should assess additional stores, different contexts, and compare different providers of smart stores to improve generalizability (Yu, et al., 2017). Second, the limited available dataset (n=374) and low numbers of negatively perceived emotions provides opportunities for additional research. A more detailed investigation of the ECX in smart stores is needed using quantitative approaches, datamining, and other methods. These would provide information on consumer characteristics for more personalized approaches. Further study of cognitive, behavioral, sensory, and social responses provides opportunities to enhance our understanding of smart technologies in the retail space

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A Proposed Structure for the Egyptian Airspace Optimizing Air Traffic Control, Workload and Safety

Hatem Gamel

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ABSTRACT

The Egyptian airspace is a crucial link between Europe, Africa, and the Middle East. With an average of over 1,000 daily flights, it is one of the busiest airspaces in the region. However, the current airspace structure and air traffic management system face significant challenges in meeting the growing demand for air travel, leading to congestion, delays, and safety concerns. Therefore, there is a need for a more efficient and effective airspace structure to enhance air traffic management, workload and meet the future needs of the aviation industry.

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Keywords: airspace structure; airspace capacity; en-route airspace design; air traffic control; workload.

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I. INTRODUCTION

Airspace structure can be used as a procedural mechanism for a priori separation and organization of en-route air traffic. Although many studies have explored novel structuring methods to increase en-route airspace capacity, the relationship between the level of structuring of traffic and airspace capacity is not well established. To better understand the influence of traffic structure on airspace capacity, efficiency, and safety.

The current en-route airspace design is centered around predefined airways, sectors and ground-based Air Traffic Controllers (ATCo). Although enhancements to air traffic systems and procedures have led to incremental capacity improvements, the current centralized system architecture has been widely reported to be nearing saturation levels (N. A. Doble, R. Hoffman, et al., 2008).

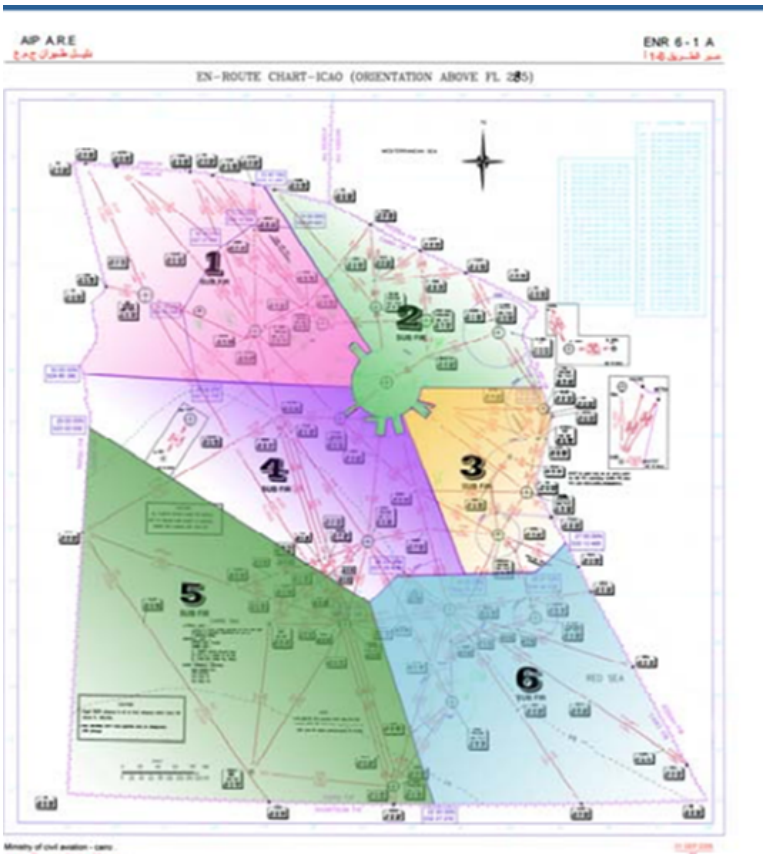
To keep pace with the ever growing demand for air transportation, it is necessary to investigate novel methods of organizing and structuring traffic to increase en-route airspace capacity. However, a fundamental relationship between the level of structuring of traffic and resulting properties, such as efficiency and safety, is not well established, and different studies in this field report seemingly contradictory findings (Joint Planning and Development Office, 2007).

Free-Flight researchers, for instance, advocate that higher densities can be achieved through a reduction of traffic flow constraints and structure, whereas other studies argue that capacity would benefit more from a further structuring of airspace. This dichotomy suggests that airspace structure and capacity are invariably tied together. The relationship between these two variables, however, is not well understood, i.e., does more or less structuring lead to higher capacity? Or, is there a transition point, where a further increase in capacity will require a switch from one approach to the other? (J. Klooster, S. Torres, et al., 2010).

In this paper make a scientific research proposal titled a proposed structure for the Egyptian airspace.

II. CURRENT EGYPT AIRSPACE

Egypt Airspace is including 6 sectors are basic controlling units of air traffic flow management and capacity sectors Figure (2.1). They were originally designed according to some predefined rules such as historical, geographic considerations, the density of airports in the sector, or just according to experience. Sectors have essentially remained unchanged in terms of geometric shape and the total number of sectors inside Egypt airspace. However, along with rapidly increasing air traffic flow, fixed sectors cannot accommodate varying traffic flows anymore; several problems have appeared, such as unbalanced workload distribution across different sectors, with overload in some sectors and very sparse flow density in others, increasing point of conflict between aircraft and improper sector numbers, which means too many open sectors in off-peak time periods and too few sectors during busy times or too little flight time in a single sector for some flights.



(Source :Egyptian Aeronautical Information Publication (AIP) SEP. 2009)

Figure (2.1): Egypt airspace sectorization

Keep in mind air traffic is rerouted to avoid climate sensitive areas. This rerouting of flights leads to a changing traffic distribution. Density of traffic in the sector also may be rerouted to another sector to avoid conflict between aircraft. rerouted is made in case of activity military area, sufficient airspace to be used for military operations is considered to be an area that can accept a certain number of aircraft (depending on the military mission) at any time for the purpose of training, weapons testing, development of strategic and tactical capabilities or any other reasons. The sectorization of airspace enables air traffic controllers to guide aircraft in a safe and efficient way. Balanced operational

performance, controller workload, procedure design or capacity management as well as territorial aspects are key factors triggering airspace sectorization.

III. ATC WORKLOAD

Air traffic controllers (ATCs) tasks are cognitively complex in nature and the mental workload is a dominant safety-related consideration in the air traffic controller domain. Throughout the literature, signification relationships between extremes of workload (under load, high workload, and overload) and a decline in controller performance, such as an increase in operational errors, have been consistently reported (cox-fuenzalida, 2007).

One is to compute basic air control load, which is the workload unavoidable under the condition of certain airspace structure and air control rules, however, conflict situation in air space. The other is reallocate computation of air control load, which is workload resulting from resolving flight conflict among aircraft, given certain airspace structure and air control condition.

Total sector workload within time slice t is expressed as follow the equation blew,

Equation below is used to calculate the ATC workload.

$$W(t) = \sum_{j=0}^{s} Wj\,(t) = \sum_{j=0}^{s} \left(W_j^{st}(t) + W_j^{dy}(t) \right)$$

Where $W(t)$ denotes total ATC workload within time slice t, $W_j(t)$ denotes total ATC workload on route j within time slice t, $W_j^{st}(t)$ denotes basic air control load on route j within time slice t, $W_j^{dy}(t)$denotes reallocated air control load on route j within time slice t.

IV. A PROPOSED STRUCTURE FOR THE EGYPTIAN AIRSPACE

New airspace design will help air traffic controllers from workloads and more safety for air traffic. For example we can as fast procedure to make new sectorization of the sectors see finger (4.1).

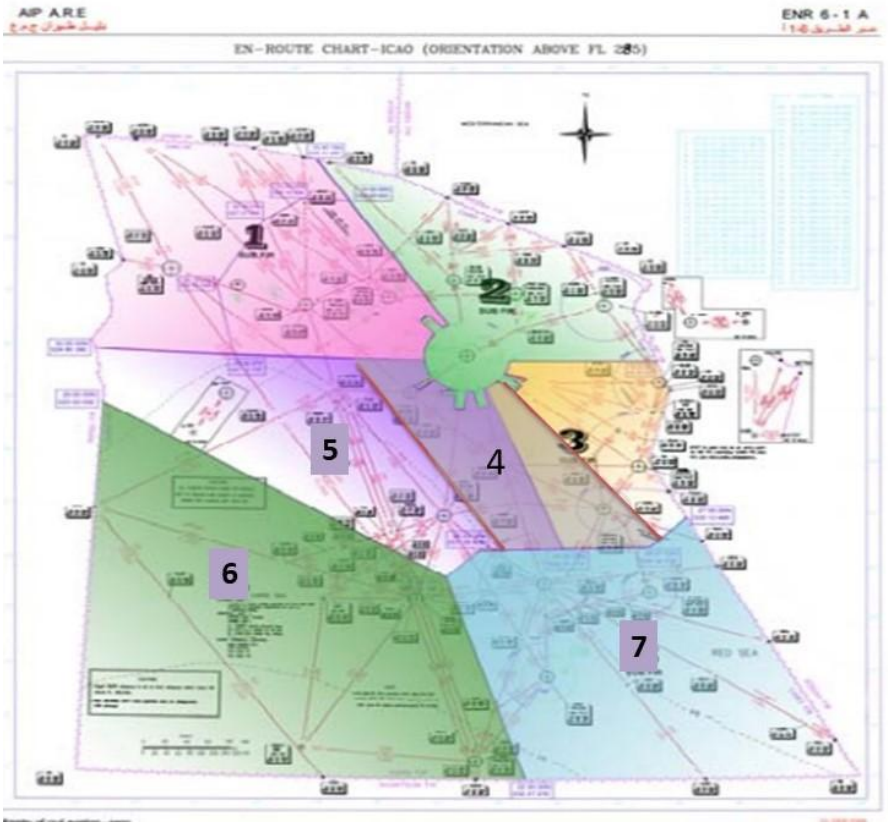


Figure (4.1): New Egypt airspace sectorization

Planning the sector capacity utilization model and operational use of the same one should take into account the required volume of new airspace structure, period of use, amount of traffic demand, and the geographical distribution of the airspace structure.

V. CONCLUSION

The proposed research aims to develop an optimal airspace structure for the Egyptian airspace, enhancing efficiency and safety in air traffic management, reducing congestion and delays, workload, and minimizing the environmental impact of aviation. The research will provide valuable insights and recommendations to policymakers, regulators, and other stakeholders in the aviation industry, promoting the development of a more sustainable and efficient air traffic management system.

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The Impact of Macroeconomic Volatility and Interest Rate Differences on Stock Market Liquidity in Nigeria and South Africa (1983–2022)

Dr. Israel Odion E. Idewele

ABSTRACT

Orientation: High market volatility increases unfavorable market risk premium. Investors have a keen interest in knowing variables that may help forecast stock prices.

Research purpose: The study examined the impact of macroeconomic volatility and interest rate differentials on stock market liquidity in Nigeria and South Africa.
Motivation for the study:

While prior research has established that macroeconomic instability and financial liquidity variables determine stock market volatility in Africa, less research attention has been paid on the factors that can buffer better relationship.

Research approach/design and method: This study was structured to capture the relationships that exist between macroeconomic volatility and the interest rate differential on stock market liquidity, which implied that ex-post facto and analytical research designs were used. It relies extensively on secondary data, which was obtained from World Bank development indicators for the selected two countries from 1986–2022.

Keywords: macro-economic volatility, stock market, co-integration and arch effect, nigeria and south africa, economic growth.

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Main findings: Findings indicated that Macroeconomic volatility has a positive and significant effect on the stock market liquidity in Nigeria, while in South Africa, macroeconomic volatility has a positive and non-significant effect on the stock market liquidity.

Practical/managerial implications: These findings implicate the need for government enacts sound monetary policies in order to enhance economic growth in Nigeria and South Africa.

Contribution/value-add: This study is one of the first to show that the possibility that macroeconomic variables such as GDP, money supply, industrial production, are unstable and weak when it comes to absorbing stock.

Keywords: macro-economic volatility, stock market, co-integration and arch effect, nigeria and south africa, economic growth.

I. INTRODUCTION

The ever-growing need for well-functioning stock markets for economic growth and development has drawn the attention of many researchers globally, especially in emerging economies. This is because a stock market serves as an avenue through which funds are generated and mobilized for productive use, thus enhancing the economic growth of a country. Investors have a keen interest in knowing variables that may help forecast stock prices. Thus, they can more perfectly manage their positions and portfolios (maximize returns and/or minimize risk) if they can use macroeconomic news releases as reliable indicators for where the stock market is headed. Conversely, policymakers meticulously focus on the situation of the stock market, which can be regarded as a leading indicator of future macroeconomic activity. "Market liquidity is mainly evidence of its efficiency". Illiquidity in markets is a red flag that

the market is poorly functioning, which can lead to a financial crisis. The measurement of liquidity is an important question that needs to be answered. Four dimensions are important in this respect. (1) Trading time: the ability to execute a transaction immediately at the prevailing price. (2) Tightness: the ability to buy or sell an asset at the same time and at the same price. (3) Depth: the ability to buy and sell a certain amount of an asset without influencing the quoted price. (4) Resiliency:

II. THEORY & HYPOTHESES

Despite the crucial role of stock markets in promoting economic growth, African stock markets are considered small and illiquid, with infrastructural bottlenecks and weak regulatory institutions. Thus, since most investors are risk-averse, they tend to run away from the market when there is uncertainty in expected returns. High market volatility increases the unfavorable market risk premium.

2.1 Conceptual review

2.1.1 Macroeconomic volatility

It is reasonably unarguable to believe the notion that the general macroeconomic environment, whether volatile or not, can have a significant impact on the stock market of a country (David & Ampah, 2019). Macroeconomic volatility can be seen as fluctuations in economic variables due to either domestic or external shocks that are not foreseeable or predictable. Macroeconomic volatility implies the vulnerability of macroeconomic variables to shocks. It is a situation where there is the possibility that macroeconomic variables such as GDP, money supply, industrial production, oil price, trade openness, exchange rate, interest rate, etc. are unstable and weak when it comes to absorbing shock.

2.1.2 Interest rate differential

According to Uchendu (1993), as cited in Salama (2018) "interest ratecan be defined as the return or yield on equity or opportunity cost of deferring current consumption into the future". Trade

2.1.3 Openness

Admittedly, trade openness can be used as an indicator of macroeconomic volatility; for example, Eiji (2017) asserted that the macroeconomic interpretation of the trade openness variable is that it measures the extent to which a domestic economy is exposed to external shocks.

2.1.4 Stock market liquidity

The term stock market refers to various channels through which the shares of a publicly held company are bought and sold. Such financial activities are conducted under a given set of regulations (James, 2022).

Turnover Ratio: The turnover ratio, as an indicator of stock market liquidity, measures the number of times the outstanding volume of shares changes hands and can complement traded value or GDP in some cases. It is obtained by dividing the value of the total shares traded by the stock market capitalization.

2.1.5 Money Supply

Money literally consists of the legal tender of a country and all other liquid financial instruments flowing in the economy at a particular point in time.

2.1.6 Exchange rate

The exchange rate is the rate at which one currency is exchanged for another currency (Mohan & Chitradevi, 2014). In another word," the price paid for a country's currency relative to another country's currency is known as the exchange rate" (Olweni & Omondi, 2011).

2.1.7 Macroeconomic Environment and the Stock Market

Understanding the relationship between macroeconomic volatility and the stock market is crucial for investors because macroeconomic factors play a vital role in the performance of the stock market.

2.1.8 Interest Rates and the Stock Market

Monetary policy uses interest rates as a tool to either increase or decrease the quantity of money in an economy. Thus, it raised the concern of regulators and investors about the pressing need to educate stakeholders on the impact of interest rate fluctuations (Sammyjo, 2022).

III. THEORETICAL REVIEW

3.1 Capital Asset Pricing Model

The Capital Asset Pricing Model (generally known as CAPM) was developed in the 1960s by Sharpe (1964). It is based on the portfolio theory introduced by Markowitz (1952). According to Sharpe, diversification gives the investor the opportunity to minimize all portfolio risk except the risk derived from fluctuations in economic activity. This risk, the systematic risk, grows with the addition of an individual stock and depends on the response to the economic and political environment.

3.2 Empirical Reviews

Yeoh and Suhal (2019) investigated the effects of money supply, exchange rate, and interest rate spread on the performance of the stock market in Malaysia. The study employed monthly data, from January 1997 to August 2018. The methods of analysis were the autoregressive distributed lag (ARDL) and GARCH models. The results showed that the money supply, real effective exchange rate, and interest spread had a long-run effect on the performance of the stock market.

Demir (2019) examined the impacts of some prominent macroeconomic factors on the Turkish stock market index, BIST-100 (Borsa Istanbul-100), over the 2003 Q1–2017 Q4 period using the Autoregressive Distributed Lag (ARDL) model. The study found that economic growth, the relative value of the domestic currency, portfolio investments, and foreign direct investments raise the stock market index, while interest rates and crude oil prices negatively affect it.

Udoka, Nya, and Bassey (2018) examined the effect of macroeconomic determinants on stock price movements in Nigeria using data on macroeconomic variables such as gross domestic product, exchange rate, inflation, interest rate, and absolute stock price, The study concluded that there was no long-term relationship between macroeconomic determinants and stock price movements in Nigeria. John (2019) examined the effect of macroeconomic variables on stock market performance in Nigeria uses annual time series data spanning 1981 to 2016. The study employed the Ordinary Least Square (OLS) regression technique and showed a negative effect on stock market performance (represented by market capitalization). The results showed that money supply has a significant positive effect and interest rate has a significant negative effect. The study also found that the exchange rate and inflation rate have no statistically significant effect on stock market performance in Nigeria.

Uhumnwangho (2022) examines the volatility of African stock markets and the factors influencing it in Africa. The Generalized Autoregressive Conditional Heteroscedasticity (GARCH) was used to generate the volatility, and the Generalized Method of Moments was applied to a dynamic panel model to examine the factors that account for volatility in Africa. Sixteen (16) African stock markets were covered for the period 2013 to 2019. Data was sourced from the African Securities Exchanges Association, Bank for International Settlements, and World Bank Development Indicators databases. The study found that macroeconomic instability and financial liquidity variables determine stock market volatility in Africa.

Siddiqi et al. (2021) examine how much stock liquidity is influenced by macroeconomic variables in the case of Pakistan. For this purpose, time series data is used for analysis by considering liquidity on the Pakistan stock exchange using a time span from 2016 to 2020.

The study seeks to examine the impact of macroeconomic volatility and interest rate differentials on stock market liquidity in Nigeria and South Africa.

Ho_1: Macroeconomic volatility and interest rate differentials do not have a significant positive impact on stock market liquidity in Nigeria and South Africa.

IV. RESEARCH METHODS AND DESIGN

This research study was structured to capture the relationships that exist between macroeconomic volatility and the interest rate differential on stock market liquidity, which implied that ex-post facto and analytical research designs were used. The study relies extensively on secondary data, which was obtained from World Bank development indicators for the selected two countries from 1986–2022. The motivation to use secondary data lies in the fact that the study is based on historical research that requires past quantitative data to test hypotheses. The various data sources were based on the parameters of the variables. Macroeconomic volatility (MAVO) was measured using the standard deviation of the gross domestic product (GDP), the interest rate (INT) differential was measured with the short-term interest rate, trade openness (OPEN) was measured with total trade (import + export) % GDP, stock market liquidity (STR) was proxied with the stock turnover ratio, and control variables were money supply (MOS) and exchange rate (EXR).

4.1 Measure, Control Variable

4.1.1 Dependent Variable

4.1.1. Stock Market Liquidity (STR):

A stock's liquidity generally refers to how rapidly shares of a stock can be bought or sold without substantially impacting the stock price. Liquidity enables investors to execute buy and sell orders at the desired price more efficiently. Liquidity helps increase the number of active participants in the stock market because you will easily find buyers to sell your assets.

4.2 Explanatory Variables

4.2. 1 Macroeconomic Volatility (MAVO)

Macroeconomic volatility is defined as periods of unexpected boost and unpredictable sharp downward and upward movements of the macroeconomic variables. Macroeconomic volatility is measured by finding the standard deviation of the gross domestic product (GDP). In this study, macroeconomic volatility serves as the key explanatory variable.

4.3 Interest Rate Differential (INT)

An interest rate differential (INT) weighs the contrast in interest rates between two similar interest-bearing assets. Most often, it is the difference between two interest rates. Traders in the foreign exchange market use interest rate differentials when pricing forward exchange rates. Higher interest rates offer lenders in an economy a higher return relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise.

4.4 Trade Openness (OPEN)

Trade openness refers to the outward or inward orientation of a given country's economy. Trade openness is defined as the ratio of exports plus imports over GDP. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries, whereas inward orientation refers to economies that do not take advantage of the opportunities to trade with other countries. Trade openness serves as an explanatory variable.

4.5 Money Supply (MOS)

The money supply is the total amount of money—cash, coins, and balances in bank accounts—in circulation. The money supply is also defined as a group of safe assets that households and businesses can use to make payments or hold as short-term investments. It was included as a control variable because the supply of money can boost or decrease stock market liquidity.

Exchange Rate (EXR): An exchange rate is the rate at which one currency will be exchanged for another currency. The essence of employing the exchange rate as a control variable is that it affects the prices of stocks in the stock market as well as the investment decisions of investors.

Techniques of Data Analysis: They applied some diagnostic tests for the purpose of achieving validity and reliability. The co-integration causality test and OLS were applied to ensure a reliable result.

Unit Root Test

Statement of Hypothesis

H_o : Series has a unit root,**H_1 :**H_o is not true

Table 1: Unit Root Test Table

Variable	NIG			Order		SA			order	
	ADF sta	5% cri	P-Value	Intgrat.	Decission	ADF sta	5% crit	P-Value	Intgrat.	Decission
M Supp	-4.4059	-2.9763	0.0018	1(1)	Rej -null	-2.6206	-1.9539	0.0108	1(1)	Rej -null
Exc Rate	-5.5655	-2.9719	0.0001	1(1)	Rej- null	-4.6127	-2.9677	0.0010	1(0)	Rej- null
Imports	-4.5199	-2.9677	0.0013	1(0)	Rej- null	-6.2806	-2.9678	0.0000	1(0)	Rej- null
Exports	-6.0455	-2.9719	0.0000	1(1)	Rej-null	-5.3716	-2.9919	0.0002	1(1)	Rej-null
Stock T	-2.3568	-2.0063	0.0270	1(1)	Rej- null	-6.2807	-2.9678	0.0000	1(0)	Rej- null
GDP	-4.5109	-2.9678	0.0013	1(1)	Rej-null	-5.0231	-2.9678	0.0003	1(0)	Rej-null
Int. Rate	-5.5931	-2.9484	0.0000	1(1)	Rej-null	-6.1112	-3.5366	0.0001	1(1)	Rej-null
Net_Tra	-5.0207	-2.9389	0.0002	1(0)	Rej-null	-2.5213	-1.9501	0.0131	1(0)	Rej-null

The study observed that, from table (1), the constant and trend were not absolutely restricted simply because some trends were not statistically significant at the 5% level while others were. Since some of their respective probability values are not greater than 5% significance, we failed to ignore them by choosing (at the intercept, trend, or both). There is no evidence of a unit root among the series as tested since the probability value of t-statistics is less than 5% significant in both countries under study. The ADF results or values are more negative than the critical values at the 5% level in absolute terms. The

series are said to be stationary at this point since there is no evidence of a unit root; therefore, the null hypothesis (presence of a unit root) is not accepted. The order of integration in both countries is similar while achieving a stationary level for all the variables; therefore, we apply the bounds co-integration test so as to identify the nature of their long-term relationship or association.

Test for Co-integration

Statement of Hypothesis

H_0 : Series is not co-integrated

H_1 : H_0 is not true

Decision Criteria: Reject the null hypothesis if the calculated F-statistics is greater than i(1) bounds at 5% level of significance ,otherwise accept the null hypothesis.

Table 2: Bounds Co-integration Test Table

NIG	F St at@5%	i(1) bounds	i(0) bounds	Result	SA	G S tat@5 %	i(1) bounds	i(0) bounds	Result
Model one	3.13	3.67	2.79	Accept H_0	Model one	3.10	3.67	2.79	Accept H_0
Model Two	1.44	3.67	2.79	Accept H_0	Model Two	2.31	3.67	2.79	Accept H_0

The results of table 2 indicate that there is no evidence of co integration among the variables. All the outcome from model one, two and three show that the value of Statistics is not greater than i (1) bounds and this gave rise to acceptance of null hypothesis. This implied that long run relationship does not exist among the variables, hence the need for short run causality test.

Test for Short run Causality (wald Test)

Statement of hypothesis

H_0 : C(2) =C(3)= C(4) =0

H_1 : C(2) =C(3) = C(4) ≠0

Decission criteria: Accept the null hypothesis if C(2)=C(3)= C(4) = 0,otherwise reject the null.

Table 3: (Nigeria)

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.160340	(3, 15)	0.1353
Chi-square	6.481019	3	0.0904

Null Hypothesis: C(2)=C(3)=C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.483131	0.690262
C(3)	-0.183440	0.314894
C(4)	-0.052686	0.037781

Restrictions are linear in coefficients.

Table 3 as displayed above, where the value of F-statistic is 2.160340,Chi-square is 6.481019 with corresponding probability of 0.1353 and 0.0904 respectively are not equal to zero. This implied that c(2)=c(3)=c(4) is not equal 0 .The study conclude that gross domestic product ,money supply and exchange rate cause the stock trade in the short run. It proves that short run causal effect exist among the variables .The study failed to accept the null hypothesis, stating that c(2)=c(3)=c(4) is not equal to zero.

Statement of hypothesis

H_o : C(2) =C(3)= C(4) =0

H_1 : C(2) =C(3) = C(4) ≠0

Decission criteria: Accept the null hypothesis if C(2)=C(3)= C(4) = 0,otherwise reject the null.

Using model two as stock traded= f(interest rate, money-supply, exchange rate)

Table 4: (South Africa)

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.691162	(3, 15)	0.0835
Chi-square	8.073487	3	0.0445

Null Hypothesis: C(2)=C(3)=C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.032036	0.472958
C(3)	-0.509260	0.367711
C(4)	-0.043623	0.016788

Restrictions are linear in coefficients.

Table 4 as indicated above displayed the value of F-statistic as 2.691162,Chi-square as 8.073487 with corresponding probability of 0.0835 and 0.0445 respectively which are not equal to zero.This implied that c(2)=c(3)=c(4) is not equal 0 .The study conclude that interest rate ,money supply and exchange rate cause the stock trade in the short run. It proves that short run causal effect exists among the variables. The study failed to accept the null hypothesis, stating that c(2)=c(3)=c(4) is not equal to zero.

Statement of hypothesis

H_o : C(2) =C(3)= C(4) =0

H_1 : C(2) =C(3) = C(4) ≠0

Decission criteria: Accept the null hypothesis if C(2)=C(3)= C(4) = 0,otherwise reject the null.

Using model One as stock traded =f(GDP, money-supply, exchange rate)

Table 5

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	10.54262	(3, 24)	0.0001
Chi-square	31.62786	3	0.0000

Null Hypothesis: C(2)=C(3)=C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.693709	0.624503
C(3)	0.300539	0.176659
C(4)	-0.200059	0.067709

Restrictions are linear in coefficients.

Table 5 as indicated above displayed the value of F-statistic as 10.54262,Chi-square as 31.62786 with corresponding probability of 0.0001 and 0.0000 respectively which are not equal to zero in absolute terms .This implied that c(2)=c(3)=c(4) is not equal 0 .The study conclude that gross domestic product ,money supply and exchange rate cause the stock trade in the short run. It proves that short run causal effect exist among the variables. The study failed to accept the null hypothesis, stating that c(2)=c(3)=c(4) is not equal to zero.

Statement of hypothesis

H_o : C(2) =C(3)= C(4) =0

H_1 : C(2) =C(3) = C(4) ≠0

*Decission criteria:*Accept the null hypothesis if C(2)=C(3)= C(4) = 0,otherwise reject the null.

Using model two = stock traded=f(interest rate, money-supply, exchange rate)

Table 6

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	7.045950	(3, 23)	0.0016
Chi-square	21.13785	3	0.0001

Null Hypothesis: C(2)=C(3)=C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.264152	0.653089
C(3)	0.078108	0.210369
C(4)	-0.212403	0.069081

Restrictions are linear in coefficients.

Table 6 as indicated above displayed the value of F-statistic as 7.045950,Chi-square as 21.13785 with corresponding probability of 0.0016 and 0.0001 respectively which are not equal to zero. This implied that c(2)=c(3)=c(4) is not equal 0 .The study conclude that interest rate ,money supply and exchange rate cause the stock trade in the short run. It proves that short run causal effect exist among the variables. The study failed to accept the null hypothesis, stating that c(2)=c(3)=c(4) is not equal to zero.

Test For Multi- collinearity

Decission criteria: If the value of centered variance inflation factor(CVIF) is less than ten(10),there is no evidence of multi-collinearity on the explanatory variables.

Table 7

NIG Variables	Uncentered VIF	Centered VIF	Multi-co linearity	SA Variables	Uncentered VIF	Centered VIF	Multi-co linearity
MAVO	3.31492	1.25346	Absent	MAVO	1.675603	1.027255	Absent
MOS	14.32433	1.43485	Absent	MOS	70.18831	1.760174	Absent
EXR	8.879076	1.41511	Absent	EXR	29.92147	1.725551	Absent
INT.rate	7.653061	1.21972	Absent	INT.rate	38.25001	1.965012	Absent
T –Open	3.33897	1.03567	Absent	Open	2.21128	1.76461	Absent

Table 7 as indicates that the value of centered variance inflation factor(CVIF) for South Africa(SA) on these variables (mavo,mos,Exch rate ,Int rate and trade -open) are 1.027255,1.760174,1.725551 , 1.965012 and 1.76461 respectively .We observed in absolute terms that all the values are said to be less than ten (10)

On the same table 1,we observed that for Nigeria (mavo,mos,Exch rate, Int rate and trade-openness) , have their corresponding centered variance inflation factor (CVIF) values as 1.25346,1.43485,1.41511,1.21972 and 1.03567 respectively which is less than ten (10)

Test for ARCH Effect

Statement of Hypothesis

H_0: No ARCH effect

H_1: H_0 is not true

Decission Critera: Accept the null hypothesis if $b_1 = b_2 = b_3 = 0$,otherwise reject the null in favour of the alternate hypothesis.

Table 8: ARCH Effect Table

NIG	MAVO(-1)	Decission	SA	MAVO(-1)	Decission
F-Stat	0.325289		F-Stat	0.139349	
Obs. R^2	0.345983	Accept null	Obs. R^2	0.149268	Accept null
Prob F(1,26	0.5733		Prob F(1,26)	0.7120	
Prob .ChiSq	0.5564		Prob .Chi-Sq	0.6992	
	Interest Rate(-1)			Interest Rate(-1)	
F-Stat	0.050955		F-Stat	1.815575	
Obs. R^2	0.053788		Obs. R^2	1.824670	
Prob F(1,26	0.8227	Accept null	Prob F(1,26	0.1865	Accept null
Prob .ChiSq	0.8166		Prob .ChiSq	0.1765	

Source: Researchers computation

Table 8 indicate that probability values of F-statistics and that of Obs.R^2 on MAVO and Interes rate in both countries are (Nigeria -MAVO P-value of F-stat =0.5733 and P-value of Chi sq=0.5564). In similar manner South African activities were observed on the same table as (South Africa -MAVO P-value of F-stat =0.7120 and P-value of Chi sq=0.6992). The result or the outcome on the variable is said to be statistically not significant ,since it is neither equal to zero nor less than 5% level of significance .

On the same table 8 the Interest rate differential on both countries are said to be statistically not significant, since the probability values of all the outcomes in absolute terms are neither equal to zero nor less 5% level of significance. Based on these observations ,the study opted for the use of Fixed and random Effect estimation for the purpose of eliminating co-llinrearity of explanatory variables ,since there is no presence of ARCH effect ,therefore no need of ARCH model

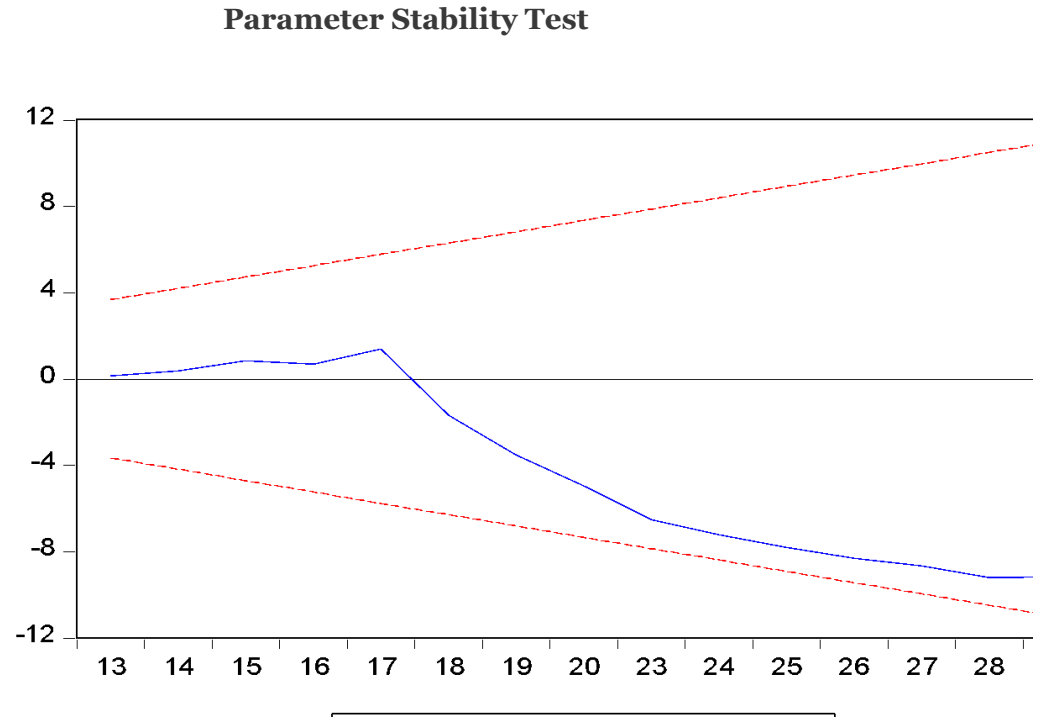
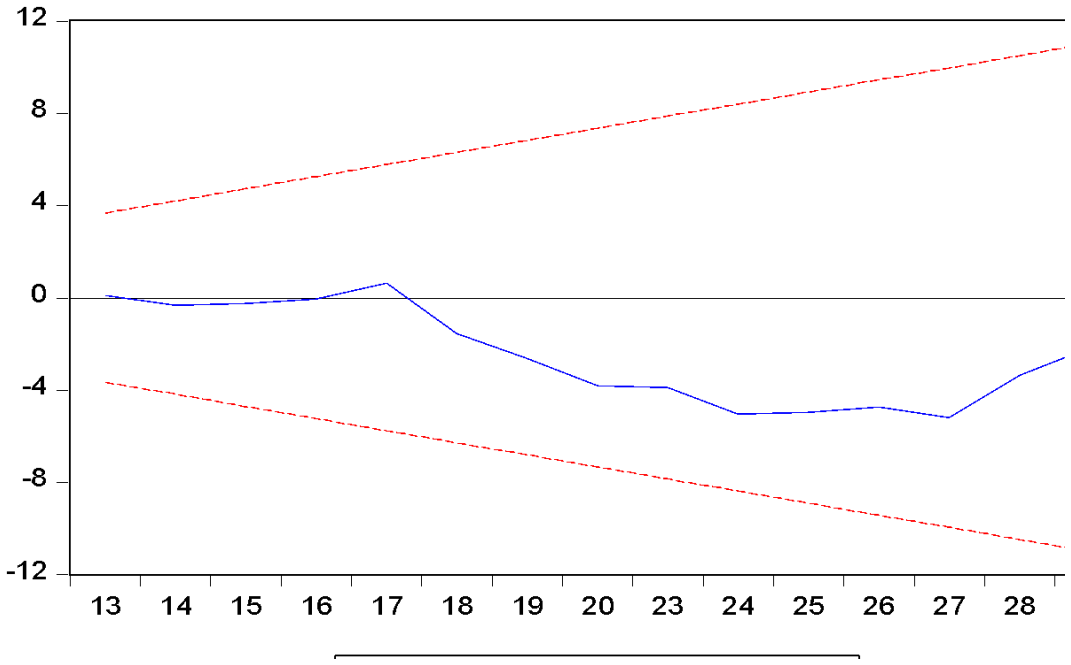


Figure 1: Nigeria Model one



Figue 2: Model Two

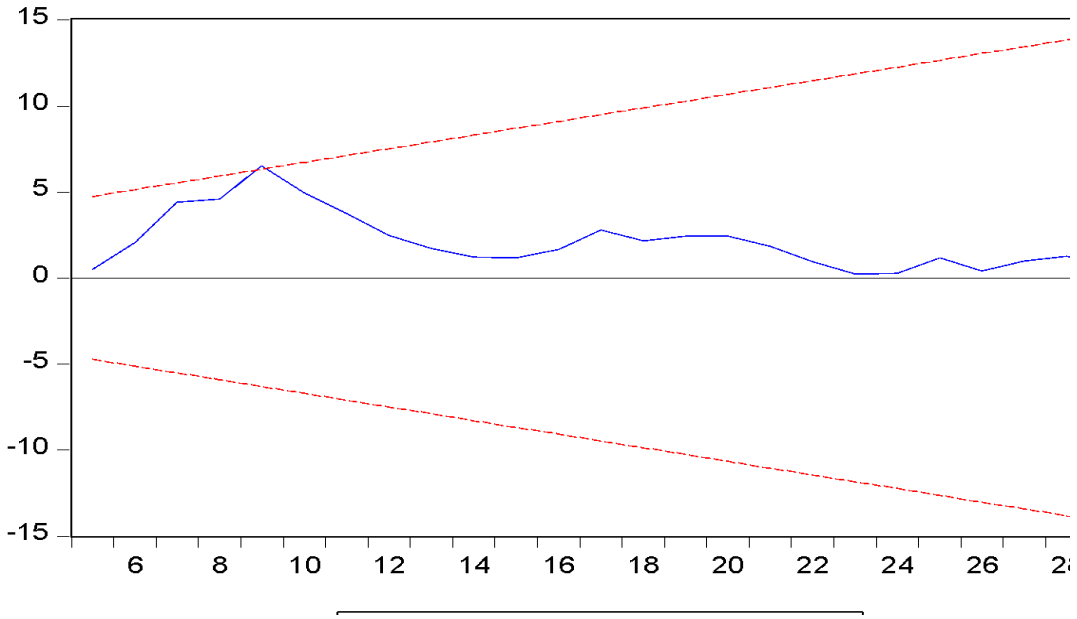


Figure 1: South Africa Model One

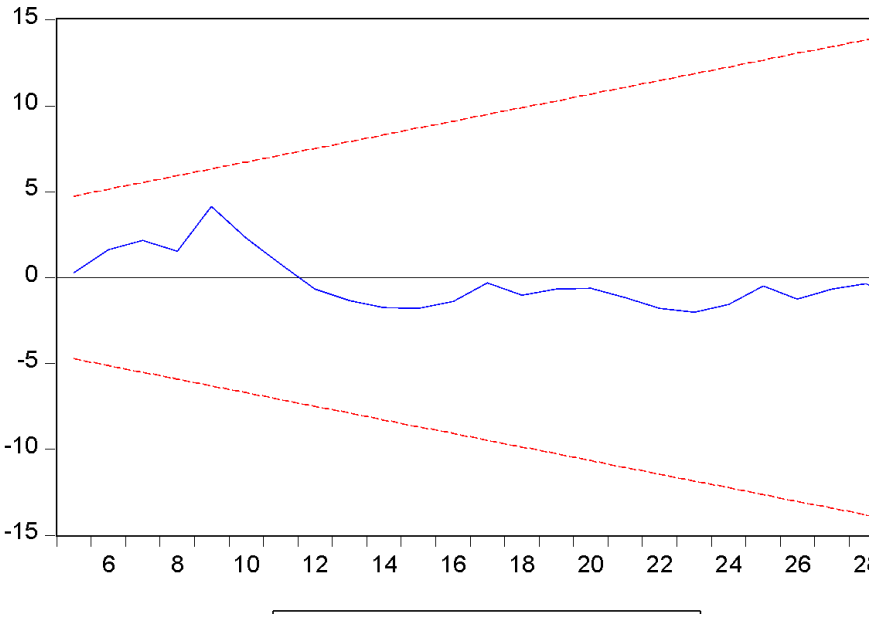


Figure 2: Model Two

Test of Hypotheses

Test of Hypothesis one

Statement of Hypothesis in Null Form

$H_{0:}$ Macroeconomic volatility did not have positive and significance effect on the stock market liquidity in Nigeria and South Africa

Decision Criteria: Accept the null hypothesis if the coefficient of the explanatory variable is negatively signed and the probability value is not less than 5% level of significance ,otherwise reject the null. This condition is applicable to other hypothesis.

MODEL ONE

$$(STR_{it} = \beta_1 MAVO_{it} + \beta_2 MOS_{it} + \beta_3 EXR_{it} + \mu_{it})\, STR_{it} = \beta_1 MAVO_{it} + \beta_2 MOS_{it} + \beta_3 EXR_{it} + \mu_{it})$$

Table 9: Multiple Regression Table (OLS)

Variables	Coeffients	T-statistic	P values	R^2	Aj R^2	P(f-stat	D W
STR	21.9275						
(MAVO)	0.207102	0.500124	0.6203	75%	73%	0.0000	1.33
MOS(1)	0.317342	2.026678	0.0508				
EXS(1)	-0.347620	-4.632320	0.0001				
Nigeria	Coeffients	T-statistic	P values	R^2	Aj R^2	P(f-stat	D W
STR	-7.055453			0.66	0.60	0.0029	2.056
(MAVO)	1.571131	4.428479	0.0004				
MOS(1)	0.59600	3.129771	0.0061				
EXS(1)	-0.00605	-0.25013	0.7995				

Researchers computation

STR_{it} STR_{it} = Stock market liquidity, $MAVO_{it}$, $MAVO_{it}$ = Macroeconomic volatility

MOS_{it} MOS_{it} = Money supply EXS= Exchange rate

5.1 Results

South Africa

From Table 10, the interpretation of the result as regards the coefficients of various repressors is stated as follows: The value of the intercept is 32.2550; it shows that stock market liquidity (STR) will experience a 32.25% increase when all other variables are held constant. The estimate coefficients, which are -0.35759 {INT, show that a unit decrease in interest rate will cause a 0.35% decrease in stock market liquidity (STR), 0.32828% {MOS, shows that a unit increase in money supply will cause a 0.32828% increase in stock market liquidity (STR), and -0.25395 {EXS, shows that a unit change in exchange rate will cause a -0.25% decrease in stock market liquidity (STR).

The R2 of 73% implied that variation caused by (INT) stock market volatility (STR) was explained by 73%, while the remaining 27% represents unexplained variables not included in the model and was taken care of by the error term. The adjusted R2 in the result shows 70% as the best fit of the model for the explanatory variable tested. There is evidence of positive autocorrelation since the DW statistic is 1.04. The p-value of the f-statistic is 0.0000, which concludes that the overall estimate is statistically significant.

Decision: The study accepts the null hypothesis since the coefficient value of the explanatory variable (bond rate) is negatively signed (-0.35759), indicating a negative impact on stock market liquidity; though not significant (0.5949), the study therefore concludes that bond interest rates have a negative and non-significance effect on stock market liquidity in South Africa.

From Table 9, the interpretation of the result as regards the coefficients of various regressors is stated as follows: The value of the intercept is -7.055453; it shows that stock market liquidity (STR) will experience a 7.055% decrease when all other variables are held constant. The estimate coefficients, which are 1.571131 {MVO, show that a unit increase in macroeconomic volatility will cause a 1.57% increase in stock market liquidity (STR), 0.59600% {MOS} shows that a unit increase in money supply will cause a 0.59% increase in stock market liquidity (STR), and -0.006058 {EXS} shows that a unit change in exchange rate will cause a -0.006% decrease in stock market liquidity (STR).

The R2 of 66% implied that variation caused by (MVO) stock market volatility (STR) was explained by 66%, while the remaining 34% represents unexplained variables not included in the model and was taken care of by the error term. The adjusted R2 in the result shows 60% as the best fit of the model for the explanatory variable tested. There is evidence of positive autocorrelation since the DW statistic is 2.056. The p-value of the f-statistic is 0.000290, which concludes that the overall estimate is statistically significant.

Decision: The study fails to accept the null hypothesis since the coefficient value of the explanatory variable is positively signed (0.59600), indicating a positive impact on stock market liquidity and significance. The study therefore concludes that macroeconomic volatility has a positive and significant effect on stock market liquidity in Nigeria**.**

Test of Hypothesis Two

Statement of Hypothesis in null form

H_0: Interest rate differentials did not have positive and significance impact on stock market liquidity in South Africa.

Table 10: Multiple Regression Table (OLS)

Variables	Coeffients	T-statistic	P values	R^2	Aj R^2	P(f-stat	D W
STR	32.2550			0.73	0.70	0.0000	1.04
INT RATE	-0.35759	-0.53762	0.5943				
MOS(1)	0.32828	1.63510	0.1113				
EXS(1)	-0.25395	*3.96832	0.0004				
Nigeria	Coeffients	T-statistic	P values	R^2	Aj R^2	P(f-stat	D W
STR	-6.121344			0.32	0.20	0.077	1.05
INT RATE	-0.006386	-1.086833	0.2923				
MOS(1)	10.82669	2.171246	0.04444				
LNEXS(1)	-3.257574	-0.675649	0.5084				

Researchers computation

STR_{it} STR_{it} = Stock market liquidity, INT_{it} INT_{it} = Interest Rate Differentials, MOS = Money supply

EXS= Exchange rate

VI. DISCUSSION

5.1 Results

South Africa

From Table 10, the interpretation of the result as regards the coefficients of various repressors is stated as follows: The value of the intercept is 32.2550; it shows that stock market liquidity (STR) will experience a 32.25% increase when all other variables are held constant. The estimate coefficients, which are -0.35759 {INT, show that a unit decrease in interest rate will cause a 0.35% decrease in stock market liquidity (STR), 0.32828% {MOS, shows that a unit increase in money supply will cause a 0.32828% increase in stock market liquidity (STR), and -0.25395 {EXS, shows that a unit change in exchange rate will cause a -0.25% decrease in stock market liquidity (STR).

The R2 of 73% implied that variation caused by (INT) stock market volatility (STR) was explained by 73%, while the remaining 27% represents unexplained variables not included in the model and was taken care of by the error term. The adjusted R2 in the result shows 70% as the best fit of the model for the explanatory variable tested. There is evidence of positive autocorrelation since the DW statistic is 1.04. The p-value of the f-statistic is 0.0000, which concludes that the overall estimate is statistically significant.

Decision: The study accepts the null hypothesis since the coefficient value of the explanatory variable (bond rate) is negatively signed (-0.35759), indicating a negative impact on stock market liquidity; though not significant (0.5949), the study therefore concludes that bond interest rates have a negative and non-significance effect on stock market liquidity in South Africa.

Nigeria

From Table 10, the interpretation of the result as regards the coefficients of various regressors is stated as follows: The value of the intercept is -6.121344; it shows that stock market liquidity (STR) will experience a 6.12% decrease when all other variables are held constant. The estimate coefficients, which are -0.006 {INT, show that a unit decrease in interest rate will cause a 0.006% decrease in stock market liquidity (STR), 10.82% {MOS, shows that a unit increase in money supply will cause a 10.82% increase in stock market liquidity (STR), and -3.25 EXS, shows that a unit change in exchange rate will cause a -3.25% decrease in stock market liquidity (STR).

The $R^{2\ of}$ 32% implied that variation caused by (INT) stock market volatility (STR) was explained by 32%, while the remaining 68% represents unexplained variables not included in the model and was taken care of by the error term. The adjusted R2 in the result shows 20% as the best fit of the model for the explanatory variable tested. There is evidence of positive autocorrelation since the DW statistic is 1.05. The p-value of the f-statistic is 0.07, which concludes that the overall estimate is not statistically significant.

Decision: The study accepts the null hypothesis since the coefficient value of the explanatory variable (bond rate) is negatively signed (-0.006), indicating a negative impact on stock market liquidity; though not significant (0.2923), the study therefore concludes that bond interest rates have a negative and non-significance effect on stock market liquidity in Nigeria.

5.2 Theoretical Implication

The findings emanating from the impact of macroeconomic volatility and interest differentials on stock market liquidity are as follows:

- Macroeconomic volatility has a positive and significant effect on the stock market liquidity in Nigeria, while in South Africa, macroeconomic volatility has a positive and non-significant effect on the stock market liquidity.
- Interest rates have a negative and non-significant effect on stock market liquidity in South Africa and Nigeria.

Since the coefficient of macroeconomic volatility is -0.207 and 1.57 for South Africa and Nigeria, respectively, it implies that a change in the volatility by 1% will result by the same margin in a fall or a rise in the level of stock market liquidity that would be experienced in economic activity.

5.3 Practical Implication

These finding implicate the need for government enacts sound monetary policies in order to enhance economic growth in Nigeria and South Africa. The government will also need to benchmark for best practices in monetary policy development from those economies that are more advanced in order to develop better monetary policies that can improve the performance of the stock market.

5.4 Limitation and Future Decision

This study was limited to investigating the impact of macroeconomic volatility and interest rate differentials on stock market liquidity in Nigeria and South Africa from the period (1983-2022).The base year (1983) was marked by Food and Agricultural Organization (FAO)Launched by the United Nations to assist in alleviating famine in Africa.A population of 54 countries in Sub-Sahara Africa was sampled ,while two countries were selected based on the volume of their market transactions over the years under study. In future research the researcher will look at more countries, and widen the score of the research by extending the period of study to 2024.

VII. CONCLUSION

The term stock market refers to various channels through which the shares of a publicly held company are bought and sold. Such financial activities are conducted under a given set of regulations. The market moves excess funds from savers (the surplus unit) to institutions (the deficit unit), which then invest them in productive uses.

All the explanatory variables in this study have elasticity less than unity (Es< 1). This implies that a proportionate change in any of the independent (X) variables will result in a proportionate change in stock market liquidity. With the findings resulting from this study, the following conclusions are drawn:

1. It will be important if the government enacts sound monetary policies in order to enhance economic growth in both countries under study. The government will also need to benchmark for best practices in monetary policy development from those economies that are more advanced in order to develop better monetary policies that can improve the performance of the stock market.
2. The government needs to create an enabling environment and promote infrastructural development to facilitate the ease of stock market activities in particular and the financial systems of both countries.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Author's contributions

I.O.I. collected and analysed the study data, conducted the literature search and prepared the final manuscript.

Ethical considerations

Ethical clearance was obtained from the Ethics Committee of the Department of Banking and Finance, Evangel University, Abakaliki Ebonyi State, Nigeria. Informed consent was obtained from all countries involved in the study.

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Data availability

Derived data supporting the findings of this study are available from the corresponding author, I.O.I., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of any affiliated agency of the author.

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Advancing Sustainable Practices in the Bangladeshi Ready-Made Garments Industry: A Systematic Review and Future Research Avenues in Green Human Resource Management

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ABSTRACT

This paper focuses on Green Human Resource Management in the Bangladeshi Ready Made Garments industry. It is claimed that the concept of GHRM fits in the Bangladeshi RMG industry context, especially in aspects such as HRM, sustainability, environmental management, green management, and corporate social responsibility (CSR). However, there is a paucity of researcher that has suggested potential research avenues by focusing on GHRM in the early mentioned industry context. To address this gap in literature and to fully understand and develop further knowledge on GHRM, this paper contextualizes the notion of GHRM in the context of export-oriented small, medium, and large firms predominantly in the RMG industry in all five geo-political regions in Bangladesh to offer a comprehensive future research avenues. Systematically reviewing 57 papers, this paper has provided a comprehensive overview of different aspects of the Bangladeshi RMG industry and the extent of GHRM practices implementation there. The review has revealed six contextual gaps for the potential researchers in the relevant field. The originality of this paper lies in the fact that it has highlighted the GHRM research gaps in the Bangladeshi RMG industry context which is found absent in the literature.

Keywords: ready made garments, green human resource management, corporate social responsibility, environmental management, sustainable performance, sustainability initiatives, ecofriendly practices, green recruitment, green training, green employee involvement.

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This paper focuses on Green Human Resource Management in the Bangladeshi Ready Made Garments industry. It is claimed that the concept of GHRM fits in the Bangladeshi RMG industry context, especially in aspects such as HRM, sustainability, environmental management, green management, and corporate social responsibility (CSR). However, there is a paucity of researcher that has suggested potential research avenues by focusing on GHRM in the early mentioned industry context. To address this gap in literature and to fully understand and develop further knowledge on GHRM, this paper contextualizes the notion of GHRM in the context of export-oriented small, medium, and large firms predominantly in the RMG industry in all five geo-political regions in Bangladesh to offer a comprehensive future research avenues. Systematically reviewing 57 papers, this paper has provided a comprehensive overview of different aspects of the Bangladeshi RMG industry and the extent of GHRM practices implementation there. The review has revealed six contextual gaps for the potential researchers in the relevant field. The originality of this paper lies in the fact that it has highlighted the GHRM research gaps in the Bangladeshi RMG industry context which is found absent in the literature.

Keywords: ready made garments, green human resource management, corporate social responsibility, environmental management, sustainable performance, sustainability initiatives, ecofriendly practices, green recruitment, green training, green employee involvement.

I. INTRODUCTION

Green Human Resource Management (GHRM) plays a vital role in addressing and implementing sustainability initiatives. It is the integration of environmental management into human resource management (Renwick et al., 2013). Its major aspects include green recruitment and selection, which is aimed at getting the right persons with environmental values and concerns, green training and development, which is concerned with developing green skills, green performance management, which is focused on assessing and improving employees performance by including green criteria in the performance management systems, green compensation and reward which intends to motivate employees based on their green performance, and green employee involvement which encourages employees in initiating and implementing green innovations and initiatives (Tang et al., 2018; Renwick et al., 2013; Jackson et al., 2011). In light of these GHRM aspects, previous GHRM studies have reported a positive impact of GHRM on multiple dimensions of organizational sustainable performance, which includes environmental performance, economic performance, social performance, corporate social responsibility, green competitive advantage, as well as multiple dimensions of individual performance including green behavior, green creativity, green innovations, green job satisfaction etc (Zafar et al., 2023; Darvishmotevali and Altinay, 2022;

Zhu et al., 2021). Moreover, Tang et al. (2018) claimed that GHRM can create win-win situations for multiple stakeholders, including consumers, employees, owners, suppliers etc. Therefore, there is a call for more research on GHRM to make the field more flourished and developed (Renwick et al., 2013; Jabbour et al., 2010; Islam et al., 2022).

Despite Ready Made Garments (RMG) industry of Bangladesh has been playing a tremendous role in enhancing foreign currency earnings of Bangladesh, the sustainability issues have not been made formalized and implemented to the expected extent (Chowdhury et al., 2017; Islam et al., 2020; Rubel et al., 2021). Therefore, Islam et al. (2020), and

Chowdhury et al. (2023) argued that implementing GHRM practices could play an important role in the sustainable development of the industry by addressing green in labor-management issues . However, this review has revealed that there is a paucity of studies on GHRM in the Bangladeshi RMG industry context. Moreover, there is no comprehensive research agenda in the field to date to direct potential researchers to take more research initiatives. This study aims to address this void in the literature in the industry context as mentioned earlier.

The subsequent section has given a justification for addressing the Bangladeshi RMG industry context, followed by methods, synthesizing and reporting review results, and research directions. Finally, the paper has been concluded.

II. WHY BANGLADESHI RMG CONTEXT?

The key reasons behind taking this industry as the context of this research are twofold: first, this is one of the major contributors to the socio-economic development of Bangladesh, and second, this is an under-researched industry in terms of GHRM-focused research. These have been discussed in detail in the subsequent sub-sections:

2.1 A Key Contributor to the Bangladeshi Socio-economic Growth

The agro-based economy of Bangladesh has been converting into an industrial economy (Mendy and Rahman, 2019; Chowdhury et al., 2017; Rubel et al., 2021), where the RMG industry is playing an important role (Mia and Akter, 2019; Chowdhury et al., 2019). Therefore, sustainable development of this industry is essential by taking different sustainability oriented initiatives, including GHRM practices, green CSR, etc., for sustainable development of the country (Islam et al., 2020; Rubel et al., 2021; Chowdhury et al., 2023). Some points signifying its role have been highlighted in the following subsections:

RMG is the largest foreign currency-earning industry in Bangladesh (Rahman and Siddiqui, 2015; Islam et al., 2016), and it is the 2nd highest garments exporting country in the globe (after China) (Rahman and Siddiqui, 2015; Kaizer, 2020). Its global export share is around 4-5% (Adnan et al., 2015; BGMEA, 2023).

It contributes more than 13% to Bangladesh's total GDP (Rahman and Siddiqui, 2015; BGMEA, 2023), for which it has been considered as one of the major pillars of the economy.

Bangladesh is an overpopulated country where ensuring employment for all employable citizens is difficult (Alam et al., 2020). Hence, this industry is playing an important role in generating colossal employment for skilled, semi-skilled, and unskilled employees and thereby, accelerating poverty alleviation in the country (Chowdhury et al., 2017; Kumar et al., 2020). For example, it currently employs around 4 million workers, which is the biggest portion of the total labor force (BGMEA, 2022).

This industry has been contributing tremendously to the women's empowerment in the country, as nearly 60% of its workforce is women, which is rated as the top proportion in South East Asia (Chowdhury et al., 2017; Alam et al., 2020).

2.2 Under-Researched area in Terms of GHRM-Focused Research

Despite the Bangladeshi RMG industry having playing an important part in the country's socio-economic development, this is an under-researched industry in terms of GHRM focused research (Islam et al., 2020; Rubel et al., 2021). In addition to that, there is a dearth of HR research in the same context (Rahman et al., 2018; Kabir et al., 2018; Zaman and Khan, 2021) that has addressed the link between HRM and sustainability issues, despite the claim that sustainable HRM can play an important role in sustainable management of all other organizational resources (Raut et al., 2020; Mendy and Rahman, 2019). Moreover, only two GHRM studies conducted in the Bangladeshi RMG industry context were found to date (Rubel et al., 2021; Islam et al., 2020). Apart from that, the industry background analysis has revealed the following facts in terms of HRM and GHRM research: The most of HR or GHRM studies conducted previously in the Bangladeshi RMG industry context are either literature review-based conceptual papers or empirical papers with impoverished analysis, based on which no precise or reliable insights could be developed for managerial decision-making. Therefore, more empirical research is needed to address this contextual gap. There is not even a single empirical study to date that assessed GHRM aspects and practices to suggest critical one/ones for sustainably improving individual and organizational performance. No study has been conducted to date to ascertain the extent to which GHRM practices have been implemented into the industry. No research was found that analyzed and prioritized the factors based on prominence and influential scores that either drive or challenge GHRM practices implementation in the industry. Only two GHRM studies were found in the Bangladeshi RMG industry context. For example, Rubel et al. (2021) examined how green work climate perceptions mediate the association of green HRM with eco-friendly behavior through quantitative research design. Islam et al. (2020) explored challenges and solutions in using green HRM attributes for the ecological work station through an interview-based qualitative study. Still, they ignored inter-relationship analysis among challenges to prioritize the most critical ones affecting the implementation process.

The industry analysis has also found some other studies which were focused on different aspects of HRM. For example, job satisfaction (Rahman et al., 2018), working environment (Kabir et al., 2018), compensation (Zaman and Khan, 2021), and compliance with labor law (Islam et al., 2017). Some empirical studies also focused on CSR (Chowdhury et al., 2017).

III. METHODS

Figure 1 depicts the PRISMA flow chart of this article. Firstly, the keywords focusing on the main theme have been identified. Major Key words include Green HRM in Bangladesh, GHRM in Bangladesh, GHRM in the RMG industry of Bangladesh, and Green HRM in the Bangladeshi RMG industry. Second, the papers matched with the theme were extracted from the Scopus database. Third, all the articles have been judged using some criteria as shown in Figure 1. The selected 57 papers reviewed in this study have been discussed under different themes.

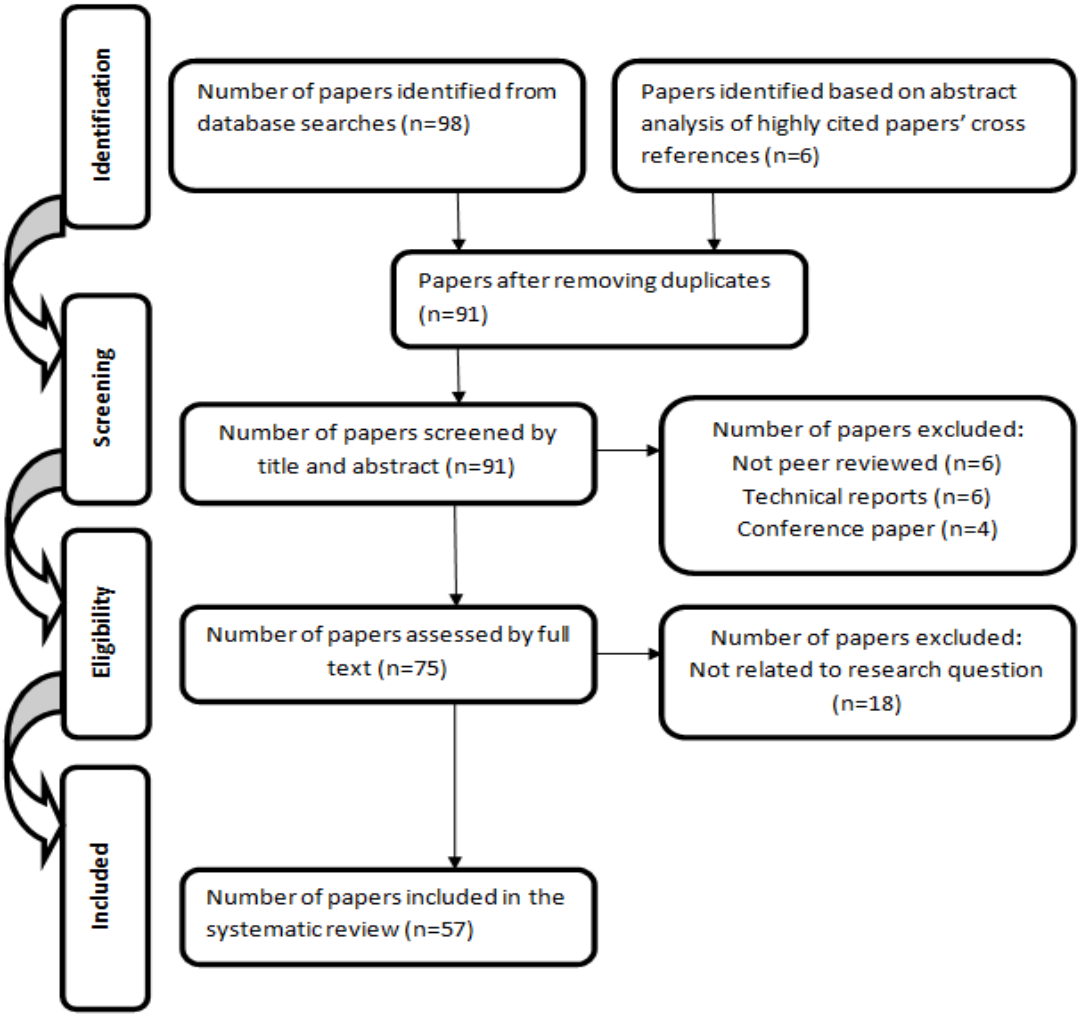

Figure 1: PRISMA flow diagram of this paper

This SLR has been conducted following the guidelines of Sharma et al. (2021); and Tranfield et al. (2003). The selected papers have been reviewed and analyzed by applying thematic analysis.

3.1 Synthesizing and reporting review results

This section provides short highlights on the Bangladeshi RMG in terms of industry and factories based on the literature review.

3.2 Contributions of the industry

The industry contributes about 13% to Bangladesh's GDP (Rahman and Siddiqui, 2015; BGMEA, 2023). Apart from that, it is the largest foreign currency-earning industry in Bangladesh (Islam et al., 2016; Rahman and Siddiqui, 2015; Alam et al., 2020). Figure 2 shows a comparative picture between Bangladeshi RMG exports and total exports.

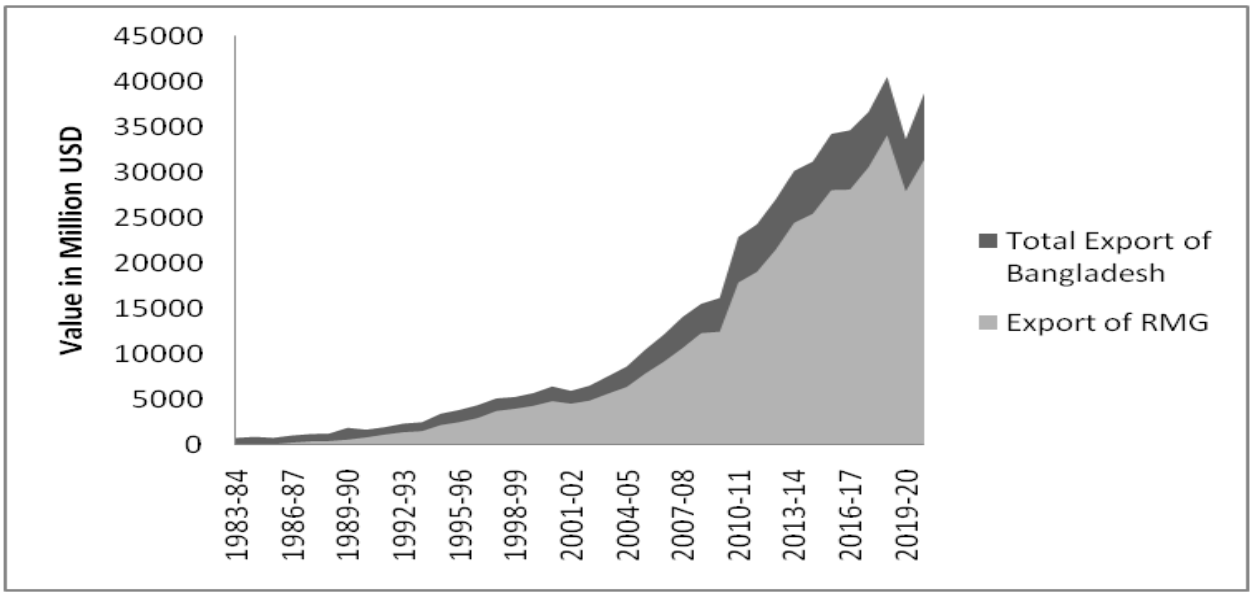

Figure 2: Comparisons between Bangladeshi RMG exports & total export

Moreover, Bangladesh has been ranked the second highest garment exporter country in the World (next to China) (Rahman and Siddiqui, 2015; Kaizer, 2020). Its global RMG export share is around 4-5% (Adnan et al., 2015; Chowdhury et al., 2022).

It is worth mentioning here that the United States and the EU have been switching their consideration from the Chinese RMG marketplace as this is no longer as favorable as the Bangladeshi one concerning low-cost labor (Sarkar et al., 2020). Furthermore, the industry plays a key role in creating job opportunities and poverty alleviation in the country (Kumar et al., 2020). Figure 3 shows the Bangladeshi knitted and woven RMGs exported to the World.

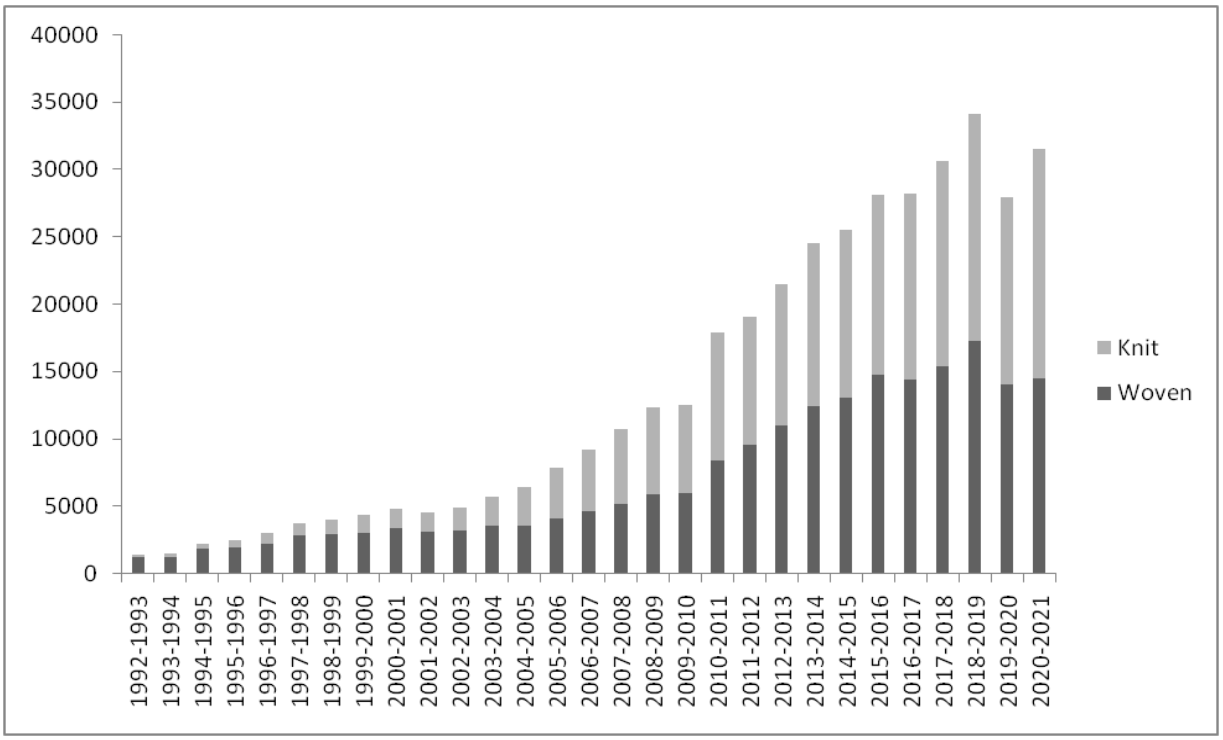

Figure 3: Bangladesh's RMG export to World (Value in million USD)

More specifically, this industry has been playing an important role in generating employment, mainly for the women workforce of the country (Mia and Akter, 2019; Alam et al., 2020). Hence, it has been contributing tremendously to empowering females, as around 60% of its workers are women which are rated top in South East Asia (Islam et al., 2016; Chowdhury et al., 2022). Moreover, one of its present targets is to contribute not only to economic development, but also to human capital development by empowering women (Rahman and Siddiqui, 2015; BGMEA 2022). Therefore, there is a call for sustainable strategies, such as GHRM practices, to ensure sustainable human capital development (Wagner, 2009) through practices such as GRS, GTD, GPM, GCR, and GEI. Despite the facts, the SLR has revealed that what GHRM aspects and practices are critical to enhancing human capital development is missing in the previous GHRM research and literature. The major socio-economic contributions of the RMG industry have been captured in Figure 4.

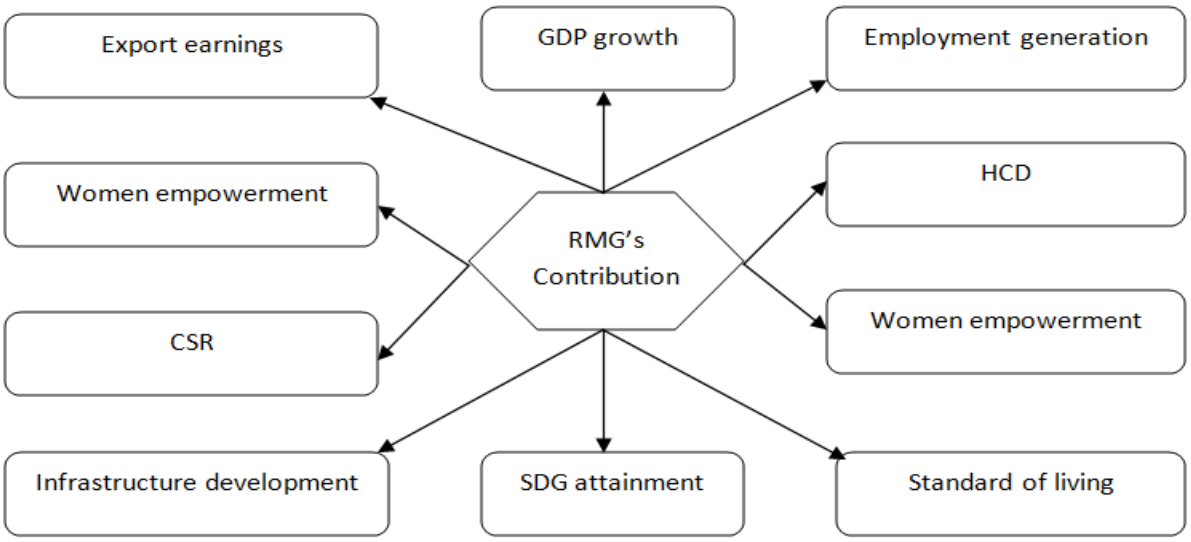

Figure 4: Socio-economic contributions of RMG in the context of Bangladesh Staff Composition

All staff working in the Bangladeshi RMG industry has been broadly categorized into two groups: white-collar staff and blue-collar staff (Chowdhury et al., 2022; BGMEA, 2022).

White-collar staff: Staff holding positions like MD, CEO, GM, DGM, AGM, manager, etc. is considered white-collar staff (Chowdhury et al., 2023; Alam et al., 2020). They perform primarily official and managerial jobs and their education level is comparatively higher than that of blue-collar staff (Sarkar et al., 2020; Chowdhury et al., 2022). More male staff come under this group than female staff. The number of staff in this group is much lower than that of the blue-collar group. RMG factories are also employing a number of foreign professionals.

Blue-collar staff: Workers working at the operating or production level are considered blue collar staff (Chowdhury et al., 2017; Alam et al., 2020). They are the staff directly involved in woven or knitted garment production. Their education level is comparatively shallow. Some have only primary education, and some are illiterate. They are the majority in numbers compared to white-collar staff (Islam et al., 2016). This review of literature shows that the majority of previous HRM studies conducted in the Bangladeshi RMG industry context were based on data collected from blue-collar staff (Chowdhury et al., 2023; Islam et al., 2020), where the majority are either illiterate or poorly educated, who cannot provide factual data to depict the actual picture of the industry. So, there is a dearth of HRM studies that were conducted based on data collected from white

collar staff who can provide more rich, accurate, and reliable data on HRM or EM or GHRM practices of the industry (Chowdhury et al., 2022; Rubel et al.,2021). Now there is a need not only to focus GHRM studies on blue-collar staff, but also on white-collar staff to ascertain the effects of green HRM practices implementation on a firm's performance, individual performance, and the extent to which both aspects are sustainable in the Bangladeshi context. The staff composition of this industry has been highlighted in Figure 5.

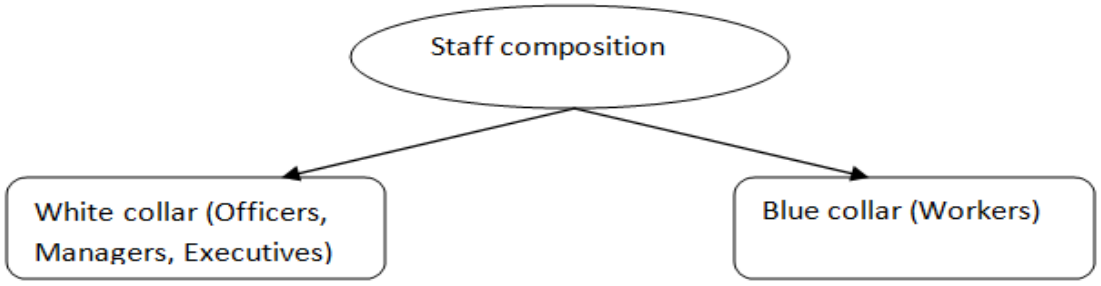

Figure 5: Staff composition of RMG in the context of Bangladesh

IV. INTERNATIONAL MARKETS

Bangladeshi RMG is concentrating on two international marketplaces: the EU and the USA. These two consist around 83% of the country's total RMG exports in 2021 (BGMEA, 2023). International buyers and suppliers have been considered crucial stakeholders having an influential voice in the management of this industry (Alam et al., 2020; Chowdhury et al., 2022). They set different benchmarks for the firms, such as minimum wages, sustainable working methods, CSR, safe working environment, leave and holidays for staff, green workplace design, etc. All of these aspects are part of external companies', and stakeholders' drive to ensure not only the implementation of GHRM practices, but also the sustainability of performance at the organizational, and individual levels. For example, after the collapse of Rana Plaza and Tazreen Fashion, international buyers have become very serious about the overall management system of Bangladeshi RMG factories, urging them to ensure a sustainable and safe workplace. Therefore, it's crucial to assess their part in ensuring a sustainable workplace. However, this review shows that very few studies explored the role of the buyer as a stakeholder in promoting a green and sustainable workplace. Major international markets are displayed in Figure 6.

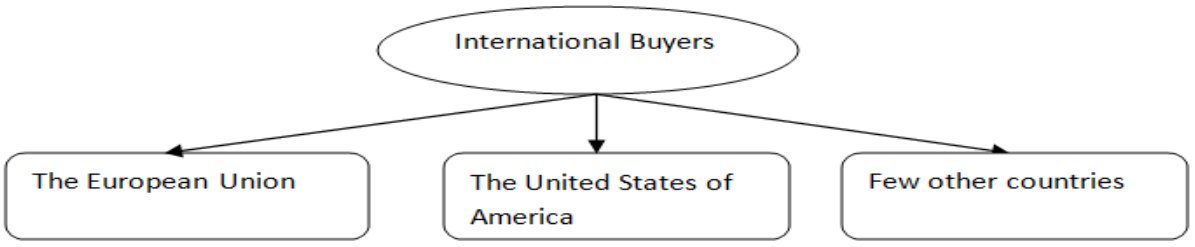

Figure 6: International markets of Bangladeshi RMG

4.1 Challenges

The industry is facing multiple types of challenges, ranging from HR, power, infrastructural, legal, political, social, and environmental to financial, in its journey of progression.

Significant challenges that have been highlighted in the previous research include unskilled workers, improper infrastructure, electricity crisis, gas shortage, insufficient bank loans associated with high rates of interest, high tax rates, intricate social compliance, political crisis, market and product diversification (Rakib and Adnan, 2015; Islam et al., 2016); lack of new investment, poor backward and forward linkage (Rakib and Adnan, 2015); higher production cost, high maintenance cost, and lack of green-financial support (Kaizer, 2020). Significant challenges that the RMG industry has been tackling are shown in Figure 7.

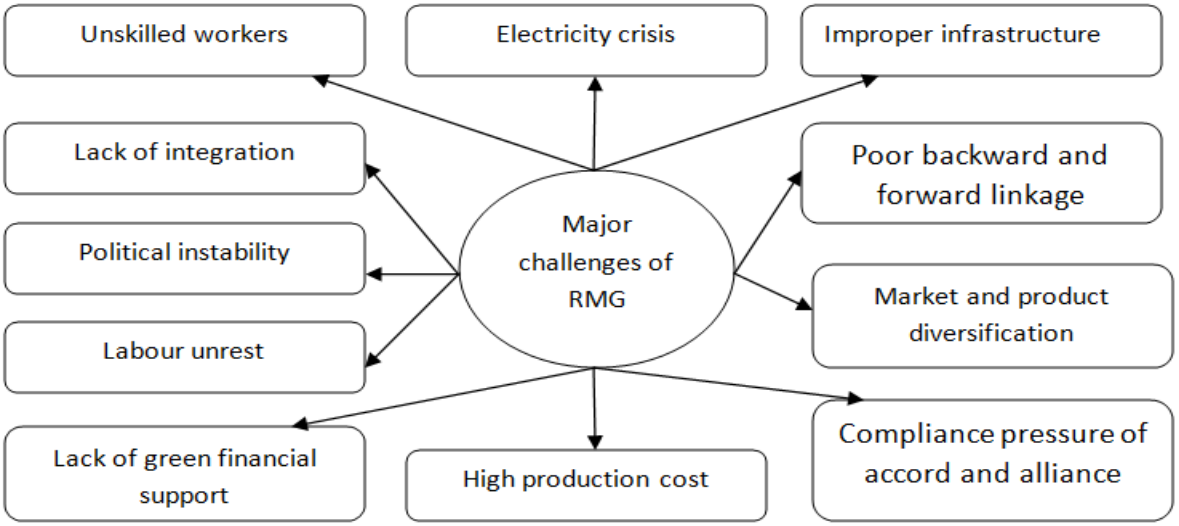

Figure 7: Challenges of the RMG industry in the context of Bangladesh

However, the background analysis of the industry shows that, though the industry is facing multiple problems in managing human resources in an environmentally friendly way, there are minimal studies conducted to explore what human-related challenges the industry is facing from various stakeholders' perspectives in managing HR in an environmentally friendly manner.

4.2 Green Concerns and Initiatives

Global demand for eco-friendly products and services has been creating tremendous pressure on RMG firms to uptake greener initiatives, design environment-friendly production systems, and hold a conclusive locus for the minimization of effluence and detrimental effects of biological footprint (Sarkar et al., 2020; Rubel et al., 2021). It was reported that this industry consumes energy and natural means in such an unmaintainable way and releases a massive amount of ozone impairing affluences that cause copious environmental, economic, and social issues from ecological alteration to worldwide-tendencies of affluence management (Sarkar et al., 2020; Rubel et al., 2021; Chowdhury et al., 2022). Therefore, the Asian RMG industries are striving to grasp the opportunities of going green movement and attract current and potential eco-friendly purchasers from Western countries (Sarkar et al., 2020; Chowdhury et al., 2017). Likewise, Bangladeshi RMG firms have been taking different green creativities, like clean production frameworks and green water treatment facilities, while the government is also daunting novel legislature and placing pressure on the RMG producers to adopt ecologically sustainable practices (Sarkar et al., 2020; Chowdhury et al.,2022). Moreover, as the buyers are asking the manufacturer for more eco-friendly products and

services, green–oriented RMG firms have the opportunity to gain a competitive advantage (Chowdhury et al., 2017; Sarkar et al., 2020).

However, it is a matter of hope that, Bangladesh is the 2nd top RMG exporting country in the ecosphere, which has the maximum numeral of green RMG plants in the World (Kaizer, 2020; BGMEA, 2022). The study conducted by Kaizer (2020) exposed that a safe working place, ecological safety, a factory's reputation, attracting buyers, and less energy consumption (among others) are the key stirring aspects behind moving towards the green RMG factories. The previous research also reported that green priority orders from the buyers, fair price, green infrastructure development from the government side, and tax deductions can extraordinarily affect the green renovation and sustainability of the RMG industry. On the other hand, BGMEA has taken some measures to lift the sustainability gait of the industry to the subsequent stage, such as SDG alignment, de-carbonization, green button, partnership for a cleaner textile (PaCT) II, green policy, waste management, etc. Major green initiatives and concerns in the RMG industry have been captured in Figure 8.

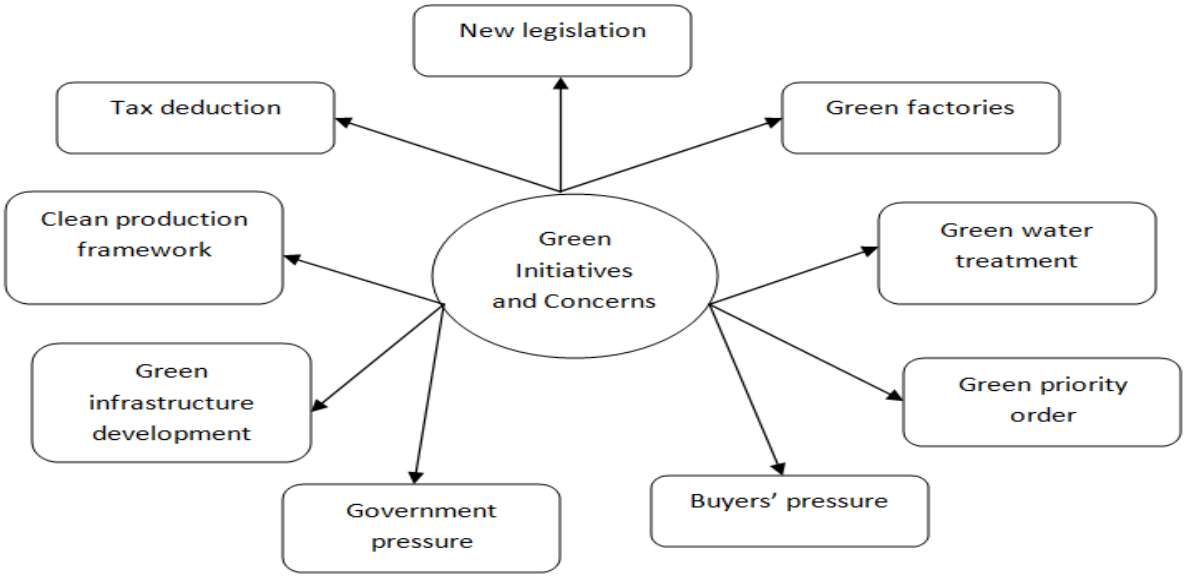

Figure 8: Green initiatives and concerns in the RMG industry in the context of Bangladesh

In a nutshell, Bangladeshi garment entrepreneurs have started to respond to the call made for ―Going Green‖ for the sustainable development of the industry. However, there is a dearth of studies that present an insightful gestalt of green business strategies from the Bangladeshi garments industry context (Islam et al., 2020; Sarkar et al., 2020).

4.3 Why is GHRM Essential in the RMG Industry?

Despite the RMG industry of Bangladesh progressing rapidly, it is also facing some emergent challenges in the area of sustainability, with issues like weather adjustment, groundwater diminution, proficiency, and many more (Chowdhury et al., 2022; BGMEA, 2022; Alam et al., 2020). Globally, it has been reported that the fashion industry is the most polluting , only after oil and gas (BGMEA, 2022; Alam et al., 2020), as it requires thousands of chemicals and many sophisticated processes to give the fast fashion industry the colors it has. More specifically, some issues that have necessitated an urgent call for GHRM practices implementation in the RMG industry are described below (see Figure 9).

Some tragedies in the Bangladeshi RMG industry have raised awareness and concerns of local and international stakeholders regarding issues such as sustainable working environment, workers' safety and job security, minimum wages, etc. For example, after the Rana Plaza accident in 2013, the garment industry went via a huge

reorganization procedure and adopted numerous variations in their health and safety initiatives (Chowdhury et al., 2017; Alam et al., 2020).

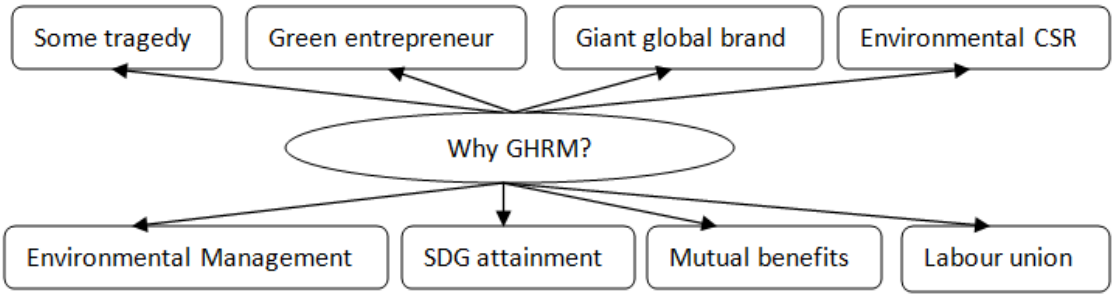

Figure 9: Emergence of GHRM in the Bangladeshi RMG industry context

The rise of a good number of green entrepreneurs in the industry has also facilitated the GHRM practices implementation. Bangladesh, the most prominent garments exporting country in the globe, has the maximum number of green garments plants in the world (Kaizer, 2020; BGMEA, 2022). It has 160 LEED green RMG plants certified by the US Green Building Council. Five hundred more factories are about to receive LEED certification. Likewise, green investors are taking different green initiatives, including environmental CSR and environmental HRM, to minimize detrimental impacts on the environment to deal with the sustainability challenges.

Giant international brands come up with pledges to their customer to supply fashion with less ecological effect. Environmental watchdogs, global policy leaders, and civil society organizations are increasingly very vocal about the effect of the apparel industry. The labor union in the industry is strong and getting stronger. They are raising their voice in favor of workers' rights and putting pressure on the management to improve governance, green working environment, safety, job security, and benefits for workers. Attaining SDGs is one of the core concerns for the Bangladesh government, and without the help of the private sector, it is not possible for the government to achieve the goals on time. Adopting GHRM can contribute to attaining this goal by addressing environmental issues in human capital development.

4.4 Scope for the Application of GHRM Practices

Bangladeshi export-oriented RMG manufacturing firms can take the benefits of GHRM practices implementation in dealing with sustainability -related challenges mentioned earlier through its different aspects, such as GRS, GTD, GPM, GCR, and GEI (Islam et al., 2020; Alam et al.,2020; Chowdhury et al., 2022). For example, through GRS, RMG firms can attract candidates with pro-environmental values and can select environmentally committed personnel who exhibit environmental in-role and voluntary behavior (Chaudhary, 2019; Zhu et al., 2021) resulting in enhanced sustainable performance directly as well as indirectly (Longoni et al., 2018; Islam et al., 2022). GTD can educate unskilled and semi-skilled workers on the EM values, train them in energy-conserving working methods, diffuse environmental awareness within the organization, provide opportunity, and reduce waste to involve staff in ecological problem solving (Kumar and Chakraborty, 2022), which helps to deal with sustainability challenges effectively (Malik et al., 2020; Chowdhury et al., 2017).

Through GPM, leaders and managers of the RMG industry can incorporate EM responsibilities into the performance management and appraisal system for workers for displaying uninterruptedly green job behaviors, including recycling, green workplace analysis, energy efficiency, and waste management, which help organizations to enhance sustainability (Zaid et al., 2018; Mousa and Othman, 2020). By providing GCR, which is

linked with workers' environmental, economic, and social performance, RMG manufacturing firms can motivate the workers to complete the activity on time, deliver the services, & show team spirit to the highest extent, which helps in enhancing the sustainable performance of the organization (Malik et al., 2020). This is because, the availability of financial and non-financial rewards in the firm sends strong signals to employees that pro environmental behaviors are encouraged, appreciated, and rewarded (Ari et al., 2020; Kumar and Chakraborty, 2022). Lastly, by implementing GEI, RMG manufacturing firms benefit in three different ways (Haddock-Millar et al., 2016) as, first, by involving and endowing staff to provide recommendations for ecological developments (Govindarajulu and Daily, 2004); second, by drumming workforce tacit knowledge acquired via their adjacent associations with the manufacturing procedure (Boiral, 2002), and, third, via nurturing a culture in the workstation, which helps ecological development endeavors (Haddock-Millar et al., 2016). However, the literature review shows that no previous research measured the extent to which GHRM practices are implemented in the industry. Moreover, no previous study has been found that investigated what aspects and practices of GHRM are significant for improving the sustainable performance of the industry.

4.5 RMG Factories

There are three types of factories in the RMG industry of Bangladesh based on 1) product types and 2) size (see Figure 10). The former factories produce three types of textiles: only woven garments, only knitted garments, and a mixture of both types (BGMEA, 2022). Woven products include formal trousers, shirts, suits, denim jeans, georgette dresses, and chiffon. Knitted products include polo shirts, t-shirts, innerwear like briefs, bras, panties, socks, sweaters, stockings, and hoodies (BKMEA, 2022). The contribution of Woven garments to the country's exports is higher than that of the knitted products. Woven factories have more female workers than male workers; conversely, knitted factories have more male workers than female workers (MiB, 2022). This study has considered all three categories of factories in its sampling, partly to enrich the sources of data collection and to allow the highlighting of the differences in terms of how the implementation of GHRM practices impacted (positively and,or negatively) organizational and individual performance.

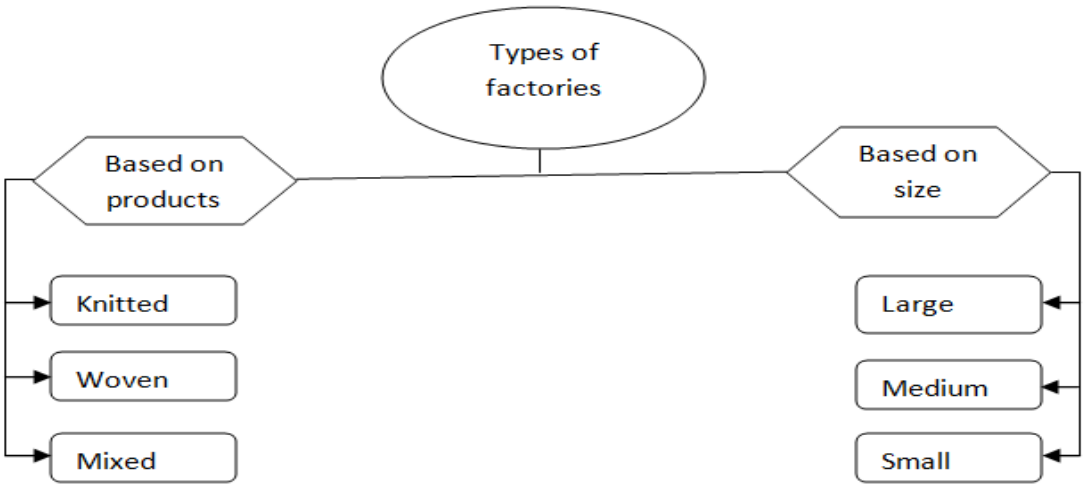

Figure 10: Types of Bangladeshi RMG factories

There are three types of RMG factories based on size: large factories having more than 1000 workers (Bangladesh Industry Policy, 2015), medium factories have 1000 or fewer but more than 50 workers (Bangladesh Industry Policy, 2015), and small factories which have one to fifty workers. These three types of RMG factories differ in various aspects, namely export worth,

employment opportunity, business nature, business automation, regulatory compliance, CSR activities, job security, HR practices, environmental management, and green HRM practices. These various aspects are clarified further in the following subsections:

Export worth: Large RMG exporters export more than 50 million USD worth of garments. Some giant exporters, like Noman group, Youngone Corporation, DBL group, and Hameem group, are exporting about 500 million USD annually. On the other hand, medium firms are exporting around 15 to 50 million USD annually, and small firms are exporting a maximum of 15 million USD annually.

Employment opportunity: Large factories, such as Babylon group, Walton group, and Hameem groups, etc., employ around 5000 workers, thereby, are creating more employment opportunities than medium or small firms.

Business nature: Usually, large RMG firms, such as Ananta group, Standard group, and DBL group, conduct business directly with buying houses/buyers, whereas medium and small firms work as subcontractors in most cases.

Business automation and Tech savvy: Large RMG firms are adaptive to modern manufacturing systems. For example, large groups, such as Fakir Group and Bitopi Group, use current software, such as enterprise resource planning (ERP), MIS planning, production management systems, HR payroll, etc. On the other hand, medium and small RMG firms can not avail themselves of these modern technological opportunities in most cases.

Regulatory Compliance: Large RMG factories, like Epic Group, and Mohammadi Group, mainly comply with different laws and standards, such as the Bangladesh National Building Code (BNBC), Accord, Alliance, and fire safety standards. This is because they are financially sound to invest in complying with these issues. On the other hand, compliance with these issues is poor in medium and almost absent in small factories.

CSR activities: Large RMG firms like AVS Fashion and Epyllion Group perform CSR activities regularly, and have a separate CSR fund. In this case, they hold an accommodative stance. On the other hand, medium firms hold a defensive stance, and small firms hold an obstructionist stance in most of the issues.

Job security: As large RMG firms work directly with the buyers, their operations and production has more continuity, which ensures better job security for the staff. Conversely, medium and small firms provide less job security as they mostly work as subcontractors. HR Practices and EM: HR practices and EM in large-sized RMG firms, such as RBS Fashion and Square Textile, are comparatively more structured than in medium and small firms. Almost all large firms have a separate HR department and EM wing.

Green factory: Almost all of the green factories in the Bangladeshi RMG industry are under large-scale firms, whereas medium and small firms have no green factories. A review of previous research, such as Kaizer (2020), Alam et al. (2020), MiB (2022), Rubel et al. (2021), Chowdhury et al. (2017), and Chowdhury et al. (2022), has exposed the fact that most of researches conducted in the Bangladeshi RMG context focused on either small firms or medium firms or large firms. Though, these three types of factories differ significantly in multiple aspects, as stated above, very few studies included all three types of factories (Chowdhury et al., 2017; Rubel et al., 2021).

Almost all export-oriented RMG factories are located in Dhaka, which is the capital city; Chittagong which is the commercial city, Narayangonj, Gazipur; and a few at different EPZs (MiB, 2022; Alam et al., 2020). More specifically, among export-oriented RMG factories, 37.9% are located in Dhaka, 28.9% are located in Gazipur, 16.1% are located in Chittagong, 14.7% are located in Narayangonj, and 1.5% are located in EPZs (Alam et al., 2020; Chowdhury et al., 2017). According to the MiB database, Narayanganj has the highest number of knit factories, Dhaka has the maximum number of woven factories, Chittagong has the highest number of mixed

factories, and Gazipur has the highest number of sweater factories (which is also under knit factories). Significant locations of RMG factories have been highlighted in Figure 11.

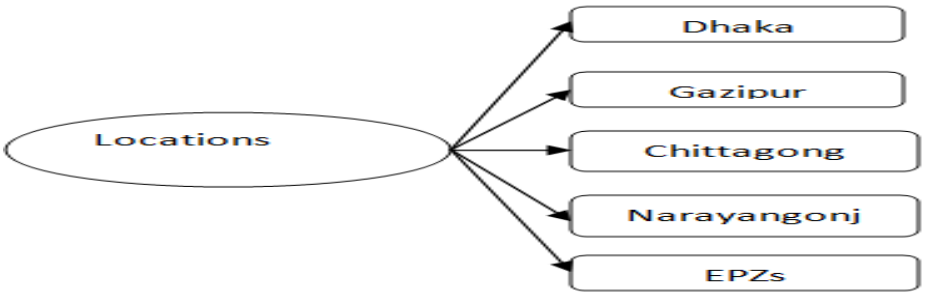

Figure 11: Locations of Bangladeshi RMG factories

For generalizing the research findings, it has been suggested to use the probability sampling technique wherever possible to ensure better representation of the target population. However, a review of previous GHRM studies showed that, very few studies were conducted in the RMG industry context that applied the probability sampling technique in collecting and analyzing data.

There are around 5000 garment factories in Bangladesh (BGMEA, 2022; Chowdhury et al., 2022). Among these, the total export-oriented RMG factories are 3805 (MiB, 2022). Out of these, 2767 factories are BGMEA and BKMEA member factories, while the remaining 1038 factories are non-members.

V. RESEARCH AVENUES

This systematic literature review has revealed the following contextual research gaps.

Gap one: The SLR has revealed that what GHRM aspects and practices are critical to enhance human capital development is missing in the previous GHRM research and literature, specifically in the context of the Bangladeshi RMG industry.

Gap two: The majority of previous HRM studies conducted in the Bangladeshi RMG industry context were based on data collected from blue collar staff (Chowdhury et al., 2023; Islam et al., 2020), where the maximum is either illiterate or poorly educated, who cannot provide factual data to depict the actual picture of the industry. So, there is a dearth of HRM studies that were conducted based on data collected from white-collar staff who can provide more rich, accurate, and reliable data on HRM or EM or GHRM practices of the industry (Chowdhury et al., 2022; Rubel et al.,2021). Now there is a need not only to focus GHRM studies on blue-collar staff, but also on white-collar staff to ascertain the effects of green HRM practices implementation on a firm's performance, individual performance, and the extent to which both aspects are sustainable in the Bangladeshi RMG industry context.

Gap three: This review further show, very few studies have explored the role of the buyers as a stakeholder in promoting a green and sustainable workplace in the same industry context.

Gap Four: The background analysis of the industry shows that, though the industry is facing multiple problems in managing human resources in an environmentally friendly way, there are minimal studies conducted to explore what human-related challenges the industry is facing from various stakeholders' perspectives in managing HR in an environmentally friendly manner.

Gap Five: There is a dearth of studies that present an insightful gestalt of green business strategies from the Bangladeshi garments industry context (Islam et al., 2020; Sarkar et al., 2020).

Gap Six: Finally, this literature review shows no previous study that has measured the extent to which GHRM practices are implemented in the industry. Moreover, no previous research has been found that investigated what aspects and practices of GHRM are significant for improving the sustainable performance of the industry.

VI. CONCLUSION

This paper has focused on different aspects of GHRM practices in the Bangladeshi RMG industry context to highlight the future research potentials and scope. A systematic review of 57 papers has revealed six contextual research gaps, which can be summarized as follows: no study has been found which is focused on assessing the extent of GHRM practices implementation, no single study was found that explored and suggested critical GHRM drivers and challenges facilitating or hindering the GHRM practices implementation in the industry, few types of research have been found which were conducted based on data collected from white-collar staff, the role of the buyer is less explored as an essential stakeholder affecting GHRM practices, very few studies have been seen that took all three types of RMG factory namely, small, medium, and large or woven, knitted, and mixed factories. Therefore, more studies in the future are needed on GHRM practices in the context of the RMG industry of Bangladesh to ensure sustainable performance improvement.

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