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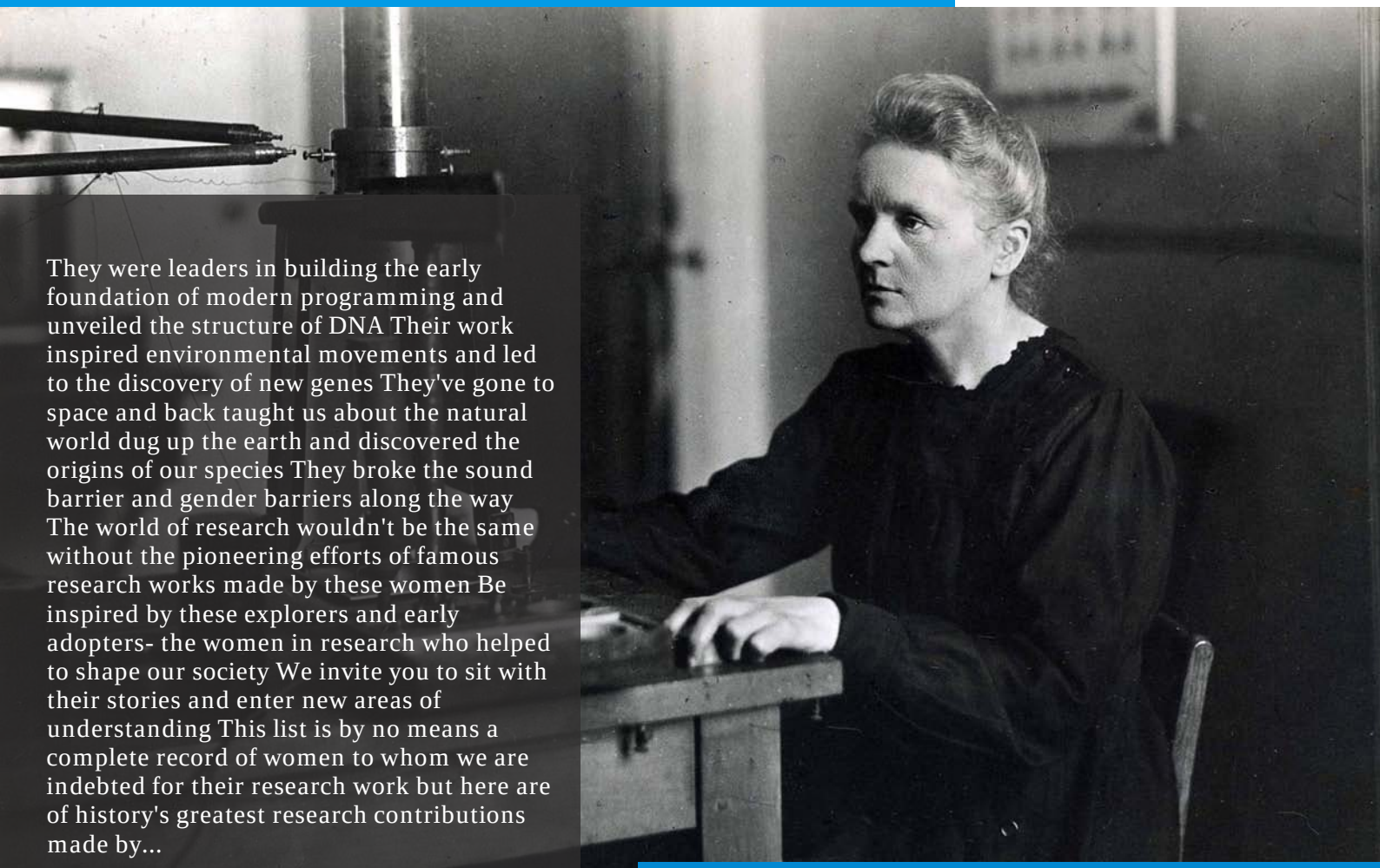

They were leaders in building the early foundation of modern programming and unveiled the structure of DNA Their work inspired environmental movements and led to the discovery of new genes They've gone to space and back taught us about the natural world dug up the earth and discovered the origins of our species They broke the sound barrier and gender barriers along the way The world of research wouldn't be the same without the pioneering efforts of famous research works made by these women Be inspired by these explorers and early adopters- the women in research who helped to shape our society We invite you to sit with their stories and enter new areas of understanding This list is by no means a complete record of women to whom we are indebted for their research work but here are of history's greatest research contributions made by...

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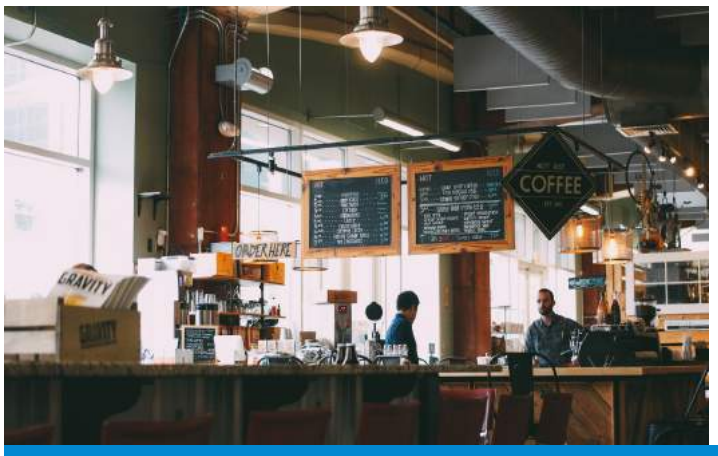

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Applying the CHAP² Multimethodology to Address Complex Challenges in Public Transport Systems

Giovani M. Avila, Mauro Cesar L. Branco & Marcos Pereira E. Lins

Universidade Federal do Rio de Janeiro

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The development of sustainable urban mobility represents a major challenge for cities, especially regarding public transportation. In São Pedro da Aldeia/RJ, passengers expressed dissatisfaction with the service offered, while the concessionaire company claimed that fare revenue was insufficient to cover operating costs. This paper aimed to examine the experience and results of applying the CHAP² (Complex Holographic Assessment of Paradoxical Problems) methodology, developed at COPPE/UFRJ, in the context of public transportation in the municipality. The research adopted the CHAP² methodology, which is characterized as a multi-methodology, combining qualitative and quantitative approaches to deal with the complexity of the interrelationships and dynamics of the sector. Through this approach, aspects such as operation, sustainability, planning, infrastructure, inspection and safety of the service were analysed. The results indicate that the applied methodology proved to be an effective tool for structuring and solving issues related to the quality of public transport provision in São Pedro da Aldeia/RJ, contributing to the identification of critical issues and possible paths for improvements.

Keywords: complex modelling, soft operational research, chap2 multimethodology, public transportation, urban mobility, stakeholder engagement, systems thinking, sustainable transport, participatory planning, paradox management.

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I. INTRODUCTION

Promoting sustainable urban mobility represents one of the most significant challenges faced by contemporary cities. This means ensuring that all people have access to city services and opportunities in an inclusive and environmentally responsible manner (IDB and MDR, 2020).

The disorderly growth of urban centres, combined with the lack of territorial planning, has led to the occupation of increasingly distant areas. This type of population expansion fosters the demand for transportation and makes people need to travel longer and longer, contributing to the deepening of social and spatial inequalities (Balbim, Krause, Linke, 2016). For this reason, the public collective transportation system (TPC) emerges as an effective alternative to promote mobility in cities.

The Brazilian Constitution establishes it as an essential service, while Federal Law No. 12,578/2012 positions it as a priority in relation to individual motorized and cargo transportation. TPC provides urban mobility, transports a significantly larger number of people, takes up less road space, contributes to the rational and democratic use of roads and is an environmentally sustainable option (BRASIL, 1988; BRASIL, 2012).

Figure 1: shows the role of public transport.

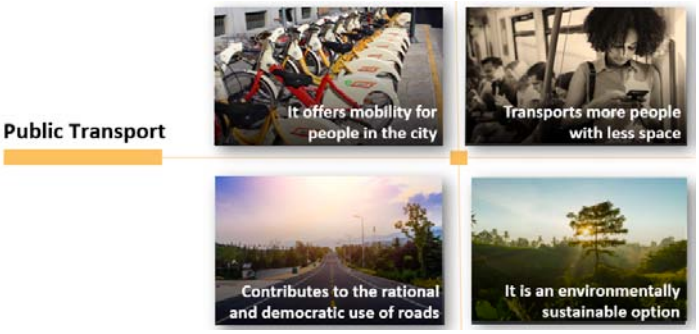


Figure 1: The Role of Public Transport

TPC plays an important role in mitigating problems arising from the large number of private vehicles on the roads, such as congestion, pollutant emissions and traffic accidents. However, investment policies that prioritize infrastructure for private vehicles, combined with the low quality of services, compromise their effectiveness and attractiveness to passengers ((Balbim, Krause, Linke, 2016); ÁVILA, 2010).

Among the cities facing these challenges, São Pedro da Aldeia, in the state of Rio de Janeiro, stands out. In the municipality, TPC was going through a period of crisis, with an imminent risk of interruption. A survey conducted by the service operator in December 2019 revealed that 63.7% of passengers were dissatisfied or very dissatisfied with the quality of the service offered. The operating company, on the other hand, claimed that the fares charged did not cover operating costs. This situation was frequently reported in local newspapers, as shown in Figure 2.

It was therefore imperative to find solutions that would enable the maintenance of the service (LIMA, 2022).

Figure 2: Recurrent Complains in Public Transport.

The problem definition starts with three stakeholders: the dissatisfied population, the operator that could not cover the costs with the current tariff, and the local government at a loss as to how to solve the problem, as shown in Figure 3.

Figure 3: Case Study Problem Definition.

It is important to emphasize that problems of this type, in which many independent agents connect and interact locally, generate counterintuitive attitudes and nonlinear responses.

They encompass a wide range of factors, causes and effects that make analysis and approach challenging.

Solving them requires a methodology that considers this inherent complexity, resulting from the multiple interrelationships and the intrinsic dynamics of the process. In this context, a new multi-methodological approach emerges, which recognizes that complex social problems cannot be adequately understood or solved through a single perspective or method.

On the contrary, it requires the application of multiple methodologies, often interdisciplinary, using the combination of qualitative and quantitative methods and the adoption of a holistic and comprehensive view of the problem (LINS, 2018; VASCONCELOS, 2018).

A summary of this approach is shown in Figure 4.

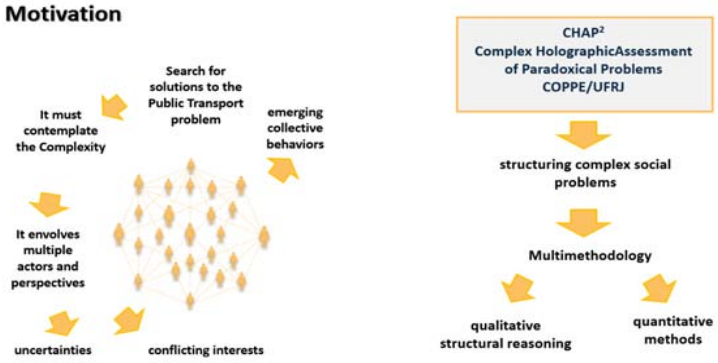


Figure 4: Motivation to Apply CHAP² in Public Transport

To address this type of complex problem, this study adopted the CHAP² (Complex Holographic Assessment of Paradoxical Problems) methodology developed at the PSIGMA Laboratory (Problem Structuring and Indicators Group for Modelling and Assessment) of COPPE/UFRJ.

It is a multi-methodological approach developed to address complex social problems. Through this, crucial issues were identified and addressed, ranging from the operation and sustainability of the service to planning, infrastructure, monitoring and security.

Thus, this work presents the experience and results of the application of this multi-methodology in solving problems related to public transportation in São Pedro da Aldeia/RJ but also seeks to contribute to the academic literature in improving methodological strategies aimed at solving complex urban problems, providing subsidies for more effective and sustainable public policies. The CHAP² multi-

methodology demonstrated its effectiveness as a tool to assist in structuring and solving issues related to the quality of public transportation services in the municipality of São Pedro da Aldeia, Rio de Janeiro.

II. THEORETICAL FRAMEWORK

Classical scientific theories – such as Descartes' reductionism, Newton's mechanism and Laplace's determinism – have profoundly influenced science over the centuries, based on objectivity, isolated analysis of phenomena and predictability through mathematical laws.

These approaches treated reality as physical and ordered, seeking empirical and systematic explanations. However, they faced limitations in failing to explain emergent and complex phenomena, such as free will, leading to questions about the vision of a purely mechanistic science devoid of humanity. (KAUFFMAN, 1996; STEWART, 2014; VASCONCELOS, 2018).

Analytical thinking is showed in Figure 5, based on premises such as Simplicity, Stability, and Objectivity, has limitations in explaining collective properties emerging from a complex system and understanding interactions among components.

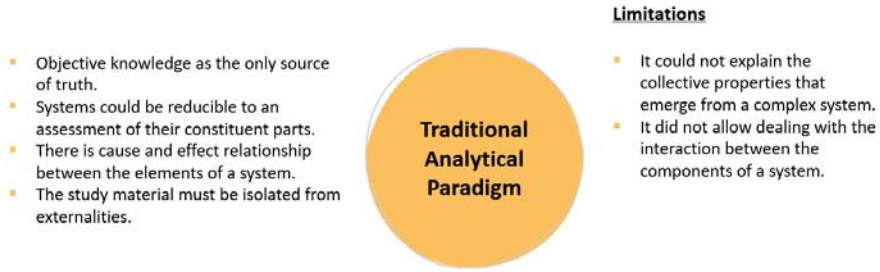


Figure 5: Assumptions of Analytical Thinking.

Edgar Morin (2005), when defining complexity, highlights that it is not simply a sum of elements, but a fabric of different interconnected parts. He suggests that complexity involves multiple elements that cannot be separated without losing the meaning of the whole. He also shows us that understanding complexity requires going beyond simplistic or reductionist analyses. It is necessary to recognize that everything is interconnected, and that the world works in a dynamic and interdependent manner.

Lins (2018) emphasizes that complex problems require dialogue to balance opposing opinions and overcome contradictions, both in interpersonal and intrapersonal relationships.

Systems science emerges as a response to these limitations, incorporating the interdependence of elements and the non-linearity of processes. Vasconcelos (2018) portrays the evolution of the mechanistic paradigm to systems science, as in Figure 8.

Thus, we work within a world characterized by the features of complex systems, which are unstable and based on intersubjective knowledge as showed in Figure 6.

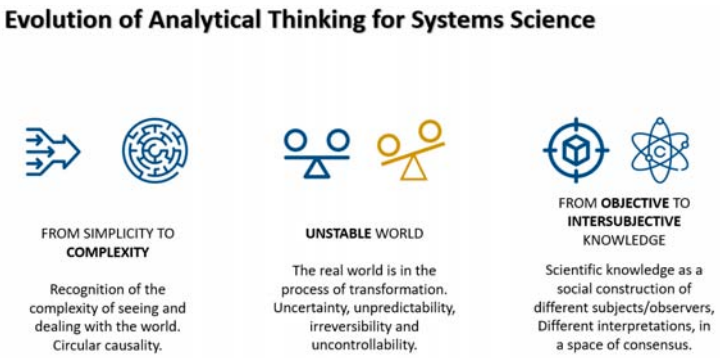


Figure 6: The Evolution of Science.

In systems science, the focus is on a holistic view of its constituent elements and the observer's relationship with this system. Problem structuring is carried out in an environment of collaborative and autonomous dialogue in which the components or participants can work together to build solutions that they themselves have identified.

It is worth noting that traditional science is inefficient in dealing with unstable problems in which the subjects themselves participate during circumstances (MINGERS, 2006; VASCO -NCELOS, 2018).

Systems Science proposes understanding a system considering connections and interactions among elements and resulting synergy, moving from deductive to inductive methods. Structuring the problem occurs through collaborative and autonomous dialogue until disputes are resolved, requiring an unbiased analyst.

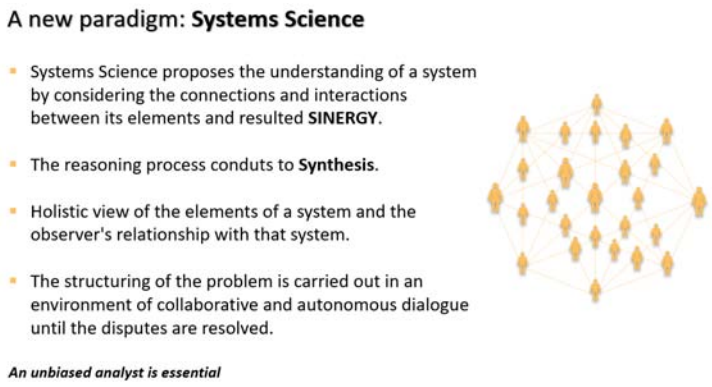


Figure 7: A new paradigm: Systems Science.

In Figure 8 we present a taxonomy from Bertalanffy to Mingers, who addressed Multimethodologies.

According to Mingers (2006), this perspective has expanded the capacity to understand and intervene in multidimensional problems, impacting several areas of knowledge.

In the field of urban mobility, this evolution has allowed the integration of technical, social, economic and environmental aspects, promoting more effective and sustainable solutions.

Source: Adapted from Mingers, 2006.

Figure 8: Contributions of Systems Science to Areas of Science.

The CHAP² methodology fits into this context as a multi-methodological approach, combining qualitative and quantitative methods to deal with paradoxical problems.

Inspired by General Systems Theory and Cybernetics, the methodology recognizes that complex social problems cannot be solved in isolation, but rather through the interaction between multiple perspectives and stakeholders, requiring a methodological framework capable of integrating different dimensions –technical, social, economic and political – simultaneously. The CHAP² methodology allows for a structured and systemic analysis of the system, favouring the construction of integrated solutions that are adaptable to the reality of each context.

By applying this methodology to public transportation in São Pedro da Aldeia, this study demonstrates how systems science enables new ways of understanding and acting on urban challenges, contributing to improving the quality of life and sustainability of cities.

2.1 Methods and Techniques

Lins (2018) describes six operational stages of CHAP², which are summarized below:

Stage I: Characterization of the real system, literature review, interviews with experts, and the formation of a working group involving decision makers. At the beginning, knowledge maps are created to understand the real system. This involves literature research and interviews with experts in the field of study, seeking technical information and personal opinions. In addition, stakeholders are selected according to criteria such as functional categories, ideologies, and worldviews, forming a working group that brings together the most diverse and representative perspectives.

Stage II: Training and orientation of agents involves seminars with the working group aimed at presenting the CHAP² methodology and promoting group engagement. Facilitators lead the seminars. Activities such as dynamics and assessments are carried out to develop the ability to think metacognitively. If necessary, individual guidance can be provided.

Stage III: Uses interviews to formulate metacognitive maps. This phase aims to capture the views of each agent, expressing the system and problems from their perspectives. The interviews are transcribed and transformed into metacognitive maps, including disagreements between agents. The maps are validated by each agent in the group and grouped by theme.

Stage IV: Workshop for developing conceptual and paradoxical maps A workshop is held to converge the representations of the agents' perspectives, aiming to accommodate and consolidate the different perspectives so that they converge towards strategic directions and actions

of common interest. Thematic maps are reviewed, and problems and solutions are prioritized. Conflicts and divergent perspectives should be highlighted in the paradoxical maps.

Stage V: Articulation with formal models, indicators and processes. Develops formal models to support decision-making. In this stage, the content of stage IV is used to create formal models that assist in decision-making. The qualitative approach (conceptual and paradoxical maps) is integrated with the quantitative approach (optimization, simulation, performance indicators, for example). Specific seminars can be held to identify and define indicators.

Stage VI: Identification and implementation of actions – Monitoring. Create an action plan with viable initiatives for this context. This final step involves identifying and implementing the actions designed by the working group. The obstacles mentioned in the paradox map are considered and the impacts of the changes on those involved are assessed.

In addition to identifying problems and solutions, the CHAP² methodology monitors the implementation process to measure and evaluate the results.

A Summary of application of CHAP² can be found in Figure 9.

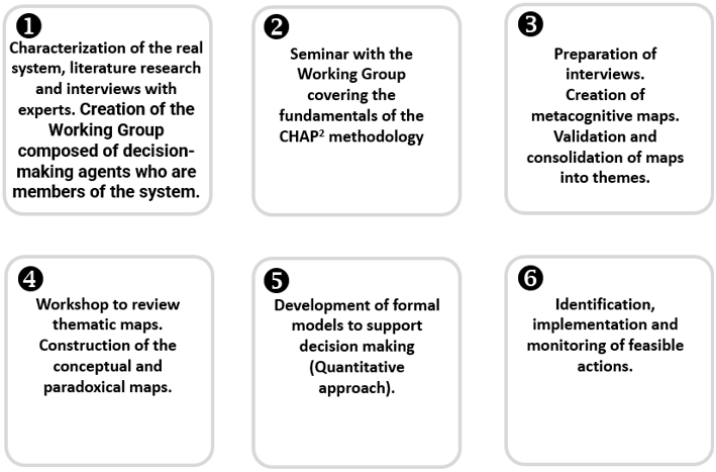


Figure 9: CHAP² Methodology in 6 Stages.

The CHAP2 methodology integrates qualitative and quantitative methods to address complex social systems. These are composed of several actors that interact with each other, generating uncertainty and conflicting interests.

Management and control are not centralized in a single entity or individual; instead, these responsibilities are distributed among the different actors in the system. Each participant plays an active role in its regulation and is the generator of the changes that occur in it. This is known as self-regulation (LINS, 2018).

The term "holographic" in the methodology suggests that, just as a hologram contains a complete image, although it is not a perfect representation of reality, complex systems can also be understood through integrated representations.

Maps or models are visual tools that allow a clearer and more intuitive understanding of these systems, helping to simplify the complexity of the real world.

These representations are holistic, that is, they incorporate all perspectives and aspects relevant to understanding the system (LINS, 2018).

The CHAP² methodology uses conceptual maps to represent knowledge and metacognitive maps, which externalize the thought process of each stakeholder participating in the study, helping to express the limitations caused by their own beliefs, experiences, inconsistencies, and

contradictions, which can make it difficult to identify real critical points and possible solutions.

The term "paradoxical problems" highlights the contradictory nature of problems in complex social systems (LINS and CABRAL, 2018; LINS and CHAGAS, 2018).

Representing reality through maps is an important tool to stimulate the construction of critical thinking and meaningful learning, through the understanding of new concepts that may contradict consolidated ideas.

The methodology seeks to promote more collaborative human interactions, replacing competition with cooperation and consensus (LINS, 2018).

The Cmap tools, available free of charge on the Institute for Human & Machine Cognition (IHMC) website, were used to prepare the maps.

Due to the study being conducted during the Covid-19 pandemic, it was agreed among the members of the Working Group to use the WhatsApp application to facilitate the communication process between the participants.

The CHAP² methodology stands out for two main characteristics. First, it is a multi-methodology that provides a bridge between the qualitative (soft) and quantitative (hard) approaches of Operational Research. This combination seeks to overcome the limitations of each method used in isolation, exploring how they can be complementary and synergistic. Second, the methodology is deeply participatory, based on the interaction and engagement of the decision-makers involved in the study.

In the next section, we will present how the 6 stages of the CHAP² methodology were applied in relation to the public transit system in the municipality of São Pedro da Aldeia/RJ, where we will contextualize how these stages were adapted or customized to local conditions, restrictions and dynamics of the stakeholders.

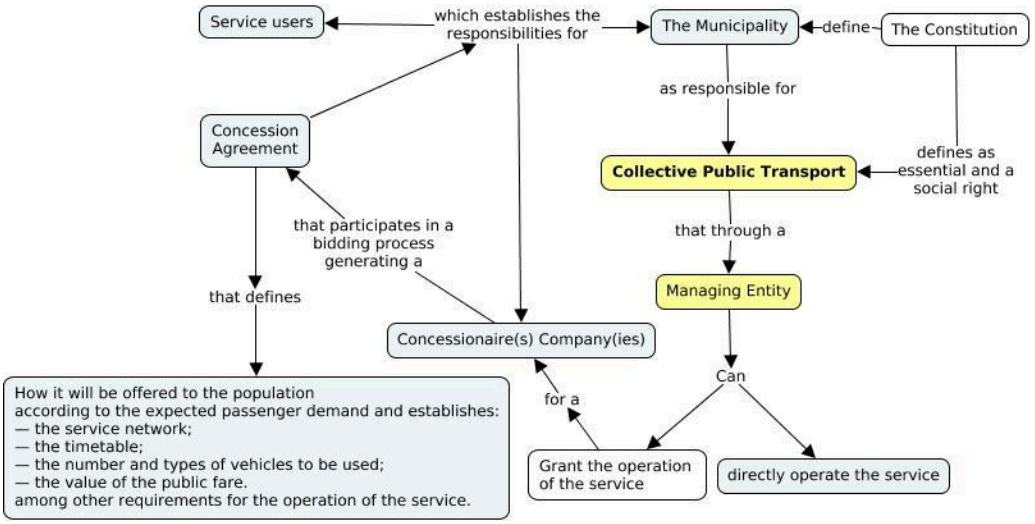
III. METHODOLOGY APPLICATION

3.1. Stage I

At this stage, the characterization of the "real" system was obtained, that is, the detailed analysis of the existing conditions in a system before proposing any intervention or change. This characterization allows us to understand the reality of the system before proposing solutions. In the context of urban mobility and public transport, for example, this means assessing and understanding how the system works.

3.1.1. TPC Operation Map

In Figure 10 we can see in the map the general view of how the operation of a public transport system run.



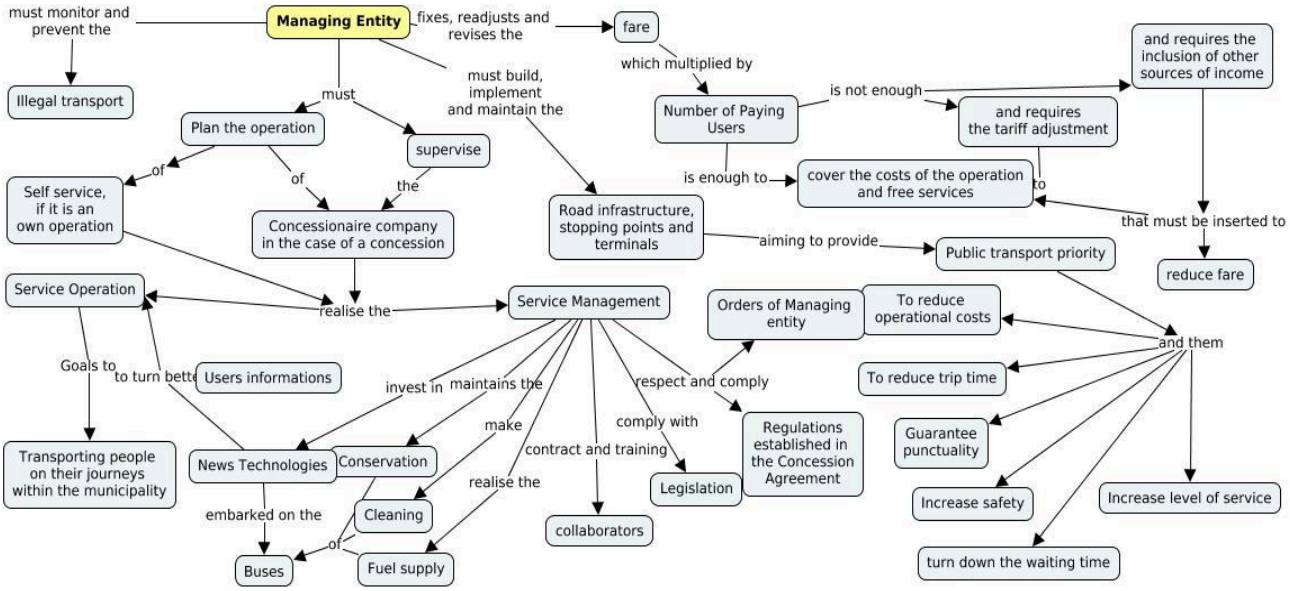


Figure 10: Maps relating the operation of a public transport system to the managing entity

3.1.2. Expert perspective

Still in stage I, the perspective of an expert was collected, aiming not only to obtain technical information, but also their personal views on what a quality and sustainable public transportation system would be like, contributing to the process of reflection on the topic.

The map in figure 11 seeks to organize and visually represent their perspectives, highlighting key concepts and their interrelationships.

The perspectives of an expert were collected, in which we sought to present his point of view on how to achieve a quality and sustainable public transport system.

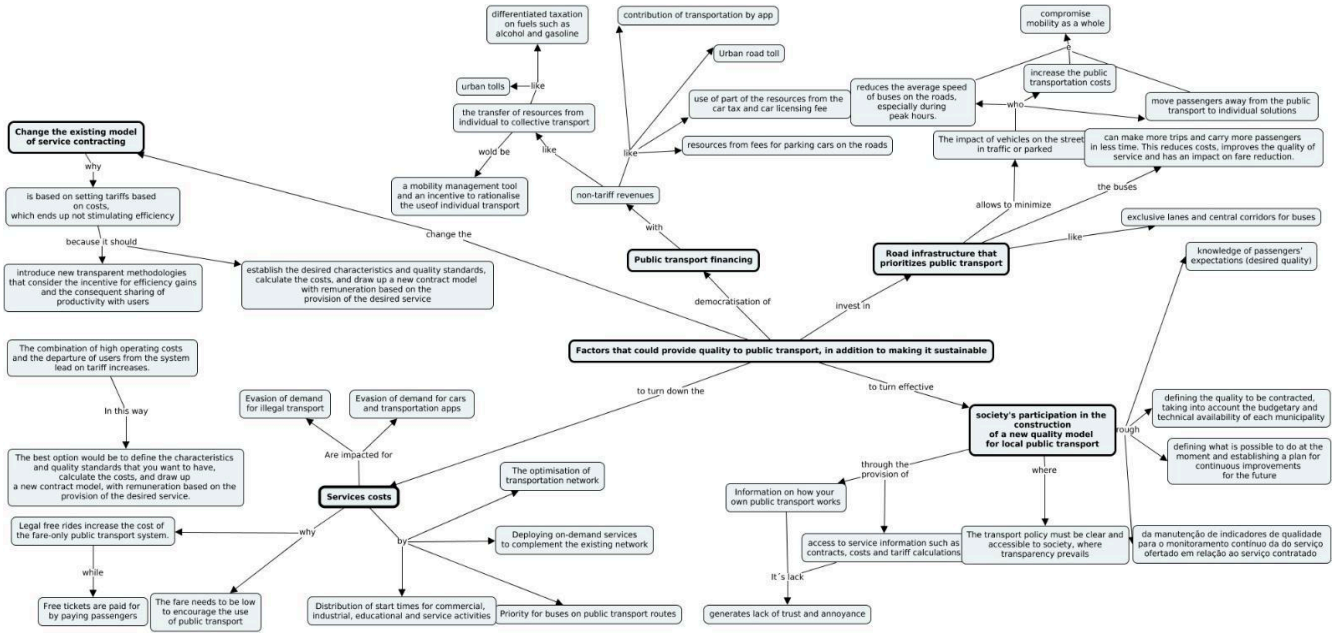


Figure 11: Map from the Specialist's perspective.

3.1.3. Mobility and Homework in São Pedro de Aldeia

According to the IBGE (Brazilian Institute of Geography and Statistics), the population of São Pedro da Aldeia, in the State of Rio de Janeiro, in 2022 was 104,029 inhabitants. The municipality is in the Lakes Region, Rio de Janeiro State, and has an area of 332,488 km². It is located approximately 2 hours from the capital of state.

Source: http://diariodotransporte.com.br - Visited in 15/2022

Figure 12: municipality of São Pedro da Aldeia – Aerial View.

The TPC in the municipality of São Pedro da Aldeia was undergoing a process of degradation. Users complained about the insufficient supply of trips, while the company operating the service maintained that the costs were not covered by the revenue earned.

Over the years, there was a decrease in the number of public transport passengers in the city, from 2,584,668 passengers in 2010 to 568,850 passengers in 2021.

The creation of so-called "shared taxis" (Municipal Law 2711/2017) and the proliferation of illegal transport (private vehicles transporting people without authorization from the municipal government) may have influenced the reduction in transported demand. Both services picked up passengers at bus stops and competed directly with the TPC, but they only operated on paved roads and during times of high passenger demand.

Public transport, on the other hand, had to follow routes and timetables established by the municipal management body. This included rural routes and the responsibility for transporting free passengers (elderly people, people with disabilities, and students in the state school system).

Individual or shared transportation apps also attracted paying passengers from public transportation, and the Covid-19 pandemic led to a reduction in the number of passengers transported.

The result found in 2021 by the tariff calculation spreadsheet defined in the concession contract showed the unsustainability of the system.

The public fare was R$4.30, while the technical fare calculated by the spreadsheet was R$11.86. This value would bring the economic and financial balance of the contract but would certainly drive users away from the system because it was above their ability to pay.

This unsustainable situation led the operating company to seek legal action for breach of contract (BRASIL, 2022).

Figure 13 shows the formation of Transport Fare where can see the percentage breakdown of transportation fare costs, mainly fuel and labour, accounting for about 70% of the total.

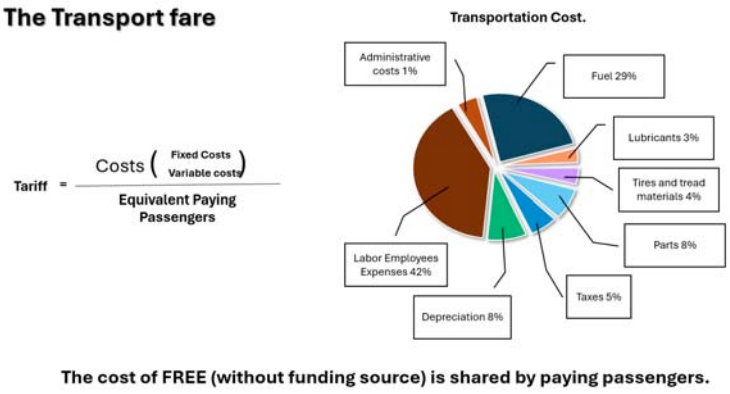


Figure 13: Transport Fare.

In Figure 14 is showed the increase in diesel prices over 20 years, from 2 to 7 Brazilian Reais (0.4 to 1.4 USD), resulting in passengers switching to other modes like cars and motorcycles.

Source: NTU 2028; ANP 2022

Figure 14: Transport Fare.

3.2. Maps Construction

The methodology considers three aspects of a complex system (individual needs, environment, and society as a whole). It proposes problem structuring by integrating perspectives from each interested party in a holistic reasoning process, aiming to find consensus solutions that support decision-making, as one can see in Figure 15.

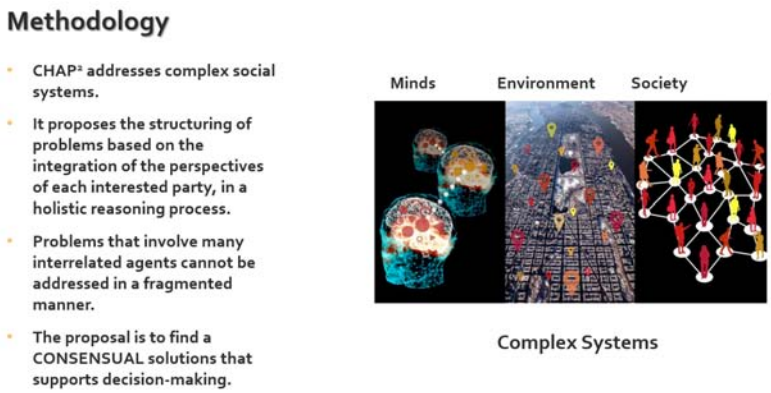


Figure 15: Complex System Considerations.

3.2.1. Stage I – Documents review, data collection and formation of the Working Group

In Stage I Extensive research was conducted on public transport documentation in government archives, and experts' perceptions of the quality of public transport were collected.

Figure 16: Stage 1.

Representatives were chosen inclusively and broadly from each stakeholder group involved in the process. Interviews were conducted to gather their perceptions, followed by the formation of the working group.

The CHAP² methodology values the criteria of qualitative representativeness, in which data collection is done through interviews with stakeholders who are part of the system, aiming to capture multiple points of view on the problem situation, ensuring that all perceptions and interests are considered. The participation of multiple stakeholders in the system requires the creation of an environment of collaboration and dialogue and can help ensure that all parties feel heard and represented in the process (LINS, 2018).

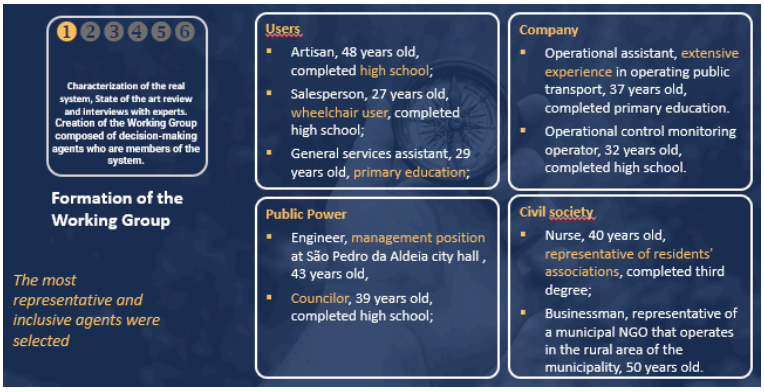


Figure 17: Stage 1 (Cont.).

In this way, the Working Group was organized, composed of the following agents:

- Four representatives of the users: they were already interacting with the company providing the service seeking solutions to the problems in the transport system in São Pedro da Aldeia.
- Two representatives of the municipal government: appointed by the City Hall.
- Two employees of the service provider: appointed by the company itself.
- Two representatives of organized civil society: invited by the City Hall.

3.2.2. Stage II – Training and Engagement

In Stage II, the agents involved must understand how the methodology works then a training seminar was held for them, having a high level of engagement, where the methodology was presented, doubts were clarified, and awareness was raised about the relevance and opportunity of contributing to the development of the TPC service in the city of São Pedro da Aldeia through participation in the study. Separate meetings were held with agents who missed the meeting, thus reaching all members of the Group.

Considering the diversity of educational backgrounds of the participants, the content was presented in a playful way, using metaphors, sketches and drawings, seeking to obtain an understanding of complex concepts that permeate the methodology, seeking engagement and the creation of an environment of collaboration and dialogue, helping to ensure that all parties feel heard and represented in the process (LINS, 2018).

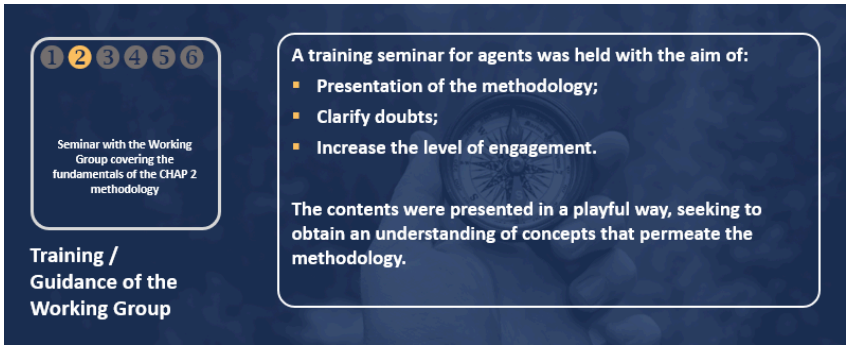


Figure 18: Stage 2 – Training.

3.2.3. Stage III – Conducting Interviews

In the third stage, interviews were conducted with the members of the Working Group to capture the perceptions of each agent, consolidating them in the form of maps.

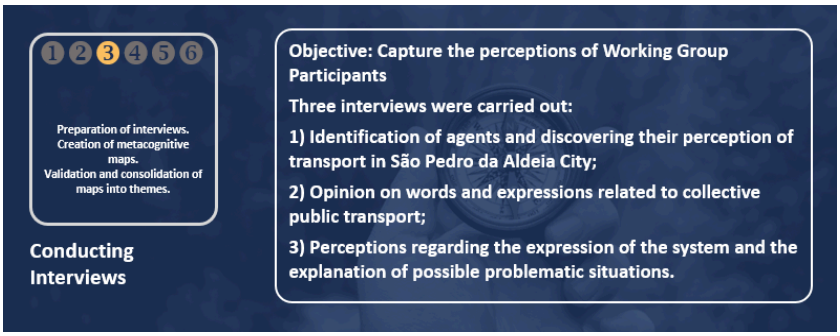


Figure 19: Stage 3 – Conducting interviews.

To this end, three stages of interviews were used. Interview 1 aimed to identify the agents and, through an open-ended question, to learn about their knowledge about transportation in São Pedro da Aldeia. In interview 2, words that were somehow linked to or referred to the quality of the TPC service were listed, aiming to broaden each agent's reflection. In addition to the script used, with the words or expressions above, the interviewed agent was allowed to add any information that he or she considered important to report.

In interview 3, we sought to extract from each member of the Working Group the way in which the system manifests itself or is perceived and the explanation of possible problematic situations. After the interviews, metacognitive maps were

prepared for each of the participating agents. In a workshop, the maps were validated by each participant and, considering the content of each map, the predominant themes were identified and classified by the Working Group in order of relevance, as shown in the Table 1:

Table 1: Definition of Themes.

Temas	Decision-Making Agents										
	US1	US2	US3	US4	PP1	PP2	CS1	CS2	SCO1	SCO2	Total
Infrastructure, planning and supervision	1	1				1	1		1	1	7
Service operation	1	1	1	1	1	1	1	1	1	1	11
Service sustainability	1	1		1	1	1	1	1	1		9
Transportation safety		1				1				1	4
Legenda											
US	System Users										
PP	Public Authority										
CS	Service Provider										
SCO	Organized Civil Society										

One method used to apply CHAP² was the development of metacognitive maps, providing a holistic view of the problem and the needs of each agent involved.

The individual maps were aggregated into a single map divided into themes, as shown in Figure 20.
Themes:

- Infrastructure, planning and supervision (green)
- Service operation (blue)
- Service sustainability (yellow)
- Transportation Safety (orange)

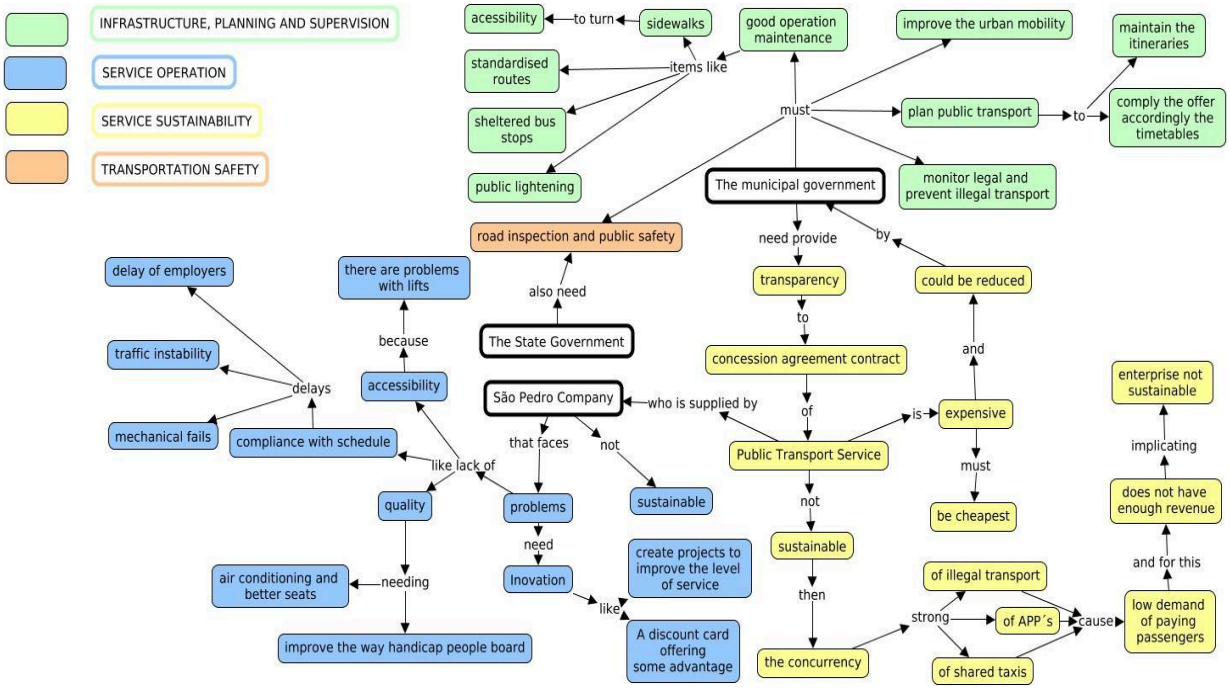


Figure 20: Consolidated metacognitive map (by topic).

3.2.4. Stage VI - Conceptual and Paradoxical Models

To organize and consolidate the representations of the agents' perspectives, a workshop was held in the fourth stage to deepen the discussion on the problems of each specific topic. For each of them, the reasons were answered, the proposed solutions were listed (conceptual model) and any barriers to making them feasible were raised (paradoxical model). The results are presented in Figures 21 to 23. The creation of conceptual and paradoxical maps can be seen, presenting key questions for each participant in the system, the origin of the problem, the solutions and barriers to solving the problem, and explaining any divergences. An example involving the need to simultaneously lower the price of the tariff and increase the service offer (costs):

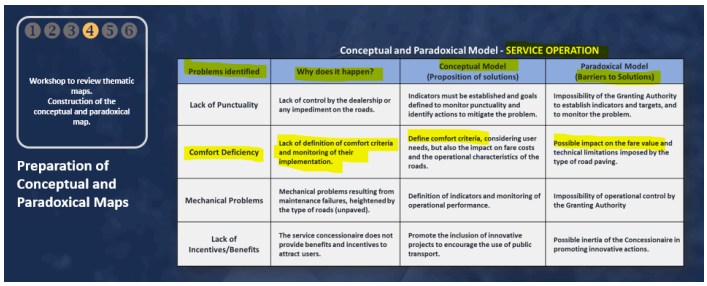


Figure 21: Conceptual and Paradoxical Model - Service Operation.

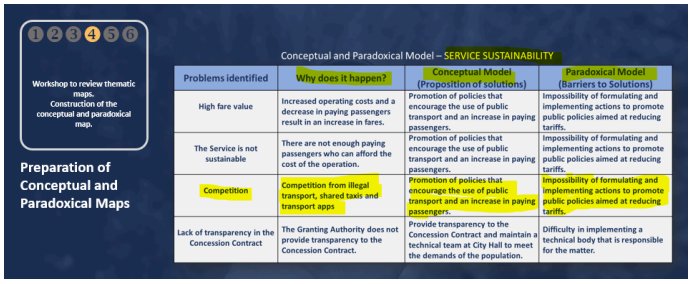


Figure 22: Conceptual and Paradoxical Model - Service Sustainability.

Another example involving the system operator is highlighted. Figure 22 shows an example of a Modal Competition problem, with the presence of ride-sharing apps (such as Uber) and competition from illegal transportation. The solution would therefore be to promote policies that encourage official public transportation and increase the number of paying passengers. However, the paradoxical model indicates the impossibility of formulating and implementing actions to promote public policies to reduce fares.

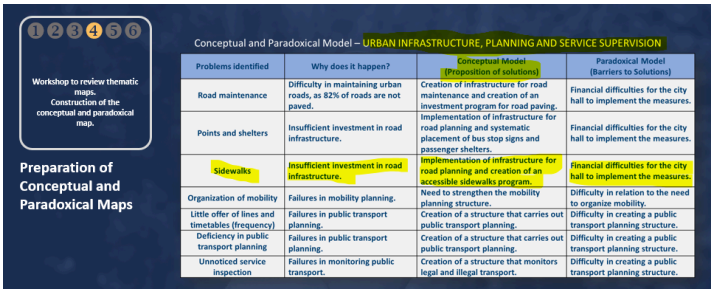


Figure 23: Conceptual and Paradoxical Model – Urban Infrastructure, Planning and Inspection.

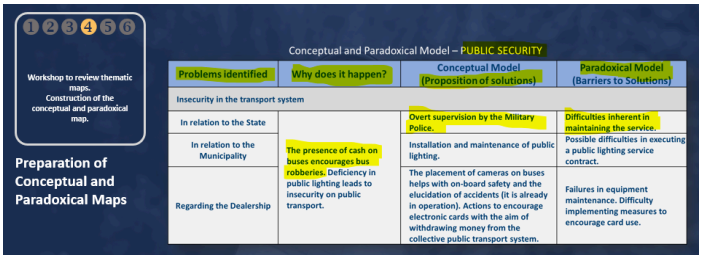


Figure 24: Aspects related to Public Security.

3.2.5 Stage V–Models to Support Decision-making

In Stage V, the formal models developed to support decision-making are articulated. In this case, performance indicators were established, as showed in figure 25.

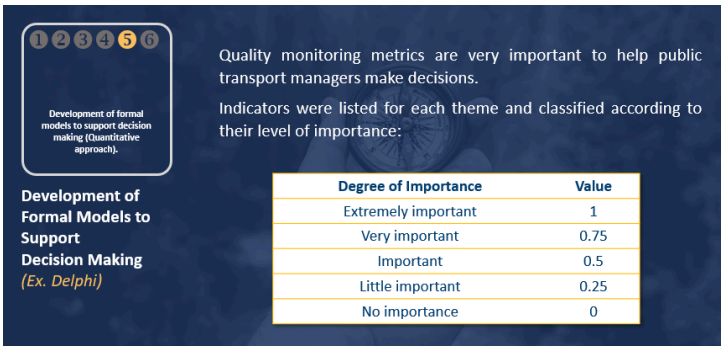


Figure 25: Quality indicators, metrics index.

Considering the content prepared by the Working Group, namely the conceptual and paradoxical maps, in Stage V we sought to identify a formal quantitative model that would assist in decision-making and regulation of the process.

According to BRASIL (2010), the implementation of performance indicators that monitor the quality of goods and services delivered to society are fundamental for public management focused on results. Bezerra (2020), through a bibliographic review, identified a total of 80 quality indicators for public transportation that were grouped into 6 domains: infrastructure, mobility, accessibility, safety, user satisfaction, and environment.

Based on the content of the conceptual and paradoxical maps, presented in figures 21 to 24, and the quality indicators listed by Bezerra (2020), those that could best measure the performance of the homework service in São Pedro da Aldeia were identified for each theme. After this definition, each of them was classified by degree of importance according to the Working Group. Thus, the level of importance of each indicator was identified, by Theme, as showed in Tables 2 to 5.

Table 2: Indicators and degree of importance for the Working Group - Service Delivery.

Indicator - SERVICE DELIVERY	degree of importance
Departure Punctuality - Percentage of trips that departed on time (more than 5 minutes late or more than 1 minute earlier).	0,88
Occupancy index - Rate of people standing per square meter.	0,79
Vehicle cleaning - User opinions through research.	0,75
Accident Rate per Kilometer - Percentage of accidents per total mileage traveled.	0,75
Trips interrupted by mechanical breakdown - Percentage of trips interrupted by mechanical breakdown related to scheduled trips.	0,75
Internal Temperature - User opinions through research.	0,71
Trip Fulfillment - Percentage of trips not taken in relation to scheduled trips.	0,71
Vehicle Age - Classification referring to the year of manufacture.	0,67
Internal Noise - User opinions through research.	0,42

Table 3: Indicators and degree of importance for the Working Group - System Sustainability.

Indicator - SYSTEM SUSTAINABILITY	degree of importance
Users' Perception Regarding the Fare Value - User opinion through research.	0,92
Commitment to transportation expenses - Percentage of transportation costs in relation to individual income.	0,88
Equivalent Passenger Index per Kilometer (IPKe) - It shows the relationship between the number of paying passengers transported and the kilometers traveled. The higher the indicator, the more productive the transport system will be, resulting in lower costs for the user of the service.	0,88
Economic Coverage Level - Percentage of revenue in relation to expenses determined in the concession contract spreadsheet. (Indicates whether the operating cost of the lines is being covered by the tariff revenue earned.	0,83
Discounts and Freebies - Percentage of passengers who do not pay the fare or there is no source of funding (free of charge).	0,75

Table 4: Indicators and degree of importance for the Working Group - Urban Infrastructure, Planning and Service Supervision.

Indicators - URBAN INFRASTRUCTURE, PLANNING AND SERVICE SUPERVISION	degree of importance
Physical Accessibility Index of bus terminals and stops - Percentage of the number of accessible facilities in relation to the total number of facilities (terminals and stopping points for people with disabilities).	0,92
Percentage of Safe Crossings - Percentage of Crossings (from the sidewalk segment) that comply with Legal Safety and Quality Requirements.	0,88
Road Signage - Drivers' perception regarding the state of signage on roads that carry public transport.	0,88
Condition of the roads - User assessment regarding the condition of the road.	0,83
Correctly Identified Points - Percentage of bus stops effectively identified.	0,83
Presence of Covered Shelters at Bus Stops - Percentage of covered shelters in relation to bus stops.	0,83
Paved Roads - Percentage of paved roads in relation to the total mileage of the collective public transport network.	0,75
Condition/Conservation of Bus Stops - Portrays users' perception of bus stops.	0,71

Table 5: Degree of importance of indicators for the Working Group -Safety in Public Transportation

Indicators – SAFETY IN PUBLIC TRANSPORTATION	degree of importance
Safety perception when walking to Bus Stops - User perception regarding security when walking to bus stops.	0,75
Safety perception at Bus Stops - User perception regarding security at bus stops.	0,71
Safety perception of Vehicle - User perception regarding security of vehicle.	0,79

3.2.6. Etapa VI – Results and Implementation

In Step 6, showed in figure 26, was identified actions that cater to both supplies, i.e., operators, and the Public Authority, highlighting the main initiatives of this set, such as contract sustainability, moderate fares, and the creation of an information system for the user.

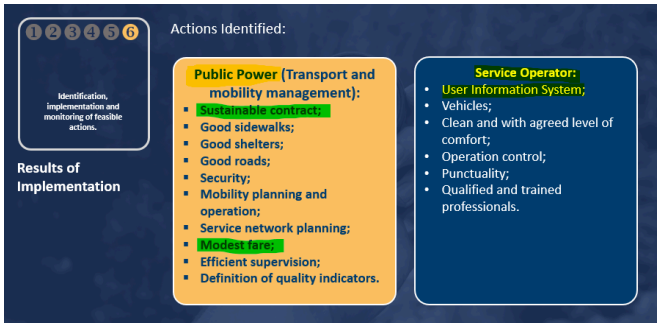


Figure 26: Stage 6 – Results of implementation.

The study highlighted the need for profound and urgent changes in the municipal public transportation system, both in terms of service quality and the system's unsustainability.

It would be inevitable to introduce extra-tariff revenues into the system to cover the deficit between revenues and costs. However, there was great resistance to the City Hall disbursing funds to finance the service. This seems to have led the City Hall to make a first attempt, carrying out a bidding process for the concession of the transportation system along the same lines as the previous concession.

The attempt did not yield practical results, since the winning company was disqualified for not presenting the number of buses defined in the bidding notice.

The City Hall then decided to bid for a different format than the previous one for contracting the provision of the service, contemplating a new governance model, which considered some of the suggestions listed in the study. The implementation of this new model brought transformative changes to the system. The decision was made to rent buses with drivers, paying for the service per kilometre travelled, making the system sustainable, improving comfort and safety features, increasing the number of trips available and reducing the amount paid by users. The City Hall decided to change the fare from R$4.30 to R$2.50, assuming responsibility for paying the difference between the cost and the revenue earned.

Figure 27 shows the results of the implementation and the topics covered by the application of this methodology, highlighting the

expansion of the service offered, fare reduction, and financing.

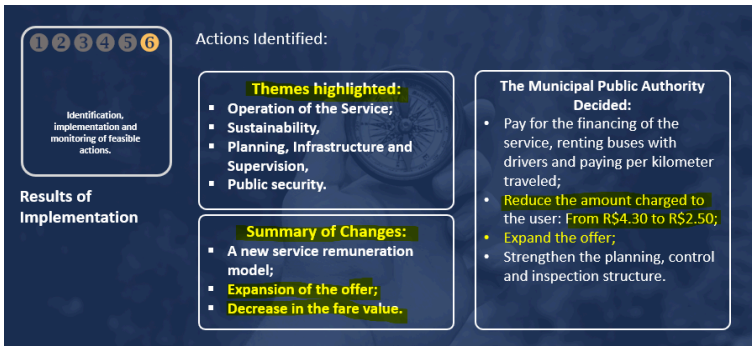


Figure 27: Stage 6 (Cont.).

Based on the new bidding model, the management structure was strengthened to accommodate functions related to service management.

The service planning, control, and supervision structure was expanded to meet the responsibilities required by the new governance process. In addition, quality improvement requirements were included in the new bidding process, such as: monitoring cameras, air conditioning, geore- ferencing system, new visual identity, and an average age of the vehicle fleet of no more than five years from manufacture.

The final considerations presented in Figure 28 show the finding that there was full adoption by users, comparing the number of paying passengers before and after the implementation of the actions.

The graph shows data from January 2022 to August 2022, where we observe a tripling of the number of paying passengers.

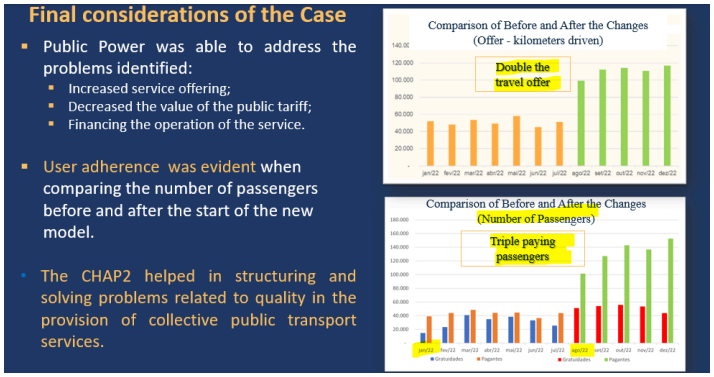


Figure 28: Final Considerations

With the new management logic implemented, the City Hall assumes the leading role in organizing and managing the security demands in the system, and actions were identified under the responsibility of the state and municipal government and the TPC service operator itself.

Intensified monitoring by security agencies, improved public lighting and the implementation of the elimination of the use of cash on buses are measures that could be adopted.

IV. CONCLUSION

The application of the CHAP² methodology in the context of São Pedro da Aldeia demonstrated its potential to address complex social problems related to urban mobility and did so in a structured and participatory manner.

The process allowed for the construction of a shared diagnosis and the engagement of stakeholders in the search for viable solutions. However, the experience revealed challenges that deserve attention, such as the need to maintain active participation throughout the stages and the challenge of aligning expectations among the different actors involved.

A central contribution of this study was the adoption of a multi-methodological approach to solving complex social problems, allowing for a holistic approach, enabling the formulation of strategies for the evolution of public transportation in the city of São Pedro da Aldeia/RJ.

The findings of this research highlight that, although the CHAP² methodology is a powerful tool for structuring decision-making, its effectiveness depends on the capacity of local institutions to implement and maintain the proposed actions. Establishing indicators for monitoring can be a way to strengthen the continuity of initiatives, although their sustainability cannot be guaranteed without a long-term institutional commitment. Thus, this study not only reinforces the relevance of CHAP² as an instrument for participatory management of urban mobility but also points to ways to improve its implementation. It is recommended that future studies explore strategies to strengthen communication and trust among participants, in addition to deepening the analysis of how the lessons learned can be replicated in other municipalities.

It is recognized that this study has limitations, especially regarding the time taken to monitor the actions and the depth of the analysis of long-term impacts. However, by using CHAP² in its multi-methodological approach to address complex social problems, it is expected that this research will contribute to the advancement of discussions on participatory planning and urban mobility in local contexts. Finally, it is important to highlight the fundamental role of academia in supporting municipalities, assisting in the formulation of public policies, and generating tangible results for society.

4.1. Rcommendeations and Suggestions for Future Work

It is important to monitor the new model chosen in São Pedro da Aldeia of the collective public transport system in relation to the quality and sustainability of the service.

It would be advisable to develop other studies, contemplating other methodologies that address complex systems, with the objective of evaluating the effectiveness of the implementation of new actions that could be undertaken.

Declaration of competing interest

The authors declare that there are no potential competing interests.

CRediT authorship contribution statement

All unreferenced figures and tables were prepared by the author.

Mauro Cesar L. Branco: Writing – review & editing,

Giovani M. Avila: Writing – review & editing, Validation, Conceptualization Supervision.

Marcos Pereira E. Lins: Writing – original draft, Supervision.

Data availability

Data will be made available on request.

REFERENCES

1. ALMEIDA, V.P., VALERIO, R., PENACHIOTTI, A.G., FONSECA, B.G. - Infraestrutura aero-portuária brasileira: uma análise do modal. São José do Rio Preto, 2019. Revista Científica UNILAGO - v. 1 n. 1 (2019). Disponible in: https://revistas.unilago. edu.br/index.php/ revista- cientifica/article/view/205 Accessed on: 28/04/2024.
2. ÁVILA, G. M. A Contribution to Urban Transport System Analyses and Planning in Developing Countries. In: PINA FILHO, A. C.; PINA, A.C. Methods and Techniques in Urban Engineering. Intech Open, 2010. p. 270. ISBN 978-953307096.

3. IDB - Inter-American Development Bank and MDR - Ministry of Regional Development. Qualification of the Public Transportation System by Bus in Brazil. Global Environment Facility – GEF (funder) – Brasília: Editora IABS, October 2021.
4. BALBIN, R; KRAUSE, C; LINKE, C.C. - Cidade e Movimento: Mobilidades e Interações no Desenvolvimento Urbano. – Brasília - Ipea: ITDP, 2016. 326 p.
5. BERTALANFFY, L. General system theory: Foundations, development, applications - 1969 - repository.library.georgetown.edu
6. BOARETO, R. Urban mobility policy and the construction of sustainable cities. Revista dos Transportes Públicos – São Paulo: ANTP, 2008, pp. 143-160.
7. BRAZIL. Constitution (1988). Constitution of the Federative Republic of Brazil of 1988. Brasília, DF: Presidency of the Republic, [2016]. Available at: http://www.planalto.gov.br/ ccivil_03/constituicao/constituicao.htm. Accessed on: 10 Sep. 2020.
8. BRAZIL. Ministry of Planning, Budget and Management. Secretariat of Planning and Strategic Investments - SPI. Program indicators: Methodological Guide / Ministry of Planning, Budget and Management, Secretariat of Planning and Strategic Investments - Brasília: MP, 2010. 128 p.: il. color.
9. BRAZIL. Ministry of Planning, Budget and Management. Secretariat of Planning and Strategic Investments - SPI. Program indicators: Methodological Guide / Ministry of Planning, Budget and Management, Secretariat of Planning and Strategic Investments - Brasília: MP, 2010. 128 p.: il. color.
10. BRAZIL. National Congress. Urban Mobility Law. Law No. 12,587 of January 3, 2012. Official Gazette of the Union, Brasília, DF, 03 jan. 2012. Available at: http://www. planalto.gov.br/ ccivil _03/_ato2011-2014/2012/lei/l12587.htm#art28. Accessed on: 10 Feb. 2021.
11. BRAZIL. Ministry of Infrastructure. Studies carried out - GEIPOT - Calculation of Urban Bus Fares. Brasilia, 2022. Available at: https://www.gov.br/infraestrutura/pt-br/acesso-a-informacao/conteudo-geipot/estudos-realizados-geipot8740. Accessed on: 22 Jan. 2022.
12. KAUFFMAN, S. At Home in the Universe: The Search for Laws of Self-Organization and Complexity Hardcover. Australia and New Zealand: OUP, 7 Sept. 1996 - p. 329 ISBN-13: 978-0195111309.
13. LIMA, C.V. Grupo Salineira says it will stop transporting in São Pedro da Aldeia (RJ) on May 9, 2022. Transportation Journal. São Paulo, April 25, 2022. Available at: https://cutt.ly/ h7upaBi. Accessed on: June 14, 2022
14. LINS, M. P. E. Avaliação Complexa Holográfica de Problemas Paradoxais. In: LINS, M. P. E; ANTOUN NETTO, S. O. Estruturação de problemas sociais complexos - Teoria da mente, mapas metacognitivos e modelos de apoio à decisão. 1 ed. – Rio de Janeiro: Interciência, 2018. p. 25-72. ISBN 978-850-7193-420-7.
15. LINS, M. P. E.; CABRAL, L. M. E., S. P. - Representation of Knowledge – Metacognitive Maps. In: LINS, M. P. E. ANTOUN NETTO, S. O. Structuring complex social problems - Theory of mind, metacognitive maps and decision support models. 1 ed. – Rio de Janeiro: Interciência, 2018. p. 25-72. ISBN 978-850-7193-420-7.
16. LINS, M. P. E.; CHAGAS, N. C. – Systems management models. In: LINS, M. P. E. ANTOUN NETTO, S. O. Structuring complex social problems - Theory of mind, metacognitive maps and decision support models. 1 ed. – Rio de Janeiro: Interciência, 2018. p. 25-72. ISBN 978-85071934207.
17. LINS, M. P. E.; CABRAL, L. M. E., S. P. - Representação do Conhecimento – Mapas Metacognitivos. In: LINS, M. P. E. ANTOUN NETTO, S. O. Estruturação de problemas sociais complexos-Teoria da mente, mapas metacognitivos e modelos de apoio à decisão. 1 ed. – Rio de Janeiro: Interciência, 2018. p. 25-72. ISBN 978-850-7193-420-7.
18. LINS, M. P. E.; CHAGAS, N. C. – Modelos de gestão de sistemas. In: LINS, M. P. E. ANTOUN NETTO, S. O. Estruturação de problemas sociais complexos - Teoria da mente, mapas metacognitivos e modelos de apoio à decisão. 1

ed. – Rio de Janeiro: Interciência, 2018. p. 25-72. ISBN 978-85071934207.
19. MARTINS, C. G. B. Analysis and support for the management of a university extension course: a case study of the Extension Course in Implantology of the Faculty of Dentistry of the Federal University of Rio de Janeiro. Rio de Janeiro: UFRJ/COPPE. 2019 Available at: https://pantheon.ufrj.br/handle/11422/13262. Accessed on: 10 Feb. 2021. MORIN, E. Introdução ao pensamento complexo. Porto Alegre: Sulina, 2005. 120 p. ISBN: 85-205-0427- 8
20. MINGERS, J. A critique of statistical modelling in management science from a critical realist perspective: its role within multimethodology. J Oper Res Soc 57, 202–219 (2006). https://doi.org/10.1057/palgrave.jors.2601980
21. SÃO PEDRO DA ALDEIA. Law No. 2,711, of May 19, 2017. Provides for the creation of the Shared Taxi System in the Municipality of São Pedro da Aldeia-RJ and makes other provisions. São Pedro da Aldeia: City Hall, 2017. Available at: https://cmspa.rj.gov.br/arquivos/87/_0000001.pdf. Accessed on: 22 dez. 2021.
22. STEINBERG, F - Desafios e tendências da aviação no Brasil. Calle/PA, 2022. Associação da Latino-Americana e do Caribe de Transporte Aéreo (ALTA) / IBS Software Disponível em: https://www.ibsplc.com/images/insights/whitepaper/General/Desafiose_E_Tendencias_Da_Aviacao_No_Brasil.pdf. Acessado em: 28/04/2024.
23. STEWART, I. Em busca do infinito: Uma história da matemática dos primeiros números à teoria do caos. São Paulo: Zahar; 1ª edição – março/ 2014. 434 páginas.
24. VASCONCELLOS, M. J. E., Systemic thinking: The new paradigm of science, 11 ed. Campinas, SP: Papirus Editora, 2018 - ISBN 978-85-449-0294-3.
25. VASCONCELLOS, M. J. E., Pensamento sistêmico: O novo paradigma da ciência, 11 ed. Campinas, SP: Papirus Editora, 2018 - ISBN 978-85-449-0294-3.

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Organizational Change Management in the Digital Age: Utilizing New Technology for a Contemporary Workstyle

Aida Mehrad & Mohammad Hossein Tahriri Zangeneh

ABSTRACT

In the digital age, managing organizational change has become increasingly challenging. Leaders must balance visionary strategies with compassionate engagement to construct organizational resilience and adaptability. This paper examines how organizations can utilize new technologies, particularly blockchain, to enhance modern work styles while addressing the challenges of digital transformation. Technological advancements offer substantial benefits, such as improved efficiency, transparency, and competitiveness. However, they also present significant obstacles, including high implementation costs, resistance to change, cybersecurity risks, and regulatory complexities. Adequate leadership in this evolving landscape requires a structured change management approach that integrates technology and addresses the human aspects of transformation. Leaders can reduce resistance and foster organizational alignment by adopting people-centred strategies that promote collaboration and continuous learning. The study highlights that product innovation, processes, business models, and organizational structures can position companies for long-term success. Proactive leadership, strategic adaptability, and a commitment to ethical and sustainable practices are essential for navigating change and empowering organizations to become more resilient, competitive, and prepared for future disruptions. This research highlights the need to blend innovative solutions with firm leadership to manage organizational transitions effectively, ensuring sustainable growth in an increasingly dynamic global environment.

Keywords: change management, leader, leadership, manage, organization, technology.

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Keywords: change management, leader, leadership, manage, organization, technology.

Author: c3s business school, barcelona, 08029, spain

I. INTRODUCTION

Knowing and having some essential management information can be the first factor in any change in this area of an organization. Most leaders and managers seek updates and good ways to improve the organization's situation by providing new ideas and methods for making changes and having high outcomes. Therefore, effective change management is essential for organizations to thrive in today's competitive business environment. Many theories and approaches to change management can conflict with one another, lack empirical support, and depend on untested assumptions. Todnem (2005) addressed this issue by examining key theories and methods to develop a new framework for managing change while suggesting areas for further research.

Several key factors are typically considered in Organizational Change Management, including the organization itself, company dynamics, teamwork, managers, leaders, CEOs, HR, modification processes, goal achievement, technology, and new programs in the IT concept. The current study focused on these as its priority and boldly highlighted the importance of new technology in the management system, particularly in changing moods.

Firstly, it is essential to understand the organization in order to implement change management effectively. An organization comprises various departments and staff

members who work together to achieve specific goals and improve internal and external outcomes. It can be understood as an association of different groups united by a common objective. Within the organization, individuals collaborate to create more significant opportunities. Instead of discussing general explanations about organizations, it is crucial to identify the technologies and new methods essential for modernizing these entities. Change is necessary, especially within the management system. The critical question is: What are the latest technologies related to the organization concept? (Prosci, 2024).

The landscape of modern organizations is increasingly shaped by technological advancements, as highlighted in the work of Fosso Wamba et al. (2019), Lăzăroiu et al. (2023), Queiroz and Fosso Wamba (2019), Rejeb et al. (2020), and Wamba and Queiroz (2020). These scholars emphasize the critical need for organizations to adapt effectively to these transformations to thrive in an ever-evolving business environment. Technological innovations such as Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing traditional organizational frameworks by automating complex tasks and enabling the analysis of vast datasets. These capabilities enhance decision-making processes and streamline operations, improving organizational efficiency and collaboration. Additionally, blockchain technology has emerged as a pivotal tool, offering secure and transparent data sharing and transaction processing methods. This innovation significantly reduces the risk of fraud, and fosters trust among various stakeholders, thereby underpinning more robust organizational networks. Moreover, the Internet of Things (IoT) and the advent of 5G networks merit considerable attention. The enhanced connectivity of 5G allows IoT devices to gather and analyze real-time data, significantly improving resource management and promoting more agile operations. This capacity for real-time data analysis is essential for organizations striving to meet dynamic market demands.

Cloud computing or online delivery systems via the internet support these transformations by providing scalable and flexible IT resources. This adaptability enables organizations to adjust to changing circumstances while facilitating remote work and collaboration among distributed teams. The rise of virtual organizations, empowered by advances in digital communication technologies, has led to increasingly fluid and dynamic organizational structures. These virtual entities typically consist of geographically dispersed teams leveraging electronic communication, which fosters collaboration and innovation. Another important consideration is the role of semantic computing, which employs formal ontologies to enhance comprehension within organizational contexts. This approach improves coordination and cooperation by clarifying dependencies and integration risks inherent in complex organizational systems. Incorporating these technologies is essential for successful digital transformation, allowing organizations to foster innovation, maintain competitiveness, and effectively navigate the complexities of the modern business landscape. However, it is equally vital to consider managers' preferences when implementing these organizational changes. Identifying and understanding the key characteristics that managers prioritize—such as adaptability, open-mindedness, effective listening, being well-informed, receptiveness to new ideas, strong communication skills, commitment, problem-solving capabilities, and a deep understanding of organizational needs—will significantly influence the success of these transitions. In summary, the interplay between technology and effective management practices is crucial for organizations seeking to leverage innovation for sustainable growth and adaptability in a rapidly changing environment.

Table 1: Summary of Technology and Management System/ Actions and Process

Step	Action	Description
Create Urgency	Identify the need for digital transformation	Use primary and secondary data and industry trends to demonstrate why adopting new technology is essential.
Build a Coalition	Group-up a digital leadership team	Identify the key stakeholders, digital champions, and influencers who can drive the change forward.
Develop Vision & Strategy	Define a digital roadmap and goals	Establish clear objectives for how new technology will enhance work efficiency and improve business outcomes.
Communicate Vision	Use digital platforms to engage team members	Virtual meetings, internal social networks, and digital newsletters are used to keep employees informed.
Empower Employees	Provide digital training and resources	Schedule workshops, e-learning courses, and hands-on experience to build digital skills.
Generate Wins	Implement & celebrate small tech-driven wins	Begin with pilot projects and quick wins to build momentum and boost confidence.
Sustain Acceleration	Scale digital initiatives and iterate improvements	Expand initiatives across teams and refine the approach based on feedback.
Anchor in Culture	Foster a digital-first mindset & policies	Incorporate digital tools into everyday workflows, foster innovation, and revise policies to support a contemporary workstyle.

Key Factors in Change Management

The key factors to consider for effective change management are flexibility and open-mindedness. These qualities enable managers to adapt to new situations and appreciate diverse perspectives, which are essential for navigating the complexities of organizational change (Pollack, 2025). Additionally, strong communication skills are crucial for ensuring clear and open dialogue. Effective communication facilitates information sharing and helps minimize misunderstandings during the change process. Managers who communicate well can clearly articulate their

vision, set expectations, and provide constructive feedback (CoffeePals, n.d.). Another critical factor is problem-solving ability, which involves identifying issues and developing practical solutions. Managers who excel in this area can promptly address challenges, ensuring smoother transitions during periods of change (Pollack, 2025).

Understanding the organization's needs is essential. This involves comprehending its goals, culture, and operational dynamics. By doing so, managers can implement changes that align with the organization's objectives, ensuring that these changes are relevant and practical (Champlain College Online, n.d.).

II. TYPES OF ORGANISATIONAL CHANGE

There are words and explanations about organizational change, such as Strategic change, Process, Cultural, Technological Structural Changes, and structural changes, each of which has many points. Strategic Changes consider aligning business strategies with market trends. Process Changes are Enhancing or redesigning workflows and operations. Cultural change transforms organizational culture, values, and behaviours (being flexible and open-minded about organizational culture). Technological Changes implement new tools or systems. Structural Changes are Adjusting organizational hierarchies or roles (positions and job descriptions) (TEDx Talks., 2015, January 5).

2.1 Identifying the Need for Change -External and Internal Pressures

Considering several key internal and external factors that influence the Organization is essential. Effective communication plays a critical role and includes various aspects, such as Conflict management, Disaster management, Problem-solving, and finding solutions, Acting as a flexible advisor, Generating new ideas to address conflicts and challenges, Creating an optimistic work atmosphere, Seeking advice from external experts, such as psychologists. Additionally, it is essential to stay informed about new policies and responsibilities while educating staff about organizational behaviour. Encouraging effective communication in the workplace is vital, and this should be supported by appropriate facilities, well-defined tasks and positions, and the necessary tools (such as software and measurement instruments). Safety is paramount, and the workplace must promote mental and physical health. Salary and rewards should be commensurate with each position and employee performance, and monthly evaluations should be conducted to assess performance (Hafeez et al.,2029; Omisore & Abiodun, 2014; Pumble, 2023).

2.2 Highlighted Skills

Creating a satisfying and happy workplace requires a comprehensive approach to prioritizing organizational goals and employee well-being. Reward systems can be particularly effective when they align with employees' efforts and achievements, fostering motivation and job satisfaction. A positive relationship between management and staff, built on trust, transparency, and effective communication, fosters a healthy work environment.

Managers should actively listen to employee concerns and avoid bias to ensure fairness and inclusivity. Collaboration and involvement are crucial; empowering staff to contribute meaningfully promotes team cohesion. Indirect monitoring and supportive and attentive leadership help build autonomy and confidence among employees.

Effective meetings and clear communication channels facilitate the smooth exchange of ideas and acknowledge individual skills, including soft skills, which enhance personalized engagement and development. Team building, cooperation, and negotiation skills are vital for maintaining relationships and achieving organizational objectives. Encouraging creativity, problem-solving, and conflict management enables innovative solutions and effective resolution of workplace challenges.

Language skills are particularly important for clear communication, especially within diverse teams. Moreover, proactively and strategically managing risks and disasters ensures workplace

stability and resilience. By combining these elements, organizations can cultivate a dynamic and fulfilling work environment where employees thrive, stay engaged, and contribute to long-term success.

2.3 Which Factors Caused by Change at Organization?

Change at work, driven by internal or external factors, significantly affects an organization and employees' organizational behaviours. Likewise, It shapes workplace dynamics and influences how employees and managers adapt for growth and sustainability. Branding During Change Maintaining a strong brand identity during transitions also builds trust among clients and employees while communicating the organization's values, which organizations must consider. Enhancing soft skills such as change initiatives highlights the need to identify and improve employees' soft skills, such as adaptability and teamwork, which boost morale and productivity, and it is necessary to support and consider managers. In addition, updating systems and roles in any organization and company can be done by implementing changes that often require modernizing workplace tools and managerial approaches to ensure competitiveness and efficiency. Besides that, Revising Standard Operating Procedures (SOPs), which adapt SOPs, is crucial for enhancing productivity and fostering a mindset of continuous improvement.

Additionally, Innovative Strategies are essential in Embracing updated leadership approaches to help organizations remain relevant and succeed in evolving markets. Maintaining Communication likewise creates Strong relationships, and regular Communication with employees and partners ensures alignment and shared goals during transitions. Also, effective delegation means assigning roles that match individual strengths, which enhances accountability and operational efficiency. Revisiting Vision and Mission Change requires reassessing the organization's vision and mission to align with new goals, providing clarity and direction for all.

Unfreeze Workplace: Welcome to Change!

It is vital to have correct and logical answers to the questions below to have a general overview of unfreezing any organization.

1. What do the managers have to plan for making any change? Which essential Needs?
2. Which Process?
3. Do you have any replacement?
4. Having support/ how do you support the team?
5. Having Skills of understanding needs and changes (listening with understanding)

Effective management of organizational change requires a thoughtful and strategic approach. The following key areas should be addressed: 1. Identification of the need for change: It is essential to acquire a comprehensive understanding of the motivating factors after the change, which may include market competition, technological advancements, or existing inefficiencies within the organization. 2. Establishment of clear objectives: Defining measurable goals and expected outcomes is crucial for guiding the change process and assessing its success. 3. Stakeholder engagement: Identifying key stakeholders, including employees, customers, and partners, and involving them throughout the process fosters collaboration and support. 4. Resource planning: Strategically allocating the necessary resources, such as time, financial investments, and personnel, is vital for the effective implementation of change. 5. Development of a communication plan: A well-structured communication strategy should articulate the rationale, details, and processes associated with the change, ensuring all stakeholders are informed and aligned. 6. Risk assessment: It is important to anticipate potential resistance and barriers and to devise appropriate strategies for mitigating these challenges. 7. Assessment of training needs: Conducting a thorough analysis of skills gaps and arranging for relevant training or upskilling is crucial in preparing the team for successful adaptation to the change. This structured approach will facilitate a smoother transition and enhance the overall effectiveness of the change initiative.

To better understand the change process within an organization, it is essential to consider various factors related to unfreezing. Unfreezing involves creating awareness about the necessity for change, challenging the current status quo, and highlighting issues with the existing system. It is essential to build a sense of urgency and gain buy-in from stakeholders.

The next stage, changing or transitioning, encompasses several key elements, including implementing new systems, processes, or behaviours. This stage also includes training and development programs to upskill employees, offering emotional and practical support during the transition, and encouraging collaboration and open communication to address any doubts or resistance.

Finally, refreezing reinforces new practices through rewards, recognition, and regular feedback. Establishing policies and procedures that align with the changes made and ensuring long-term sustainability by embedding these changes into the organizational culture is vital.

Replacement or alternatives involve phased approaches instead of a complete overhaul. For example, implementing Pilot Programs can test changes on a smaller scale before a full rollout. Consider making incremental changes by introducing adjustments gradually to prevent overwhelming the team. You can also use behavioral nudges, which are subtle incentives or encouragements to guide desired behaviors. Finally, engaging third-party consultants can provide a fresh perspective and help fill skill gaps.

To ensure robust support during organizational change, it is imperative to focus on the following key factors:

1. Clear Communication: Maintain transparent communication. Employees must be fully informed about the organization's goals, the benefits of change, and the steps involved. This clarity is non-negotiable for building trust and alignment.
2. Emotional Support: It is essential to address team anxieties directly. Empathetic support through counseling or coaching creates a strong foundation of emotional well-being.
3. Training: Equip employees with the necessary skills and knowledge to succeed in their new roles. Robust training programs are crucial for fostering confidence and adaptability.
4. Employee Involvement: Involve team members in the change process. Their input is invaluable and enhances their commitment, making it vital to foster collaboration effectively.
5. Recognition: Celebrate short-term victories and recognize individual contributions. This practice is essential for maintaining high morale and fostering a culture of appreciation within the organization.

Feedback Channels: Establish clear, safe channels for employees to voice their concerns and ideas. Empowering the team by listening actively and addressing their input is critical. Organizations that prioritize these factors will successfully support their teams and drive meaningful change.

Managers need specific skills to effectively address their teams' needs and changes: 1. Active Listening: Focus on employees' concerns without interruptions. 2. Empathy: Validate employees' feelings and experiences. 3. Analytical Thinking: Identify underlying needs from feedback.4. Adaptability: Be flexible based on team input. 5. Conflict Resolution: Mediate disagreements and misunderstandings. 6. Transparency: Communicate openly when addressing issues.7. Non-Verbal Communication: Recognize body language and tone. By developing these skills, managers can create trust and collaboration, ensuring smoother transitions during change initiatives.

Which Types of Organisations are Ready to Change? Which Factors Have to Be Considered?

The first and most important factor in preparing for change is ensuring that staff members are informed and familiarized with the reasons for the change. It is essential that they clearly understand why the change is necessary, which can be achieved by providing relevant information and training. Ignoring this step can lead to significant

challenges and difficulties during the change process.

Additionally, several other factors should be considered. These include recognizing and integrating changes with the help of experts, combining various approaches and strategies—such as innovative or unique ideas—and developing work processes across different areas and segments. It is also vital to establish and share successes with the team.
Organizations will be better prepared to initiate and embrace change if these processes and ideas are followed.

2.4 How to Manage Risk in Changing Management?

Effective risk management during a change requires thorough planning, clear communication, and proactive stakeholder engagement. Start by assessing potential risks, such as operational disruptions and resistance to change. Develop a detailed succession and handover plan to ensure continuity. Transparent communication is essential. To minimize uncertainty, announce the management change early, explain its reasons, and address any concerns. To preserve institutional knowledge, document processes, and facilitate knowledge transfer among team members. To maintain stability and morale, involve key employees in the transition, provide necessary training, and reaffirm the organization's core values. Monitor performance through key performance indicators (KPIs), gather feedback, and adapt strategies to address emerging issues. Having contingency plans in place is vital. Ensure the new management aligns with the organization's culture and complies with legal and governance requirements. Lastly, it creates a positive environment by acknowledging the contributions of outgoing leaders, welcoming new ones, and conducting a post-transition review to learn from the experience and make improvements (Cameron & Green, 2020).

2.5 How Do You Develop a Risky Situation?

Happening risk, particularly in an organisational system, is assumed as one of the everyday situations in which having adequate knowledge to reduce it and conduct it in the high positive results and benefits can be considerable. Besides that, some factors can cause high and outstanding outcomes in developing and managing risky situations, such as considering staff requirements, the role of partners or stakeholders who directly and indirectly collaborate with the organization, the role of leaders in introducing and leading changing situations, and the risk of the organization. Besides that, risk management strategies should be markable. Leaders and managers must apply them correctly, as they differ based on workplace cultural factors and managers' attitudes. In different research and documentaries, the roles and importance of leaders in developing and managing risky situations are considerable; therefore, it can prove adequate training and knowledge for preparing suitable fields and situations of risky factors and conducting them accurately. The organizations must always be ready to accept and face any risk.

2.5.1 Leadership and Communicating Change Management

Leadership and change management are interrelated disciplines essential for guiding organizations through transitions. These transitions can occur due to internal objectives, market conditions, or unforeseen challenges. Successfully managing these transitions requires a solid foundation in several key areas:

a. Technology Utilization: Effectively leveraging technology is crucial for facilitating change.
b. Training: It is essential to provide comprehensive information and training for team members, including having experts available to support others.
c. Understanding Leadership and Change Management: A firm grasp of both theoretical and practical aspects of leadership is critical for effective change management.

d. Focus on Change Management Operations: Prioritizing the operational aspects of change management helps streamline the process.
e. Preparation: Designing thorough preparation plans and gathering necessary pre-information is vital for a smooth transition.

Company Culture: A supportive culture creates a favorable backdrop for successful change initiatives.

Progress Review: Regular assessments of progress ensure that the change management process stays on track.

These factors significantly influence the change management process, which knowledgeable leaders navigate skillfully.

2.6 What is Leadership? Why is it Important?

The concept of leadership should focus on the leader's meaning and role, which is to guide team members in achieving the company's goals and requirements. It is essential to recognize that leadership is integral to success. Leaders play a crucial role in organizations, and their effectiveness varies based on several factors, including communication among members and clearly defining the organization's goals. In an effective leadership dynamic, rationality in the workplace fosters healthy communication between staff and the CEO. Additionally, creating a friendly and trustworthy atmosphere at work is essential. This includes promoting diversity and equity, encouraging healthy competition, possessing solid knowledge, being flexible, researching communication methods, maintaining a positive mindset, and being a good listener. Understanding and managing any changes within the organization is also crucial. Leaders must have adequate justification for changes and be supportive of their teams. Building trust and friendship, appreciating team members, and understanding the work culture are all essential components of effective leadership.

2.7 How to Manage Leadership Styles in Changing Concepts?

1. Leadership in the Context of Change

Leadership is influencing and inspiring individuals or groups toward achieving a common goal. In times of change, effective leadership becomes even more essential. Key aspects include Vision Setting, which refers to Leaders who must articulate a compelling future vision to align teams with the desired outcomes. A clear vision reduces uncertainty and builds trust. Emotional Intelligence, which talks about Leaders with high emotional Intelligence, can empathize with employees' concerns and manage resistance effectively. They recognize emotional undercurrents and adjust communication and support accordingly. Decision-making, which considers Balancing quick, decisive action with inclusive decision-making, is vital during change. Leaders must remain adaptable, reassessing strategies as new information emerges. Role Modeling talks about how leaders must embody the change they advocate for, setting a standard for behavior and commitment.

2. Change Management Frameworks

Change management refers to structured approaches for transitioning individuals, teams, and organizations to a new state. Popular frameworks include Kotter's 8-Step Process, Lewin's Change Model, and ADKAR Model, each conducting a changing process according to the workplace situation and requirements. In this framework, different items, such as Strategies for Leading Change, which include Communication, Building Trust, Engagement and Inclusion, Training and Development, Addressing Resistance, Continuous Feedback and Adaptation, Challenges in Leadership, and Change Management, must be considered.

III. Presence of Modern Technology and Innovation in the Organization and Challenge Management

Modern technology and innovation are crucial to organizational success by enhancing efficiency, competitiveness, and adaptability. However, these advancements also pose challenges that organizations must manage effectively. This comprehensive guide examines the importance of technology and innovation in organizations and the challenges associated with managing them. Modern technology has revolutionized organizational operations, improving efficiency, productivity, and decision-making. Key technological advancements have been explored in various studies. For instance, Wambo et al. (2019) and Wamba and Queiroz (2020) examined the impact of blockchain technology on operations, stressing the necessity for managers to remain open to new ideas and solutions and highlighting the importance of being well-informed and open-minded when adopting innovative technologies in organizational processes.

3.1 Digital Transformation

Digital transformation refers to the thorough integration of digital technologies into every aspect of an organization, fundamentally changing how operations are carried out and how value is delivered. This transformation goes beyond simply adopting new technologies; it requires a significant cultural shift in which organizations embrace continuous innovation, agility, and a readiness to challenge traditional norms. The emergence of technologies such as artificial intelligence, blockchain, and quantum computing has dramatically accelerated this transformation across various industries (Philip, 2021). For example, retail has seen companies invest significantly in modernizing operations and improving customer experiences through digital means. Similarly, the healthcare and financial services industries are experiencing considerable digital shifts, which require agile responses to the changing technological landscape. In the corporate world, the structure of executive leadership teams is evolving to manage and drive digital transformation initiatives effectively. New roles, such as Chief Transformation Officer and Chief Experience Officer, have become essential for navigating the complexities of modern enterprises. This development underscores the increasing importance of cross-functional leadership and continuous learning, enabling organizations to remain competitive in a rapidly changing environment.

3.2 Digital Transformation, Change Management, and Leadership

The successful implementation of digital transformation initiatives is closely tied to effective change management and leadership. Bass (1985) described that transformational leadership highlights leaders' role in inspiring and motivating employees to prioritize the organization's collective goals over their personal interests. In digital transformation, transformational leaders are crucial in creating an environment that fosters innovation and change by encouraging the adoption of new technologies and processes. Philip (2021) argues that integrating leadership concepts into digital transformation efforts is essential, as leaders play a vital role in developing a new vision and executing strategies for transformation. The study also indicates that incorporating the elements of transformational leadership behaviours can significantly enhance the success of digital transformation initiatives.

Agile leadership is a relevant framework, especially in the dynamic and complex business environments that arise during digital transformation. Agile leaders emphasize adaptability, promote self-organizing teams, and support iterative problem-solving approaches. Weber and colleagues (2022) present the Digital Transformation Leadership Framework, which outlines leadership roles critical for addressing the challenges posed by digital transformation. Their research highlights the necessity for leaders to demonstrate flexibility and responsiveness, allowing organizations to navigate the

uncertainties and rapid changes accompanying digital transformation effectively.

Furthermore, integrating digital leadership within the transformational leadership paradigm has positively impacted organizational performance. A recent study employing transformational leadership theory as a guiding framework demonstrates that digital leadership when aligned with digital transformation efforts, enhances business performance by effectively integrating digital technologies into business operations (Shields, 2022). This alignment underscores the critical role of leadership in articulating a clear vision for digital transformation and motivating teams to embrace and implement digital initiatives successfully. In summary, the intersection of digital transformation, change management, and leadership is underscored by theoretical frameworks such as transformational and agile leadership. These frameworks provide valuable insights into the leadership behaviours and change management practices essential for successful digital transformation. Organizations are better positioned to navigate the complexities and challenges inherent in the digital transformation landscape by fostering environments that encourage innovation, adaptability, and collective leadership.

3.3 Digital Transformation Canvas

Organizations face challenges aligning digital transformation with their business strategy, developing necessary digital skills, and adapting internal processes. Digital leadership, defined as strategically guiding digitalization for the enterprise and its ecosystem, is crucial in navigating these challenges. Organizations can utilize the Digital Transformation Canvas to effectively manage digital transformation, a conceptual tool that provides a systemic view by integrating strategic and operational perspectives. This canvas consists of four main categories: Digital Transformation Strategy, which defines the purpose and strategic direction; Digital Transformation Operational Pillars, including processes, people, platforms, and partners; Digital Transformation Value, which articulates the expected benefits in product, performance, and planet; and Digital Transformation Pitfalls, addressing data protection and privacy. The canvas enables managers to visualize and communicate digital transformation initiatives, facilitating the selection of projects that align with the organization's strategic goals.

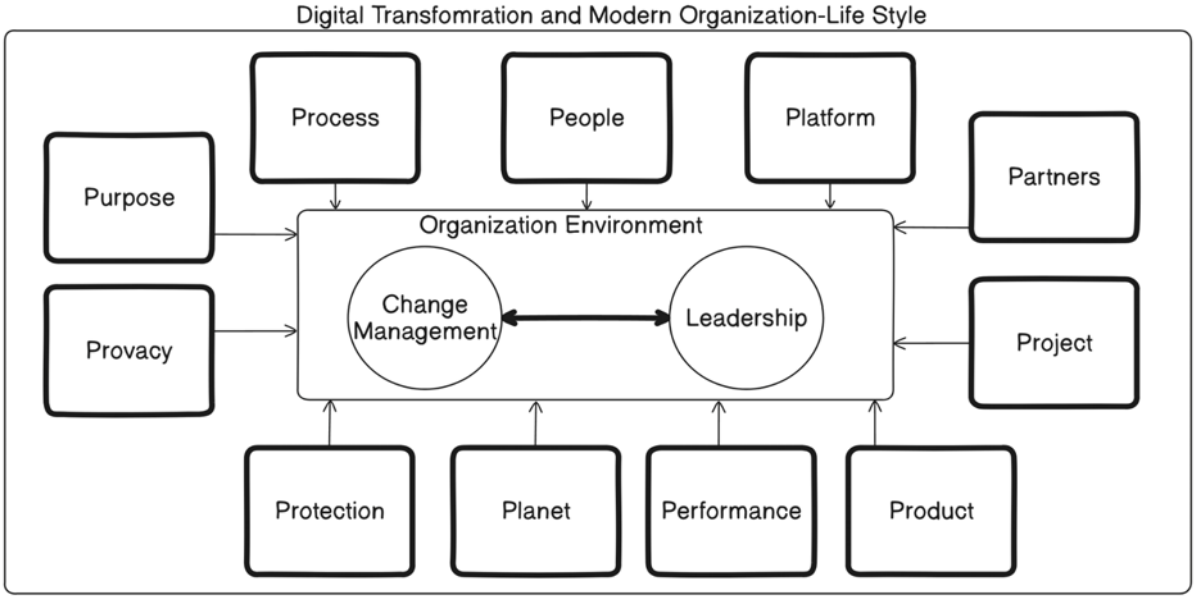

Figure 1: Digital transformation/ Modern work lifestyle.

3.4 Effects of Digital transformation and modern lifestyle on speed of changing management with considering updated leadership

According to Elia et al. 2024, The Digital Transformation Canvas (2024) is assumed to be a conceptual framework that facilitates the strategic design and implementation of digital transformation initiatives. It comprises 11 key elements categorized into four domains: strategy, operational pillars, value, and pitfalls. Among these, nine elements begin with the letter "P," and they are mentioned in continuation of the explanations, which start with Purpose: This element describes the overarching aim that justifies and motivates an organization's digital transformation efforts. It aligns with the business strategy and may arise from internal strategic plans or external market demands. The second P, as it is known, is the process of transformation, which affects specific business functions and workflows, such as marketing, sales, supply chain management, and customer service. The Process element ensures that digital initiatives integrate seamlessly with existing or newly designed business operations. The third P, which is known by the title of People, focuses on digital transformation and requires the active participation of stakeholders, including internal (employees, management) and external (customers, partners). Ensuring digital literacy and fostering a culture of innovation are crucial for success. The fourth one is Platform, which refers to the technological infrastructure that supports digital transformation, including enterprise resource planning (ERP), customer relationship management (CRM) systems, cloud computing, big data analytics, and artificial intelligence solutions. In focusing on the Ps, the fifth one is Partners, which talks about Successful transformation, which often depends on external collaboration with technology vendors, research institutions, consultants, and service providers who bring expertise and resources to facilitate digital initiatives. The Sixth P is a Project explaining that A structured approach to managing digital transformation is necessary, including budgeting, timelines, and risk assessment. This element ensures that initiatives are aligned with organizational capabilities and strategic priorities.

Additionally, the seventh one is Product, which focuses on Digital transformation and often leads to the creation of new digital products or the enhancement of existing ones with digital features. Examples include smart devices, digital platforms, and software-driven services. The eighth P is Performance, which talks about Organizations measuring the success of their digital transformation initiatives through economic and operational performance indicators, such as revenue growth, cost reduction, innovation metrics, and customer satisfaction. Moreover, the last one is Planet, which addresses digital transformation's environmental and societal impact, emphasizing sustainability, corporate social responsibility, and reducing the ecological footprint through digital initiatives. These elements provide a comprehensive framework for organizations seeking to navigate the complexities of digital transformation by integrating strategy, technology, and value creation while addressing potential challenges.

Considering the above information about Ps elements and points that explain an organization in general, Effective leadership is essential for successful digital transformation, extending beyond individual traits to include a multifaceted approach involving peers, supervisors, and organizational culture. Digital transformation leadership encompasses roles, competencies, behaviors, and enablers. Key roles include mentors, enablers, networkers, innovators, managers, mentees, and pioneers. Critical competencies involve aligning digital tools with business challenges and fostering collaborative learning. behaviours include openness to experimentation, risk tolerance, and adaptability. Enablers include a clear vision, top management commitment, cultural change, and partner collaboration.

The Digital Transformation Canvas serves as a component-based framework that defines the digital transformation process and facilitates collaborative work among stakeholders. By

adopting the canvas, organizations can enhance communication transparency, increase stakeholder trust, and empower individuals and teams to pursue new initiatives. The canvas also supports the development of a transformative vision, enabling organizations to anticipate market trends and solve complex problems. Furthermore, its modular architecture allows for continuous adjustments and promotes adaptability, making organizations more entrepreneurial and open to change.

IV. COMMUNICATION AND COLLABORATION TOOLS

Advancements in communication technology have made seamless teamwork possible, even in remote work environments. Video conferencing tools such as Zoom, Microsoft Teams, and Google Meet enable effective communication among team members. Collaboration platforms like Slack, Trello, and Asana enhance project management and improve teamwork. Cloud-based document-sharing services, including Google Drive and Dropbox, simplify accessing and collaborating on files.

4.1 Blockchain and Decentralized Technologies

Blockchain technology is a beacon of transparency, security, and efficiency, revolutionizing transaction processing and record-keeping with its vast and impactful applications. Cryptocurrency transactions enable seamless, decentralized financial operations, allowing individuals and businesses to transfer value effortlessly globally. Smart contracts automate the execution of business deals, ensuring that terms are met without intermediaries, streamlining operations, and reducing costs. At the same time, supply chain tracking enhances trust and accountability by making the journey of products from origin to consumer transparent and traceable. Innovation is the lifeblood of organizations striving to thrive in today's competitive landscape, enabling them to adapt swiftly to market shifts and fulfill evolving consumer demands through various key types. Product innovation focuses on creating groundbreaking or enhanced products that captivate consumers, exemplified by Apple's iPhone, which has transformed into a multi-functional marvel with cutting-edge features, and Tesla's electric vehicles that revolutionize sustainable transportation. Process innovation enhances internal workflows to boost efficiency, cut costs, and refine operations, with lean manufacturing techniques minimizing waste and AI-driven supply chain optimization reshaping logistics. Business model innovation redefines how organizations generate and deliver value, as seen in subscription-based platforms like Netflix and Spotify, which have transformed entertainment consumption, alongside sharing economy pioneers like Uber and Airbnb that revolutionize travel and accommodation. Organizational innovation reimagines corporate structures, management styles, and workplace cultures, such as Agile methodologies, that provide flexibility in software development. At the same time, remote and hybrid work models reflect a transformative shift toward adaptability. However, despite the myriad benefits of technology and innovation, organizations encounter significant challenges, including high implementation costs that present daunting obstacles for small and medium-sized enterprises (SMEs) striving to compete with larger counterparts. Resistance to change, stemming from employee anxieties over job displacement due to automation and entrenched organizational cultures that hinder the adoption of innovative practices, adds complexity.

Furthermore, the leap into the digital domain increases vulnerability to cybersecurity risks, where data breaches and ransomware attacks can lead to dire financial repercussions and tarnished reputations. Rapid technological advancements necessitate ongoing learning and adaptation to keep pace, as organizations may find legacy systems quickly becoming obsolete, requiring costly upgrades. Integration issues arise when deploying new technologies, making it challenging for businesses to harmonize AI, Internet of Things (IoT), and cloud solutions with existing systems. Additionally, regulatory and compliance challenges, including government regulations on data privacy like GDPR and CCPA, impose

intricate requirements that can be difficult to navigate. Lastly, ethical and social concerns regarding AI bias and responsible technology usage are critical issues, as automation-driven job losses risk exacerbating socioeconomic divides, raising pressing questions about the future of work.

4.2 Strategies for Effective Technology and Innovation Management

To overcome these challenges, organizations should adopt strategic approaches: Leadership and Change Management- Strong leadership is essential in fostering a culture of innovation- Change management frameworks, for instance, Kotter's 8-Step Change Model) can guide transitions. Employee Training and Upskilling - Investing in continuous learning ensures employees adapt to new technologies. Organizations should offer AI, data analytics, and cybersecurity training programs. Cybersecurity Best Practices- Implement robust cybersecurity frameworks, including endpoint protection and data encryption. Conduct regular security audits and employee awareness training: Collaboration and Partnerships. Partnering with technology providers can streamline innovation adoption. Collaborating with startups and research institutions fosters innovation. Agile and Scalable Infrastructure, including Cloud-based solutions, offer scalability and cost-effectiveness. Implementing modular and flexible IT architectures ensures adaptability. Ethical and Responsible AI Use, which focuses on Organizations, should implement ethical AI frameworks. Transparent and explainable AI models help build trust among stakeholders.

V. CONCLUSION

Effective leadership and change management requires a careful balance of vision, strategy, and empathy. Leaders must navigate operational changes while addressing the human aspects of transformation, fostering resilience and adaptability within their teams. A well-structured approach that combines innovative strategies, technological advancements, and strong leadership is essential for successfully navigating organizational transitions.

Blockchain technology, innovation, and digital transformation present significant opportunities for organizations to enhance efficiency, transparency, and competitiveness. However, these advancements also pose challenges such as high implementation costs, resistance to change, cybersecurity risks, and regulatory compliance issues. To overcome these obstacles, leaders must adopt structured change management frameworks while prioritizing a people-centred approach that promotes collaboration and continuous learning.

By leveraging innovation in products, processes, business models, and organizational structures, companies can position themselves for long-term success. Proactive leadership, strategic adaptation, and a commitment to ethical and sustainable practices empower organizations to manage change effectively, emerging more assertive, resilient, and better prepared to handle future disruptions.

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REFERENCES

1. Big Think. (2016, September 6). Why happiness at work matters | Shawn Achor | Big Think YouTube. Retrieved from https://www.youtube.com/watch?v=pNoGPrK140Q
2. Cameron, E., & Green, M. (2020). *Making sense of change management: a complete guide to the models, tools, and techniques of organizational change. Choice Reviews Online, 50(02), 50-0961-50–0961. https://doi.org/ 10.5860/choice.50-0961*
3. Champlain College Online. (n.d.). What is change management?. Retrieved February 8, 2025, from https://online.champlain.edu/blog/what-is-change-management

4. CoffeePals. (n.d.). *7 qualities of a good manager*. CoffeePals. https://www.coffeepals.com/blog/7-qualities-of-a-good-manager?utm_source=chatgpt.com
5. Elia, G., Solazzo, G., Lerro, A., Pigni, F., & Tucci, C. L. (2024). The digital transformation canvas: A conceptual framework for leading the digital transformation process. Business Horizons, 67(4), 381–398. https://doi.org/10.1016/j.bushor.2024.03.007
6. Fosso Wamba, S., Kala Kamdjoug, J. R., Epie Bawack, R., & Keogh, J. G. (2019). Bitcoin, Blockchain and Fintech: a systematic review and case studies in the supply chain. Production Planning & Control, 31(2–3), 115–142.https://doi.org/10.1080/09537287.2019.1631460
7. Hafeez, I., Yingjun, Z., Hafeez, S., Mansoor, R., & Cheema, K. U. R. (2019). Impact of workplace environment on employee performance: Mediating role of employee health. Business, Management and Education, 17, 173–193. https://doi.org/10.3846/ bme.2019.10379
8. Lăzăroiu, G., Bogdan, M., Geamănu, M., Hurloiu, L., Luminița, L., & Ștefănescu, R. (2023). Artificial intelligence algorithms and cloud computing technologies in blockchain-based fintech management. Oeconomia Copernicana, 14(3), 707–730. https://doi.org/10.24136/oc.2023.021
9. Omisore, B. O., & Abiodun, A. R. (2014). Organizational conflicts: Causes, effects and remedies. International Journal of Academic Research in Economics and Management Sciences, 3(6), 118–137. https://doi.org/10.6007/IJAREMS/v3-i6/1351
10. Philip, J. (2021). Viewing Digital Transformation through the Lens of Transformational Leadership. Journal of Organizational Computing and Electronic Commerce, 31(2), 114–129. https://doi.org/10.1080/10919392.2021.1911573
11. Pollack, J. (2025, January 22). *Change management skills*. Pollack Peacebuilding Systems.https://pollackpeacebuilding.com/blog/change-management-skills/?utm_source=chatgpt.com
12. Prosci. (2024). Change management trends: 2024 and beyond. Retrieved February 8, 2025, from https://www.prosci.com/blog/change-management-trends-2024-and-beyond
13. Pumble. (2023). Communication in the workplace statistics 2024. Retrieved February 9, 2025, from https://pumble.com/ learn/communication/communication-statistics/
14. Queiroz, M. M., & Fosso Wamba, S. (2019). Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. International Journal of Information Management, 46, 70–82.https://doi.org/10.1016/j.ijinfomgt.2018.11.021
15. Rejeb, A., Keogh, J. G., Wamba, S. F., & Treiblmaier, H. (2020). The potentials of augmented reality in supply chain management: a state-of-the-art review. Management Review Quarterly, 71(4), 819–856.https://doi.org/10.1007/s11301-020-00201-w
16. TEDx Talks. (2015, January 5). *A global perspective on sustainability | Mark Altobelli | TED x University of Tulsa* [Video]. YouTube. https://www.youtube.com/watch?v=Ir_7a3fgpFQ
17. TEDx Talks. (2016, April 14). *The happy secret to better work | Shawn Achor | TEDxBloomington* . YouTube. Retrieved from https://www.youtube.com/watch?v=eYLb7WUtYt8
18. TEDx Talks. (2015, November 17). *What makes us feel good about our work? | Dan Ariely| TEDx Riodela Plata*. YouTube. Retrieved from https://www.youtube.com/watch?v=hZSARM4VaVs
19. Todnem, R. (2005). Organisational change management: A critical review. Journal of Change Management, 5(4), 369–380. https://doi.org/10.1080/14697010500359250
20. Wamba, S. F., & Queiroz, M. M. (2020). Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities. International Journal of Information Management, 52, 102064. https://doi.org/10.1016/j.ijinfomgt.2019.102064

Wamba, S. F., & Queiroz, M. M. (2020). Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities. International Journal of Information Management, 52, 102064. https://doi.org/10.1016/j.ijinfomgt.2019.102064

21. Wamba, S. F., Kala Kamdjoug, J. R., Epie Bawack, R., & Keogh, J. G. (2019). Bitcoin, Blockchain and Fintech: a systematic review and case studies in the supply chain. Production Planning & Control, 31(2–3), 115–142.https://doi.org/10.1080/09537287.2019.1631460

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Effectively reducing the possible hazards connected with the facilitation of gender medical travel and tourism is the advancement of the artificial intelligence health system. The AI enhancement is to monitor and include the characteristics of medical journey from the initial location to the destination for treatment. Using a quantitative research technique (a survey research instrument and a PLS-SEM model), the study aims to enhance AI health systems to facilitate medical travel and tourism. 379 responders, including medical professionals, tourist experts, gender experts, and interested thinkers in AI health and technology, provided the data. According to the study findings, the AI health system of medical travel and tourism has significantly improved as a result of international medical legislation, cultural differences, safe medical destinations, and extended medical travel for gender people. In indicating AI while preserving the dignity of the holy site or the trip, the study raises the particular attention that religious travellers with gender based medical issues. Future research may concentrate on the expanded function of AI with particular emphasis to guarantee the honour and respect of the tourist location. For the best results from a reputable and secure gender vacation location, it is advised that AI deployment in the health system be centralized.

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I. INTRODUCTION

The advance artificial intelligence health system is engaged with the elements of gender based health, medical travel and tourism, global medical regulations, cultural differences, safe medical destination and prolong medical travelling (An, 2021). These are potential elements confronting multiple risks associated with the medical travel and tourism (Sumra & Alam, 2021). It is the responsibility of coincided advancements that allow gender s from the multiple destination to avail medical treatments (Peng et al., 2022). The enhance experience of the gender and the improve quality of care through the leading tools of AI is a reason for attractions within the medical tourism (Paryati, 2022). The enhanced role of AI in medical tourism are inter-related with the better health care system that is to transform the process of treatments for the gender. The care delivery service and the efficient channel of satisfying the gender arrange the automated administrative tasks while streamlining the operations and reduce risk of human error (Mahoney and Tang, 2024). The schedule for the appointments and the management of the gender medical record are to automate the system functioning within the health care. The personalization of the care is to integrate the AI role within the data patterns and trends of the gender health (Souza, 2021). It is sharing of the tailored plans of treatment for the bridging of the language barriers and presentation of the soft tools of gender satisfaction.

The use of the AI powered translation instruments for interventions of gender issues and medical professionals are reducing the communication gap, which is a major obstacle for rightful use of

medical services (Gualdron, 2023). For medical tourism similar activities are transforming the deeper AI technologies while sharing the key areas of the medical tourism to improve the care of gender and experience (Bhat & Arumugam, 2021). The overall gender medical experience is transformed with the positive measures within the diagnostic evaluations. It is the support for the valuable insights having decisions from AI tools to proceed for the surgical procedure, treatment plans and the timely use of medication (Alam & Bahrein, 2021). The adaptation of the medical treatments is linked with the data support in terms of accurate treatment to be given to the gender (Olson and Reddy-Best, 2019). The individual seeking for the medical care in other region or the industry is assisted by the AI monitoring which is to follow-up the care through the remote services and sensor devices (Bhatia and Maidullah, 2022). The remote application of the AI tools in health care are to track the gender progress and monitoring with respect to the health (Andersen, 2022).

The incorporation of the AI in medical tourism is extremely essential to meet the desires of gender for the standard care and improve health care outcomes (Lewis et al., 2021). The dynamic process is following the ethical consideration towards the integrating AI in medical tourism and to share the able administrative process for health care (Andrade & Dinis, 2019). The human error in the conventional use of medical care are time consuming processes with the expensive diagnosis faced by the gender (Toth & Mason, 2021). It is the modification with AI system that result in faster data analysis and meeting the delays in documentations for limiting the delays and error-free medical treatment (Kama, 2023). The AI platform for the health care and medical tourism are to provide the electronic health records with the secure storage and access for the separate gender record. The improve efficiency is to enhance the data and security privacy (Alam & Kuppusamy, 2023). The readily available focus of the quality health care is enhancing the ultimate service for gender care and support the health care professionals to advance the process of effective decision making (Zarei et al., 2020). This research is to examine the health system to be improved using the AI apparatus and to focus on lowering the potential threat to medical travel and tourism.

II. LITERATURE REVIEW

The assistance for the artificial intelligence health system, medical travel and tourism, global medical regulations, cultural differences, safe medical destination and prolong medical travelling is to improve gender medical record (Chandran et al., 2020). It is followed with the AI-Driven information for the health care providers those are to assess the gender data in a progressive manner (Tsaih & Hsu, 2018). It is to ensure the readily available need of the improvement for the data privacy and security. The use of the travel and tourism elements in the medical tourism are to encourage the quality health care services (Sumra et al., 2020). These are the considered satisfaction and the experience of the treatment in a progressive manner. For that reason, quality health care services for the gender are the prime motive for the satisfaction and experience which is to support the capabilities of the decisions taken for the betterment of genders (Filieri et al., 2021). The integration of the artificial intelligence in medical tourism is aligned sourcing of the treatments with the plans of advance diagnosis and care of the gender . It is the use of advance algorithms which is providing for the treatment plans and the care of the gender (Doborjeh et al., 2022). These are the continuous learning and adaptation of the personalized treatment plans for the latest search and practice in up-to-date information for systematic solution to the problems of health care. The use of the AI technology is embracing the evidence-based care which is providing high quality health care to the genders (Samara et al., 2020).

The challenge of global medical regulations, cultural differences and implementing the AI in medical tourism is lacking infrastructure with the advance instruments to integrate within the health care system (Alam et al., 2023). The coordination and continuous communication are providing the technology expertise for the data exchange and seamless connectivity (Wang and

Uysal, 2024). It is the collaboration from the autonomous provisions for the regulating of the privacy within the errors for the data security that is addressed through the efficient use of AI. This is enhanced with the trust and confidentiality that endorse the regulation of extensive training and education which is a supporting feature for the health care professionals (Jabeen et al., 2022). The care and gender experience with the technology is acknowledged through the leverage provided by the AI (Wong et al., 2022). These are supported by the compelling options of the artificial intelligence with the evolving role of ethical consideration in healthcare. The ethical extension of the accountability is managed with the major concerns of the gender information that is to prevent the unauthorized access to the data (Ivanov and Webster, 2019). Gender from the globe attract the medical services those are ensuring highest standards within the ethical and trustworthy experience of the health care.

The standards of the health care with respect to the artificial intelligence is paramount for the performance of desire medical destination that is to ease the facilities for gender (Bagga et al., 2020). It refers to the concerned support which is required in the form of ticketing, accommodation and the use of the tour operator services. For that matter, the aligned evaluation of the medical tourism is sharing the construct forecasting to fully implement the technological use of surgical procedures (Yoon and Lee, 2018). The arrivals over the medical tourism site are to ensure the marketing effectiveness and cost of the medical that expense that identified the competitive role of prolong travelling and use of safe destinations for genders. The medical tourism and the destination information system is to align the artificial intelligence as a mechanism for the competitive role of health care (Gaur et al., 2021). The enhance travelling of the patients are connected with the identified performance which is the following and using the global medical regulations, cultural differences, safe medical destination and prolong medical travelling (Lv et al., 2022). This is extending the role of medical research and tourism integration for the better and multiple opportunities those are to link with the propagating marketing and sustainable development of the tourism.

The medical tourism offers safe medical destination and management of prolong medical travelling for the larger role of AI in heath care system to satisfy the global genders arriving from the multiple destinations (Zhang et al., 2023). It is the attraction of the artificial intelligence to attract the gender while satisfying the appointment scheduling and valuable billing for the medical record. The efficiency enhanced the overall experience which is making of the medical tourism as an option of quality healthcare abroad (Arrioja-Castrejón and López-Fernández, 2021). The potential for revolutionizing the treatment plans is engaged with the machine learning diagnostics and vast analysis of the medical data. The continuous analysis and the shared improvements of the data leads to the improved outcomes for the sustainable prospects of the virtual reality and augmented reality-based technologies (De la Hoz-Correa et al., 2018).

The remote consultation for a traveller or the person within the scope of medical tourism is to receive the expert medical advice with the essential needs of travelling. The pre-operative planning for the overall gender's journey is endorsing the medical tourism which is the striking share of support to the medical tourism (Chaulagain and Hancer, 2023). The personalized care of reducing the costs with the use of augmented reality costs are the pre-operative and post-operative diagnostic for the compassionate health care experience of the medical tourists (Spoladore and Pessot, 2023). The forecasting of the travelling for medical tourism is possible with the alignment of tourists towards the desire destination with the improve standard of meeting the cultural differences. It is followed by the consideration of the desire regulations and the rules for obtaining medical visa which is a barrier for genders. The prolong medical travelling for frequent travellers is limited with the artificial intelligence in health system as the scope of prolong travelling is to improve the distance performance of the patient, which leads the development of Hypothesis that follows:

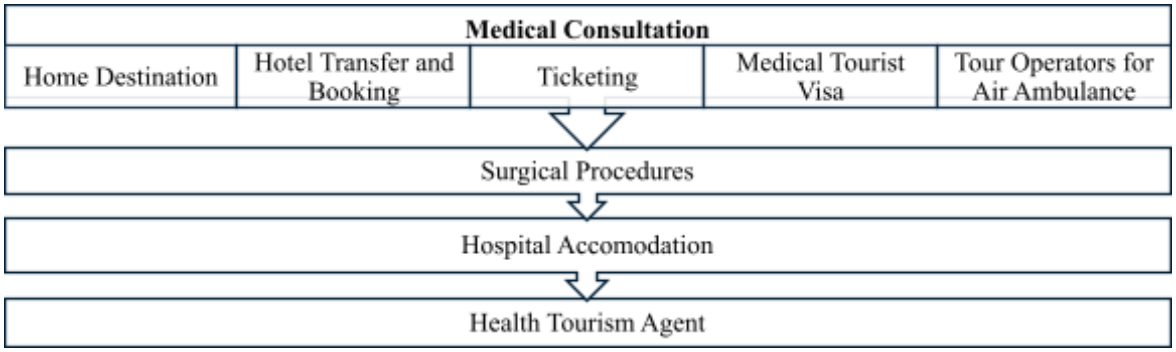
- H1: Artificial intelligence health system is positively correlated with medical travel and tourism
- H2: Artificial intelligence health system is positively correlated with global medical regulations
- H3: Artificial intelligence health system is positively correlated with cultural difference
- H4: Artificial intelligence health system is positively correlated with safe medical destination
- H5: Artificial intelligence health system is positively correlated with prolong medical travelling

Source: (Samara et al., 2020)

Figure 1: Conceptual Framework

III. GREY SYSTEM THEORY FOR GENDER IN AI MEDICAL TOURISM

The Grey System Theory in 1989 established the offers of the medical system for gender travellers to imply techniques, and factor analysis for medical tourism (Dang et al., 2020). The utilization of the AI medical tourism is based on the multiple and diverse use of the Grey System Theory which aligns with the commonly referred issues of a gender patient at home country while struggling for the visa and related services to meet the desire medical destination (Filieri et al., 2021). For the artificial intelligence used in medical traveling and tourism, Grey system forecasting of technological accuracy and successful application of global medical regulations, cultural differences, safe medical destination and prolong medical travelling for medical tourism destination (Doborjeh et al., 2022). Unlike the revenue generation for the prospective destination, gender facilitation in terms of health-related accommodation packages, ticketing and ambulances with the site seeing surgical treatments with the tour operators are resourceful medical opportunities. These are easing the process and smooth implementation of safe medical destination while providing for the management of prolong medical tourism (Samara et al., 2020). The special case of the model is applied for the gender easing of international and travelling to the site of choice which includes the considered measurement of artificial intelligence within the frame of medical tourism (Spoladore and Pessot, 2023). The performance of the cultural differences and meeting of global medical regulation is ensuring the rightful choice of using artificial intelligence in facilitating the gender medical travelling for treatment and rehabilitation tourism.



Source: (Dang et al., 2020)

Figure 2: Application of Grey System Model

IV. METHODOLOGY

The quantitative research methodology implied for the key areas of this research those are included the artificial intelligence health system, medical travel and tourism, global medical regulations, cultural differences, safe medical destination and prolong medical travelling (Sumra et al., 2022: Alam, 2022). It is the categorical interventions and the shared visions of the traveling gender s those are coming from the middle and lower-middle class states (Arrioja-Castrejón and López-Fernández, 2021). The positivist research paradigm engaged with the pragmatic research approach that interact with the medical travelling and tourism resolutions of the issues. The quantitative research method incorporates the sample of 379 from the population of 75000 as determined by the Krejcie and Morgan (1970). This drive towards the supporting and managing of the data within the efficient use of data loss over the errors developed from the analysis (Yoon and Lee, 2018). The PLS-SEM software is to be applied for the specific interventions and the use of the construct with the measurement of relationships and potential development of the model for the employing of AI in medical tourism (Gaur et al., 2021).

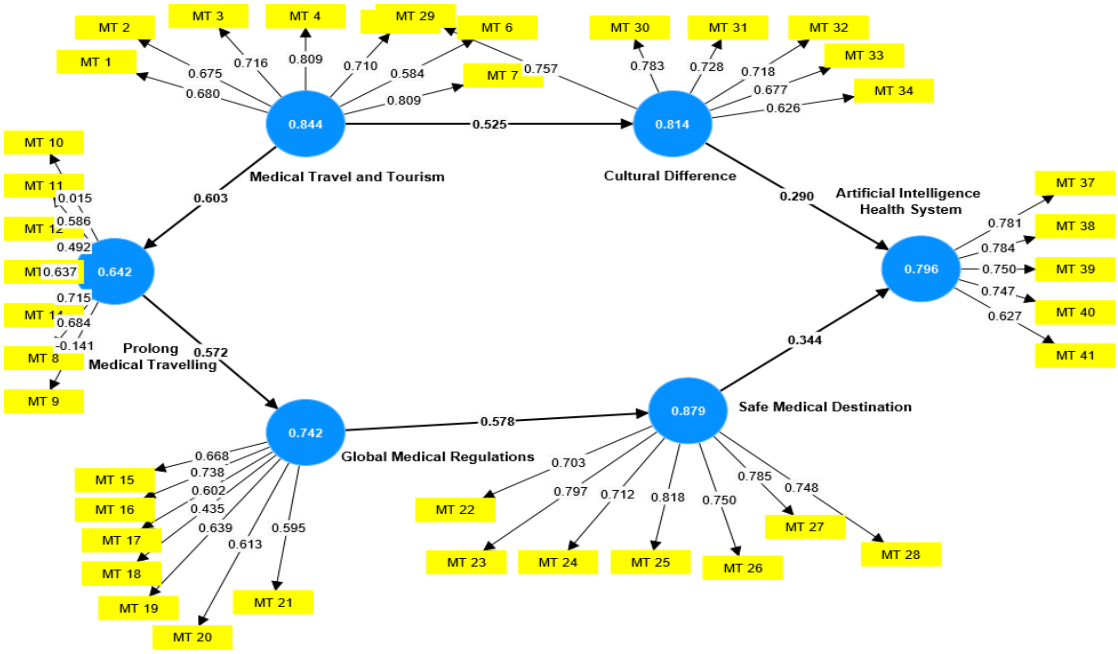
The development of the survey research instrument is provided with the alignment of the items to each of the variable and having close-ended questions in the form of multiple options given to the respondent for valuable input (Lv et al., 2022). It reflects the data collection from the relevant stakeholders of technology, AI operators, medical tourism experts and the academic scholars for potential use of AI in health care. The analysis of the data collected is inter-linked with the measurement of single variable that is shared for the PLS-SEM as a leading software and to explain the improvement of the AI on the medical tourism (Wong et al., 2022). The research method chosen for the artificial intelligence use in the medical tourism aligns the systematic inquiry required for the resolution of issues related to the safe medical health and management of the timely integration of global regulations for the medical tourism.

V. RESULTS & DISCUSSION

The participation of respondents with male 44.7% and female 45.3% that provide for the artificial intelligence role in medical travel and tourism. The demographical description is including the age range of 21-30 years with 31.3%, followed by 31-40 years with 25.7% and 41-50 with 23%. The remaining age of the respondents is calculated with 51-60 having 20% ratio in the research. The education is distributed with the intermediate at 11.4%, bachelor at 21.6% and master education with 30%. Post-graduate qualification of the participant is 37% that is higher in terms of giving opinion for artificial intelligence role in medical tourism. This is linked with the experience of 0-5 years at 13.3%, 6-12 years at 29.7%, and 13-20 years at 40% while remaining 20-25 years at 17% participation in the research.

The use of the PLS-SEM implied with the significant relationship as reflected from reliability values among the artificial intelligence health system (0.796), medical travel and tourism

(0.844), global medical regulations (0.742), cultural differences (0.814), safe medical destination (0.879) and prolong medical travelling (0.642). This follows with the r value of AI health (0.343), and related variables within the range of 0.3 is showing model and data fit for the use of AI in improving medical tourism and travelling services. These are showing a higher impact on the medical travelling and tourism using the improve artificial intelligence tools. It is essential for the health care to follow the harness of power in the medical tourism industry with the range of benefits for the improved efficiency and useful progress for smart medical operations. The gender s and providers from the finding of this research indicate that an automated workers with the AI support for application of identified patterns and trends in AI. The surgical procedures with the medication and treatment plans are ensuring the accurate and effective treatments having the seamless experience without the consideration of AI within the medical tourism.



Source: Model Development from Survey Collected Data

Figure 1: PLS Model

The total effects of the variables with 0.2 to 0.5 values are reflecting the strength for inner model and improvement in cultural differences for the AI based health system. It is the global medical regulations that are stressing for the use of AI with prospective focus on safe medical destination. The discriminant validity values of 0.6, 0.5, 0.8 and 0.7 are the prospective measures for the determinants of AI in medical tourism with sustainable effects on the performance of gender s improve health outcomes. The value for the Fornell Larcker Criterion is between the 0.5 to 0.9 as illustrated from the findings of data used in this research. The explained model fit values from the overall data ratio provided with the saturated and estimated values those are sharing SRMR from 0.114 to 0.178 from saturated and estimated model. It is following the d_ULS for both format of models with the value of 10.113 to 0.178 which is acceptable and model fit data for the artificial intelligence supported medical tourism.

The tested values share the correlation between each item with the value of 1.000 as significant contributor of association among the elements of artificial intelligence health system. It is aligned with the path coefficient values for each of the variable is showing between 0 and 1 which is testifying the assumption that improve AI health system is significantly lowering the potential risks associated with the medical travel and tourism. The involvement of the artificial intelligence as illustrated from the finding of the data analysis

are improving the AI health system to access for the widespread intersection of the risks to be decreased in medical travel tourism. It is to ease the access of the medical services for the individuals based on the digital use of technologies. These are sharing the valuable impacts and the considered working for the aspects of artificial intelligence health system, medical travel and tourism, global medical regulations, cultural differences, safe medical destination and prolong medical travelling. The cultural differences risks are possibly reduced with the implied area of artificial intelligence using multiple tools and instruments in the health care.

The global medical regulation is an essential area of sharing the lawful use of AI in medical travelling and tourism. It is provided with the safe medical destination to be considered while implying the potential access to the medicine and services for improve quality of care. The quality of the care and improve services are interrelated to the prolong medical service which may be improved for the better engagement of gender is towards the AI health system. Travelling across the regions for the medical treatments is aligned with the multiple cosmetic surgeries and procedures those are the specialized medical treatments. It is the paradigm of the medical shift that indicate multi-language marketing with the medical tourism to revolutionize the improve health of gender through the AI supported health system. The medical tourism expertise of the operators encourages the increasing travelling with the focus attention of easing the accommodation, immigration, and related issues of patient within the frame and purpose of medical tourism.

VI. CONCLUSION

The research specified that improvement of the artificial intelligence health system is significant in lowering the potential risks associated with the gender medical travel and tourism, global medical regulations, cultural differences, safe medical destination and prolong medical travelling. It is the integration of the Grey System Theory that facilitate the accommodation, travelling, consultation for medical destination, and level of performance for the desire medical care within the medical tourism system. The powered system of the AI is engaging with the potential analysis of the data for the single gender s having the diagnostic reports of health care with the multiple treatment plans and accurate interventions for the medical travel and tourism. The overall experience and engagement of the individual are seeking with the assistance of medical monitoring and follow-up care which is the resourceful response to the medical traveling and tourism risks.

Similar is the consideration from the finding of this research to regulate the religious tourism activities with the AI enabled support for the reducing the risk of misusing data technology in healthcare. This is extended with the alignment of rituals and performance of the obligatory services in the religious tourism activities comparable visiting to the holy sites with the medical teams having significant roles for the adoption and respectful use of artificial intelligence tools. This is an innovative approach to outline the regulation of the medical tourism in conjunctions for future research on the maintaining of honour and dignity of multiple religious travelling those necessity medical treatment and to pass through smart surgical procedures. The integration of the AI into medical tourism is reflection of the streamline administrative process that endorse the safe medical destination. The resolution of the prolong medical travelling for a gender during the performance of religious services is a major concern that is to be extended through this research on regulations of the medical tourism. The research is applicable and implied to the experts of medical tourism, executives working within the health care and the resourceful researchers serving for enhance role of artificial intelligence in medical tourism.

REFERENCES

1. An, L. H. (2021). Chasing the rainbow: promoting LGBT Tourism on social media: case company: GayTravelFinland.
2. Alam, M & Kuppusamy, M. (2023) Integrated Management for Image Branding; A

Prospective Outlook from Abbottabad as a Tourism Destination Valley of Pakistan, *BESRA Germany, International Conference on Recent Developments in Social Science and Digital Economy* / Washington DC.

3. Alam, M. (2022). Understanding and improving digital tourism events in Pakistan. In *Technology Application in Tourism Fairs, Festivals and Events in Asia* (pp. 233-247). Singapore: Springer Singapore.
4. Alam, M., & Bahrein, K. (2021) Image Branding Factors & Facilitating Model Of Tourism Destinations Management During Covid-19 In Pakistan. *Journal of Tianjin University Science and Technology*, Vol 54, Issue10:2021 (428-444). DOI: 10.17605/OSF.IO/956PY
5. Alam, M., Kuppusamy, M., & Kunasekaran, P. (2023). The role of destination management in mediating the determinants of Cyberjaya Tourism image branding. *Cogent Business & Management*, *10*(3), 2259579.
6. Andersen, J. B. (2022). Risks in LGBTQ+ Tourism.
7. Andrade, H., & Dinis, G. (2019). Perspective on the LGBTQ Segment: The View of Tourism Accommodation Establishments of the City of Porto. *Critical Tourism Studies Proceedings*, *2019*(1).
8. Arrioja-Castrejón, E., & López-Fernández, A. M. (2021). Analysis of medical tourism and the Effect of using digital tools to profile travelers in Mexico. In *Computer Science and Engineering in Health Services: 5th EAI International Conference, COMPSE 2021, Virtual Event, July 29, 2021, Proceedings 5* (pp. 143-161). Springer International Publishing.
9. Bagga, T., Vishnoi, S. K., Jain, S., & Sharma, R. (2020). Medical tourism: treatment, therapy & tourism. *Int J Sci Technol Res*, *9*(3), 4447-4453.
10. Bhat, I. A., & Arumugam, G. (2021, October). Construction, validation and standardization of general self-confidence scale. In *International conference on emotions and multidisciplinary approaches-ICEMA* (p. 121).
11. Bhatia, A., & Maidullah, S. (2022). Voice of the Unheard: Travel Motivation and Intention of Indian Gays and Lesbians. *Revista Latino-Americana de Turismologia*, *8*(1).
12. Chandran, S. D., Puteh, F., Azmi, N. A., & Suki, N. M. (2020). Exploring the development of medical tourism industry in Southeast Asia region. *International Journal of Business Ecosystem & Strategy (2687-2293)*, *2*(3), 28-32.
13. Chaulagain, S., Le, L. H., & Hancer, M. (2023). Traveling for medical tourism: The roles of demographics, past experience and medical tourism destination familiarity. *International Journal of Hospitality & Tourism Administration*, 1-26.
14. Dang, H. S., Nguyen, T. M. T., Wang, C. N., Day, J. D., & Dang, T. M. H. (2020). Grey system theory in the study of medical tourism industry and its economic impact. *International journal of environmental research and public health*, *17*(3), 961.
15. De la Hoz-Correa, A., Muñoz-Leiva, F., & Bakucz, M. (2018). Past themes and future trends in medical tourism research: A co-word analysis. *Tourism management*, *65*, 200-211.
16. Doborjeh, Z., Hemmington, N., Doborjeh, M., & Kasabov, N. (2022). Artificial intelligence: a systematic review of methods and applications in hospitality and tourism. *International Journal of Contemporary Hospitality Management*, *34*(3), 1154-1176.
17. Filieri, R., D'Amico, E., Destefanis, A., Paolucci, E., & Raguseo, E. (2021). Artificial intelligence (AI) for tourism: an European-based study on successful AI tourism start-ups. *International Journal of Contemporary Hospitality Management*, *33*(11), 4099-4125.
18. Gaur, L., Afaq, A., Singh, G., & Dwivedi, Y. K. (2021). Role of artificial intelligence and robotics to foster the touchless travel during a pandemic: a review and research agenda. *International Journal of Contemporary Hospitality Management*, *33*(11), 4079-4098.
19. Gualdron, C. J. B. (2023). *Gender power relations at work and at home: experiences of women in tourism in San Gil,*

Colombia (Doctoral dissertation, Wageningen University).
20. Ivanov, S., & Webster, C. (2019). Conceptual framework of the use of robots, artificial intelligence and service automation in travel, tourism, and hospitality companies. *Robots, artificial intelligence, and service automation in travel, tourism and hospitality*, 7-37.
21. Jabeen, F., Al Zaidi, S., & Al Dhaheri, M. H. (2022). Automation and artificial intelligence in hospitality and tourism. *Tourism Review*, *77*(4), 1043-1061.
22. Kama, A. (2023). But where is your wife? Reflections of a gay tourist in a heteronormative environment. In *Inclusion in Tourism* (pp. 189-202). Routledge.
23. Lewis, C., Prayag, G., & Pour, S. (2021). Linking travel motives to identity and travel behavior of the Australian LGBT market during COVID-19. *Journal of Travel & Tourism Marketing*, *38*(7), 725-741.
24. Lv, H., Shi, S., & Gursoy, D. (2022). A look back and a leap forward: a review and synthesis of big data and artificial intelligence literature in hospitality and tourism. *Journal of Hospitality Marketing & Management*, *31*(2), 145-175.
25. Mahoney, L. M., & Tang, T. (2024). *Strategic social media: From marketing to social change*. John Wiley & Sons.
26. Olson, E. D., & Reddy-Best, K. (2019). "Pre-topsurgery, the body scanning machine would most likely error:" Gender and gender nonconforming travel and tourism experiences. *Tourism Management*, *70*, 250-261.
27. Paryati, P. (2022). Estimation of Artificial Intelligence Andesite Resources Mining Area with Schlumberger Model and Vertical Sound Method.
28. Peng, M. L., Wickersham, J. A., Altice, F. L., Shrestha, R., Azwa, I., Zhou, X., ... & Ni, Z. (2022). Formative evaluation of the acceptance of HIV prevention artificial intelligence chatbots by men who have sex with men in Malaysia: focus group study. *JMIR Formative Research*, *6*(10), e42055.
29. Samara, D., Magnisalis, I., & Peristeras, V. (2020). Artificial intelligence and big data in tourism: a systematic literature review. *Journal of Hospitality and Tourism Technology*, *11*(2), 343-367.
30. Souza, G. (2021). *Mediating the Marginal: A Computational Analysis of Representational Hierarchies, Aesthetic Tourism, and Queer Imagination on Instagram* (Doctoral dissertation, Massachusetts Institute of Technology).
31. Spoladore, D., & Pessot, E. (2023). An ontology-based decision support system to foster innovation and competitiveness opportunities of health tourism destinations. *SpringerBriefs in Applied Sciences and Technology*, 61-71.
32. Sumra, K. B. Alam, M., Iftikhar H (2022) Cities Poor Management In Social Protection And Covid-19: Gender Inequalities And Opportunity Bias.
33. Sumra, K. B., & Alam, M. M. (2021). Promoting religious tourism management for creating a soft image of Pakistan. In *Global Development of Religious Tourism* (pp. 149-174). IGI Global.
34. Sumra, K. B., Ahmad, M. S., & Alam, M. (2020). Informal Economy, Social Inequalities And street Vendors In Pakistan: Governance, Politics And tourism In Pandemic.
35. Sumra, K. B., Alam, M., & Aftab, R. (2022). Artificial intelligence for strengthening administrative and support services in public sector amid COVID-19: Challenges and opportunities in Pakistan. *Advances in Data Science and Intelligent Data Communication Technologies for COVID-19: Innovative Solutions Against COVID-19*, 153-172.
36. Sumra, K. B., Alam, M., Noor, K. B. M., Hali, S. M., & Iftikhar, H. (2022). Factors Affecting Artificial Intelligence and Management of Institutional Response to the Event of Coronavirus in Pakistan. *Pertanika Journal of Social Sciences & Humanities*, *30*(4).
37. Toth, S. J., & Mason, C. W. (2021). "Out" in the Countryside: Gay Tourist Perspectives on Rural Travel in British Columbia, Canada: Gay Tourist Perspectives on Rural Travel. *Journal of Rural and Community Development*, *16*(3).

38. Tsaih, R. H., & Hsu, C. C. (2018). Artificial intelligence in smart tourism: A conceptual framework.
39. Wang, Y. C., & Uysal, M. (2024). Artificial intelligence-assisted mindfulness in tourism, hospitality, and events. *International Journal of Contemporary Hospitality Management*, *36* (4), 1262-1278.
40. Wong, B. K. M., & Hazley, S. A. S. A. (2020). The future of health tourism in the industrial revolution 4.0 era. *Journal of Tourism Futures*, *7*(2), 267-272.
41. Yoon, S. N., & Lee, D. (2018). Artificial intelligence and robots in healthcare: What are the success factors for technology-based service encounters?. *International Journal of Healthcare Management*.
42. Zarei, A., Feiz, D., Maleki Minbashrazgah, M., & Maleki, F. (2020). Factors influencing selection of medical tourism destinations: A special niche market. *International Journal of Healthcare Management*, *13*(sup1), 192-198.
43. Zhang, B., Zhu, Y., Deng, J., Zheng, W., Liu, Y., Wang, C., & Zeng, R. (2023). "I am here to assist your tourism": Predicting continuance intention to use AI-based chatbots for tourism. Does gender really matter?. *International Journal of Human– Computer Interaction*, *39*(9), 1887- 1903

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Autoregressive Integrated Moving Average Predictive Modelling for Gross Domestic Product of China, Pakistan, and Bangladesh

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ABSTRACT

Gross Domestic Product (GDP) of a nation is an important index which reflects health and performance of an economy and its aggregate income. In this paper, annual GDP data of three Asian economies for the time period 1960 – 2022 is used for predictive Autoregressive Integrated Moving Average (ARIMA) modelling. ARIMA is a time series analysis method that can capture temporal tendencies and trends in the data series. We seek to gain insights into the future expected trajectory of economic growth in the selected countries through long-term predictions for the time period 2023 – 2037. Augmented Dick Fuller (ADF) test is used to asses stationarity of the data. In the present empirical study, stationarity at the second order differencing with ARIMA (0, 2, 2) model is identified to predict GDP of China, ARIMA (2, 2, 1) model is identified to predict GDP of Pakistan, and ARIMA (0, 2, 1) model is identified to predict GDP of Bangladesh for the next 15 years. The finding shows that the forecast values of China's GDP will be $14123.90 per capita in 2023 and $29842.64 per capita in 2037 Pakistan's GDP will be $1589.066 per capita in 2023 and $2115.446 per capita in 2037, and Bangladesh's GDP will be $2880.167 per capita in 2023 and $5566.303 per capita in 2037, Our study provides skeletal guidance for governmental bodies and direct investors who rely for business planning and strategizing of the resources on reliable predictions of GDP per capita. Advance knowledge about futuristic GDP level enables administrators, investors and policymakers to make informed economic decisions that may steer economic growth, stability and development in an optimum directions.

Keywords: economy; gdp; arima; forecasting; china; pakistan; bangladesh; box- jenkins methodology.

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ABSTRACT

Gross Domestic Product (GDP) of a nation is an important index which reflects health and performance of an economy and its aggregate income. In this paper, annual GDP data of three Asian economies for the time period 1960 – 2022 is used for predictive Autoregressive Integrated Moving Average (ARIMA) modelling. ARIMA is a time series analysis method that can capture temporal tendencies and trends in the data series. We seek to gain insights into the future expected trajectory of economic growth in the selected countries through long-term predictions for the time period 2023 – 2037. Augmented Dick Fuller (ADF) test is used to asses stationarity of the data. In the present empirical study, stationarity at the second order differencing with ARIMA (0, 2, 2) model is identified to predict GDP of China, ARIMA (2, 2, 1) model is identified to predict GDP of Pakistan, and ARIMA (0, 2, 1) model is identified to predict GDP of Bangladesh for the next 15 years. The finding shows that the forecast values of China's GDP will be $14123.90 per capita in 2023 and $29842.64 per capita in 2037 Pakistan's GDP will be $1589.066 per capita in 2023 and $2115.446 per capita in 2037, and Bangladesh's GDP will be $2880.167 per capita in 2023 and $5566.303 per capita in 2037, Our study provides skeletal guidance for governmental bodies and direct investors who rely for business planning and strategizing of the resources on reliable predictions of GDP per capita. Advance knowledge about futuristic GDP level enables administrators, investors and policymakers to make informed economic decisions that may steer economic growth, stability and development in an optimum direction.

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I. INTRODUCTION

Gross Domestic Product (GDP) is a strategic component in the measurement of National Income and Product Accounts. GDP represents the total value of final goods and services. GDP assessment is based on the quantum of consumption and investment by households and businesses in addition to accounting for the governmental expenditure and net exports. GDP is therefore crucial to maintain a stable and progressive economy as it embodies all financial transactions including banking aspects. Planning and decision making for the entire economy is thus conditioned on an accurate information in respect of all the three stakeholders of the economic transactions, namely, households, businesses, and the government, which the indicator GDP can deliver. We thus have an estimated nominal GDP (NGDP) which is used for the purpose of future planning by the finance ministry of the country. The real GDP (RGDP) is obtained after adjusting the estimated NGDP for inflation. The latter is also known as observed GDP in the actual real time. The effective mathematical relationship is represented as, NGDP – inflation rate = RGDP. However, all budget planning and projections utilise the former i.e., NGDP, whereas the common citizen is directly impacted by RGDP. Therefore, fluctuations in the level of covariates of GDP are important in determination of gap between NGDP and RGDP. A country's population is represented

by its GDP per capita, or GDP per person. It suggests that an economy's output or income per person can reveal its average productivity or level of living. The terms nominal, real (inflation-adjusted), and purchasing power parity (PPP) can all be used to express GDP per capita. Per-capita GDP considers both the GDP and the population of a nation. Per-capita GDP, when interpreted simply, demonstrates the amount of economic value that can be assigned to each individual citizen. Since value of GDP per person conveniently serves as a measure of affluence, this also translates to a proxy measure of overall national wealth. Per-capita GDP is used by economists to gain understanding of both their own nation's and other nations' domestic productivity. Therefore, it may be crucial to comprehend how each potential covariate affects per-capita GDP growth. In the present paper, we focus on assessment of GDP per capita.

GDP computation is based on the principle of averages which has an upward bias. Therefore, GDP does not capture the income or expenditure or production changes on the regional level. For instance, if a large group of people experience declining income at a time when its complement group in the same population which is smaller in size but experiences upwardly rising incomes, then GDP registers rise. This implies that for the lower income group GDP per capita provides an inflated (and unrepresentative) value. Hence use of GDP at subregional level must be done cautiously. In this paper, we focus on the concept of GDP per capita which gives a more realistic picture of the economic status of a larger entity like nation. GDP represents the current market valuation of the produced goods and services in an economy for the assessment period. This value encompasses spendings and costs on the personal consumption, government purchases, inventories, and the foreign trade balance. Thus, the total capital at stake and covered under GDP envelope of a specific period can be viewed either through (i) production undertaken (ii) income generated or (iii) expenditure accrued for the same period.

The objective of present study is to predict GDP of each of the three selected nations from Asia namely, China, Pakistan, and Bangladesh using times series models. Regression models, time series models, and stochastic approaches are just a few of the numerous forecasting techniques available in statistical literature. The benefit of time series models is that we simply need data for the necessary variable over many time points, which is easily accessible from secondary sources. In contrast to the regression model, where explanatory variables are necessary, we do not require knowledge about other aspects for time series data assessment. Therefore, time series model is the best and easiest method for forecasting which produces results quickly. Time series models for predicting economic variables, such as autoregressive integrated moving average (ARIMA) have grown in favour recently. ARIMA methods are helpful for spotting trends and patterns in time series data that are utilised to provide precise forecasts. Using ARIMA models, the present study seeks to forecast GDP per capita of three selected Asian countries. To create and assess several ARIMA models, we use annual GDP data from 1960 – 2022. Outcome of the present analysis will affect investors who rely on knowledge of future patterns of GDP per capita which impact direction of an economy's growth. These projections would assist in future investment strategies for the business.

Time series ARIMA model for predicting economic patterns based on interdependencies of market forces have been studied by Thomakos and Bhattacharya (2005) forecasted the inflation, industrial output and exchange rates for India, based on univariate ARIMA models and bivariate transfer function and VAR. Ning *et al.* (2010) who projected GDP for Shaanxi, a province in China, using an ARIMA (1, 2, 1) model over the period 1952 – 2007. Tiwari (2012) emphasizes of the causality between energy consumption (measured in terms of electricity consumption), environmental degradation (measured in terms of CO_2 emissions) and economic growth (measured in terms GDP) in India, using Granger approach (in VECM framework), impulse response functions (IRFs) and Variance Decomposition (VDs). ARIMA model based on GDP prediction for Greece has been investigated by Kiriakidis and Kargas (2013). Dritsaki (2015) used an ARIMA (1,1,1) model over the period 1980– 2013 to

forecast the values of real GDP rate in Greece for 2015, 2016 and 2017. Wabomba *et al.* (2016) projected Kenya's GDP using an ARIMA (2,2,2) model over the period 1960 – 2012. Yang et al. (2016) projected the annual data of Chinese GDP from 1978 – 2014 using an ARIMA (2, 4, 2) model. Agrawal (2018) studied long-term predictions for GDP in India. Abonazel *et al.* (2019) used on ARIMA (1,2,1) model over the period 1965 – 2016 to forecast the GDP in Egypt during for the period 2017 to 2026. Eissa (2020) forecasted the GDP per capita for Egypt and Saudi Arabia, respectively, from 2019 – 2030 using the ARIMA (1,1,2) and ARIMA (1,1,1) models based on data from the period 1968 – 2018. Lu (2021) studied both ARIMA and ARIMAX (X is the exogenous variable) approaches to analyze and predict the nonlinear residual of GDP. Ghazo (2021) used ARIMA (3,1,1) and ARIMA (1,1,0) forecast for GDP and Consumer Price Index (CPI) respectively for the Jordanian economy between 2020 and 2022, based on the data from the period 1976 – 2019. Mohamed (2022) used an ARIMA (5,1,2) model for the period between 1960 – 2022 to forecast trajectory of GDP in Somalia for the next fourteen quarters. Polintan *et al.* (2023) used data from 2018 – 2022 through an ARIMA (1,2,1) model for forecasting GDP in Philippines, for 2022 – 2029 and predicted a steady growth trajectory. Lngale and Riyadh Senan (2023) have used predictive ARIMA (0, 1, 2) model for predicting GDP of India, pertaining to the period 1960 – 2020. Tolulope *et al.* (2023) used an ARIMA (2,1,2) model for predicting the Nigerian GDP using both in sample and out of sample prediction method, based on data for the period of 1960 – 2020 which correctly indicated a gradual rise in GDP. Dinh (2020) studied to domestic credit growth in Vietnam and China through ARIMA (2,3,1) and ARIMA (2,3,5) models respectively, based on data from the period 1996 – 2017. Lin (2023) analyzed the development of China's financial leasing industry using principal component analysis (PCA) and ARIMA model based on data from the period 2008 – 2021. Zhang *et al.* (2023) analyzesd the problems in China's investment in environmental pollution control, using ARIMA (1,2,1) model based on data from the period 2002–2021. Geo (2023) used on ARIMA-GARCH model is to predict the law and trend of the stock price change in China, over the period 2017– 2019. Zakai (2014) used on ARIMA (1,1,0) model over the period 1953 – 2012 to forecast the GDP in Pakistan. Farooqi (2014) used ARIMA (2, 2, 2) and ARIMA (1, 2, 2) models respectively over the period 1947 – 2013 to forecast the annual imports and exports of Pakistan. Streimikiene *et. al.* (2018) studied three different time series models such as the AR model with seasonal dummies, ARIMA model, and the Vector Autoregression (VAR) model to forecast the tax revenue of Pakistan for the fiscal year 2016–17 based on the data from the period July 1975–December 2016. The results of this study revealed that among these models the ARIMA model gives better-forecasted values for the total tax revenues of Pakistan. Hussain *et al.* (2021) used ARIMA (0,1,1) model over the period 1985 – 2015 to forecast the GDP in Pakistan. Amir *et al.* (2021) forecasted the GDP percentage share on the education of Pakistan from 1971 – 2017 using the ARIMA (2, 1, 1) model. Saleem *et al.* (2022) forecasted the GDP for Pakistan from 1961 – 2020 by using Box-Jenkins time series methodology. Chawdhary and Hosan (2016) projected Bangladesh's GDP using an ARIMA (2,2,2) model over the period 1970 – 2014. Hussain and Haque (2017) emphasizes the impact of relationship between money supply and per capita GDP growth rate in Bangladesh over the period 1972–2014 with a Vector Error Correlation (VECM) model. Miah *et al.* (2019) used on ARIMA (1,2,1) model over the period 1960 – 2017 to forecast the GDP in Bangladesh during for the period 2018 – 2030. Ahmad *et al.* (2019) used on ARIMA (2,1,1) model for forecasting the money value of Bangladesh using the yearly GDP from 1968 – 2017. Voumik and Smrity (2020) forecasted the GDP per capita for Bangladesh from 1972 – 2019 using the ARIMA (0, 2, 1) model. Jahan (2021) used an ARIMA (1,0,1) model for the period between 1961 – 2019 to forecast the economic performance of Bangladesh. Datta (2023) used ARIMA and the autoregressive conditional heteroscedastic (ARCH) methods for the period 1972 – 2020 to investigate the volatility of the growth rates of Bangladesh's real GDP. Ingrisawang (2023) found

that the efficiency of forecasting by two combined forecasting model methods (simple-average and Bates-Granger) comprising up to five individual forecasting models based on ranking of the individual forecasting models via correlation coefficients.

In this paper, we estimate and predict the GDP per capita of China, Pakistan, and Bangladesh for next one and half decade by using ARIMA time series model. Section 2 describes model determination methodology used in the present work. Section 3 describes economic stature of the three selected countries from Asia. Section 4 enumerates the models and the model adequacy measures. Section 5 focusses on data description and its analysis. Conclusion and recommendations are summarised in Section 6.

II. METHODOLOGY

Time series models are characterized by the clustering effect or serial correlation in time. In the present paper, we use statistical techniques in time series analysis to estimate and predict GDP of three selected Asian countries through the dynamic ARIMA modelling. ARIMA modelling addresses such issues of dependent errors by introducing time lagged dependent variable and past error terms on the determinant side of the time series model. The model consists of AR, I, and MA segments where AR represents the autoregressive part, I represents Integration indicating the order of differencing in the observed series to achieve stationarity and MA represents the moving average component in the model. ARIMA model fitting is an iterative process that involves four stages; identification, estimation, diagnostic checking and forecasting of time series (Figure 1).

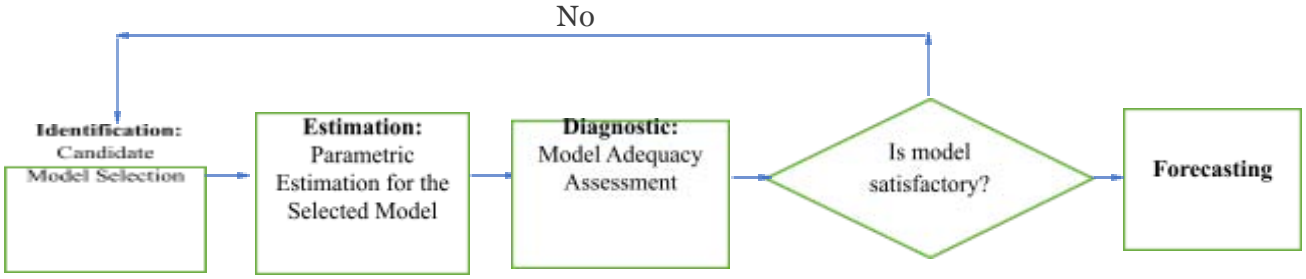

Figure 1: Iterative Modelling Progression for a Stationary Variable in Box- Jenkins Methodology

ARIMA methodology of forecasting is different from most of the other methods because it does not assume any particular pattern or distributional form in the historical data of the series to be forecast. It utilises a general algorithm for identifying a possible model from a general class of models by combining sliding averages in the process under study with spill over from error components in past. The chosen model is then checked against the historical data to see if it can adequately describe the series. Auto-correlation function (ACF) and partial auto-correlation function (PACF) are used to select one or more ARIMA models that seem appropriate during the identification stage. The next stage involves estimating the parameters of a specific Box-Jenkins model (1970) for a given time series. This step verifies the parsimony in terms of the number of model parameters or lack of over-specification by determining whether the selected AR and/or MA parameters have the lowest sum of the squared residuals in addition to the residuals being uncorrelated. A critical and sensitive aspect of an ARIMA model is parsimony. An over-parameterized model cannot predict as efficiently as a sparse model. Model diagnostics and testing is carried out in the third step. Error terms ε_t, follow the assumptions for a stationary unvarying process. Drawn from a fixed distribution with a constant mean and variance, the residuals should be white noise (or independent, if their distributions are normal). These prerequisites about the residual distribution are fulfilled by the most adequate Box-Jenkins model. The best model then needs to be decided based on these four paradigms. Thus, testing of the residuals would lead to a better

suitable model. A Quantile-Quantile (QQ) plot is a graphical tool which is used to assess the distributional similarity between two plots of datasets. In the context of ARIMA models, a QQ plot is often used to check whether the residuals of the model follow a normal distribution.

III. THE STUDY REGION

The east Asian nation of People's Republic of China (China, henceforth) with a population of more than 1.41 billion is the second most populous nation in the world. It is the third-largest country in the world by total land area, covering around 9596960 square kilometres. China had the fastest economic growth experienced by any nation, going from one of the world's poorest to one of the largest growing economies. With growth rates averaging 10% over the past 30 years, China has emerged as the leading economy with the quickest pace of expansion. China has maintained an improving GDP path owing to its manufacturing sector, export-oriented economy, and workforce sustained on low wages. In 2020, when China's GDP grew by 2.3%, it was the only significant global economy to do so. However, owing to post COVID-19 economic fallouts in 2022, it experienced one of its worst economic results in decades. After the United States, China is the second-largest economy in the world in terms of nominal GDP, and it is one of the largest economies in the world since 2016, when measured on the basis of purchasing power parity (PPP). World Bank (2022) report credits China's nominal contribution to the global economy in 2022 to about 18% – 19%, in PPP terms. World Bank (2022). South Asian nation Pakistan is also known as the Islamic Republic of Pakistan. With 235.82 million inhabitants, it is the fifth-most populated nation in the world with 881913 square kilometres of land, and as of 2023, it will also have the highest Muslim population in the entire globe with the annual population growth rate of 1.9%. Pakistan is one of the emerging economies, the economy of Pakistan is the 24th largest in the world in the terms of purchasing Power Parity (PPP), and the 41st largest in terms of nominal Gross Domestic Product (NGDP) World Bank (2022). Bangladesh also located in South Asia, is one of the most populous nations in the world with 147516 square kilometres of land. Its population is about 171.18 million, with 1.1% annual growth rate and a high population density of 1265 people per square kilometre. Due to substantial active workforce Bangladesh has a sustained GDP growth since the 1980s. It contributed to robust and consistent GDP growth of 6% per annum in the South Asian region. In terms of nominal Gross Domestic Product (NGDP), Bangladesh is the 34th-largest economy in the world and the 25th-largest economy in terms of PPP as recorded by World Bank (2022).

IV. THE MODEL AND FORECAST

4.1 Autoregressive Model

With the intent to estimate the coefficients β_j, $j = 1,2, \ldots$ p an AR process for univariate model is the one that shows a changing variable regressed on its own lagged values. AR model of order p, or AR(p) is expressed as,

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \ldots + \beta_p y_{t-p} \quad (1)$$

such that all previous study variable values y_{t-1} $(i < t)$ will have cumulative impact on the current level y_t accounting for the long-run memory. ACF therefore persists with non- zero realization for a longer time. PACF measures the correlation between an observation k periods ago and the current observation, after controlling for all other observations at the intermediate lags (i.e., all lags<k). Hence, PACF is useful for determining the maximum order of AR process. PACF(k) = ACF (k) after controlling the effects of (y_{t-1}, …, y_{t-k+1}). Thus PACF (k) is represented by coefficient of y_{t-k} in the regression.

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \ldots + \beta_{k-1} y_{t-k+1} + \beta_k y_{t-k} + \varepsilon_t \quad (2)$$

4.2 Moving Average Model

Let ε_t (t = 1,2,...) be a white noise process, such that t denotes a sequence of independent and identically distributed (*iid*) random variables with $E(\varepsilon_t) = 0$ and $var(\varepsilon_t) = \sigma^2$. Then the qth order MA model which incorporates the dependency between an observation and a residual error is expressed as,

$$y_t = \mu + \varepsilon_t + \theta_1\varepsilon_{t-1} + \theta_2\varepsilon_{t-2} + \ldots + \theta_q\varepsilon_{t-q} \quad (3)$$

(3) represents impact of past errors on the response variable. Estimated coefficients θ_j, $j = 1,2, \ldots ,q$, accounting for short term memory help in forecasting.

4.3 Autoregressive Moving Average Model

AR coupled with MA strategy of modelling forms a general class of time series models called Autoregressive Moving Average (ARMA) models intended for use in stationary data series. ARMA (p, q) model is expressed as:

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \ldots + \beta_p y_{t-p} + \varepsilon_t + \theta_1\varepsilon_{t-1} + \theta_2\varepsilon_{t-2} + \ldots + \theta_q\varepsilon_{t-q} \quad (4)$$

(4) represents a combination of both AR and MA models. In this case therefore, neither ACF nor PACF can solely provide the information on the maximum order of p or q.

4.4 Autoregressive Integrated Moving Average Model

A nonseasonal ARIMA (p, d, q) model, where p is the number of autoregressive terms, d is the number of nonseasonal differences needed for stationarity, and q is the number of lagged forecast errors in the prediction model represents a white noise, for $p = d = q = 0$. In ARIMA (0, 0, 0) there exists no AR part because y_t does not depend on y_{t-1}, there is no differencing involved and also there is no MA part since y_t does not depend on ε_{t-1}. However, If for a general ARIMA (p, d, q) model we take a first difference of y_t so that Δy_t becomes stationary. $\Delta y_t = y_t - y_{t-1}$ then $d = 1$ which implies one time step of differencing.

$$\Delta y_t = \alpha + \beta_1\Delta y_{t-1} + \beta_2\Delta y_{t-2} + \ldots + \beta_p\Delta y_{t-p} + \theta_1\varepsilon_{t-1} + \theta_2\varepsilon_{t-2} + \ldots + \theta_q\varepsilon_{t-q} + \varepsilon_t \quad (5)$$

Table 1: ARIMA (p, d, q) MODEL FOR $d = 0, 1, 2$

d	0	1	2
Model	$y_t = Y_t$	$y_t = Y_t - Y_{t-1}$	$y_t = (Y_t - Y_{t-1}) - (Y_{t-1} - Y_{t-2})$

4.5 M odel Adequacy Measures

It is necessary to conduct diagnostic checking on the model before using it for forecasting. The residuals that remain after the model has been fitted are deemed sufficient if they are just white noise, and the residuals' ACF and PACF patterns may provide insight into how the model might be improved. Akaike (1973) developed a numerical score that can be used to identify a best model from among several candidate models for a specific data set. Akaike information criterion (AIC) results are helpful when compared to other

AIC scores for the same data set. Smaller AIC score indicates a better empirical fit. Estimated log-likelihood (L) is used to compute AIC as,

$$AIC = -2(L + s) \quad (7)$$

such that *s* is the number of variables in the model plus the intercept term. Schwarz (1978) developed an alternative model comparison score known as Bayesian (Schwarz) information criterion BIC (or SIC) as an asymptotic approximation to transformation of the Bayesian posterior probability of a candidate model expressed as,

$$BIC \text{ or } SIC = -2L + s\log(n) \quad (8)$$

Where, L denotes the maximum value of the likelihood function for the model, s is the number of parameters to be estimated by the model, and *n* is the number of observations in the sample. Although the AIC and SIC values are typically used to select the most appropriate ARIMA model, it should be emphasized that these values are insufficient for determination of the optimum ARIMA model. In the present paper, we first select a model from several possibilities, with the lowest AIC and SIC values, after which the estimated data are subjected to parameter significance tests and residual randomness tests. If the test is successful, then the model is deemed to be the best one; if not, the model corresponding to the second-smallest AIC value and SIC value is selected. Subsequently, the relevant statistical test is re- run. This cycle of trial continues, till the right model is chosen.

4.5 Forecasting

Box-Jenkins method of time series models are applicable only for stationary and invertible time series. Lidiema (2017), Dritsakis and Klazoglou (2019). Future value forecasting can begin once the requirements have been met through procedures like differencing. When the selected ARIMA model confirms to the specifications of a stationary univariate process, then we can use this model for forecasting. Mean Absolute Deviation (MAD), Mean Absolute Percentage Error (MAPE), and Root Mean Square Error (RMSE) statistical measures verify the accuracy of the predictive ARIMA model.

4.6 Forecasting Accuracy

We now present different measures listed to determine accuracy of a predictive model.

(i) Mean Absolute Error

Mean Absolute Error (MAE) calculates the average absolute difference between the predicted values and the actual (observed) values. The absolute differences rather than squared differences make MAE more robust to the outliers. The formula to calculate the MAE is,

$$MAE = \frac{1}{n}\sum_{i=1}^{n}\left|y_i - \hat{y}_i\right| \quad (9)$$

Where, n is the number of data points in the dataset, y_i is the actual value of the target variable for data point I and $\hat{y}_i$ is the predicted value of the target variable for data point i.

(ii) Root Mean Square Error

Root Mean Square Error (RMSE) is a popular accuracy measure in regression analysis and is based on difference between the predicted values of the model and the actual (observed) values in a dataset. Lower RMSE indicate alignment of model's predictions with the actual data. The formula to calculate the RMSE is,

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(y_i - \hat{y}_i\right)^2} \quad (10)$$

However, due to the squaring of deviations, RMSE give more weight to the outliers and may therefore not be suitable for all types of datasets. Depending on the specific problem and characteristics of the data, other metrics such as Mean Absolute Error (MAE) or R-squared (coefficient of determination) may also be used in conjunction with RMSE to gain a more comprehensive understanding of the model's performance.

(iii) Mean Absolute Percentage Error

Mean Absolute Percentage Error (MAPE) is measuring the percentage difference between the actual (observed) values and the predicted values and it is useful to understand the relative size of the errors compared to the actual values. The formula to calculate MAPE is,

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{|y_i - \hat{y}_i|}{|y_i|}\right]\times 100 \quad (11)$$

However, it is not well-defined when the actual values are zero or near zero, which can result in non-sensical very large MAPE values.

(iv) Mean Percentage Error

Mean Percentage Error (MPE) instead of taking the absolute percentage difference like in MAPE consider the direction in percentage difference. Thus, accounting for both the positive and the negative magnitude of the errors. The formula to calculate the MAPE is,

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{y_i - \hat{y}_i}{y_i}\right]\times 100 \quad (12)$$

Such that the lower values of MPE indicate better forecast accuracy. A value of zero MPE would imply that the forecasted values match the actual values perfectly. However, MPE can have some limitations, such as the potential for the errors to cancel each other out, leading to an artificially low MPE even if the model's performance is not satisfactory.

(v) Mean Absolute Scaled Error

Mean Absolute Scaled Error (MASE) is measuring the performance of a model relative to the performance of a naive or benchmark model. The MASE provides a more interpretable measure of forecast accuracy compared to metrics like Mean Absolute Error (MAE), especially when dealing with time series data and comparing different forecasting models. It provides insights into whether a model is providing meaningful improvements over a basic, naive forecasting approach. The formula to calculate the MASE is,

$$MASE = \frac{\frac{1}{h}\sum_{t=n+1}^{n+h}|y_t - \hat{y}_t|}{\frac{1}{n-m}\sum_{t=m+1}^{n}|y_t - y_{t-m}|} \quad (13)$$

where n is the length of the series and m is its frequency, i.e., m=1 for yearly data, m=4 for quarterly, m=12 for monthly, etc. MASE measures how well the model performs relative to the naive model's forecast errors taken as benchmark. A value of MASE less than 1 indicates that the model is performing better than the naive model in terms of absolute forecast errors, while a value greater than 1 indicates worse performance than the naive model.

V. DATA AND ANALYSIS

For modelling and forecasting non-seasonal time series data of the annual GDP of the three selected Asian countries of China, Pakistan, and Bangladesh, we have obtained data from the website of World Bank for the period 1960 – 2022. This implies that we have 63 observations of GDP that satisfy the precondition of having over 50 observations for using Box-Jenkins methodology of time series forecasting (Chatfield, 2016).

5.1 Model Identification for GDP

Progression of GDP per capita of China, Pakistan and Bangladesh are graphed respectively in Figure 2 (a), Figure 2(b) and Figure 2 (c). A steady long-term rise is observed during 1960 – 2022. For GDP data beyond 2007 for China, beyond 2018 for Pakistan and beyond 2016 for Bangladesh the rate of upward trend is seen to increase sharply. Such time series may be quickly and easily determined to be unstable because of clearly marked monotonic increasing trend. Figure 3(a), Figure 3 (b) and Figure 3 (c) shows autocorrelation function (ACF) and Figure 4(a), Figure 4(b) and Figure 4(c) shows partial autocorrelation function (PACF) of respectively China, Pakistan and Bangladesh are studied further to understand genesis of data structure. It is evident from the PACF that a single prominence indicates the fictitious primary value of n=1 when it crosses the confidence intervals. Furthermore,

at ACF of 10 (height) Figure 3(a), at ACF of 13 (height) Figure 3(b), and at ACF of 9 (height) Figure 3(c), the same issue is observed to occur. According to the ACF plot, the autocorrelations in the observed series is very high, and positive. A slow decay in ACF suggests that there may be changes in both the mean and the variability over time for this series. The arithmetic mean may be moving upward, with rising variability. Variability can be managed by calculating the natural logarithm of the given data, and the mean trend can be eliminated by differencing once or twice as needed to achieve stationarity in the original observed series. An instantaneous nonlinear transformation applied to the optimal forecast of a variable may not produce the transformed variable's ideal forecast (Granger and Newbold, 1976). In particular, using the exponential function to forecast for the original variable when excellent forecasts of the logs are available may not always be the best course of action. Therefore, we further employ the differencing process on the untransformed actual data series.

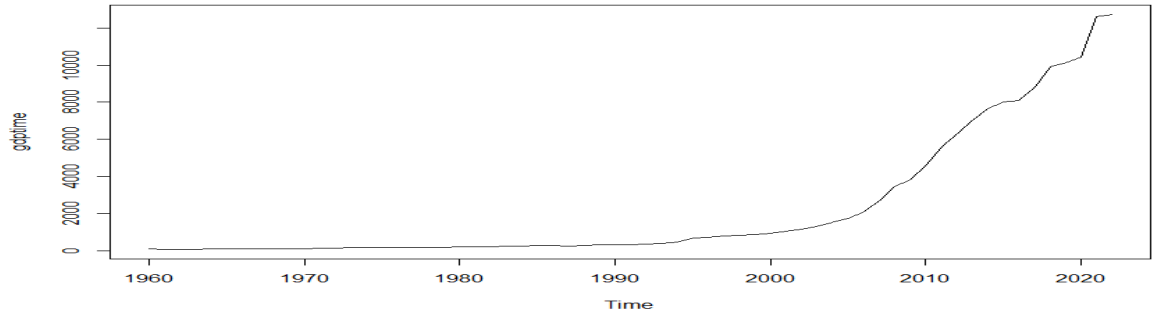

Figure 2 (a): GDP time series data of China

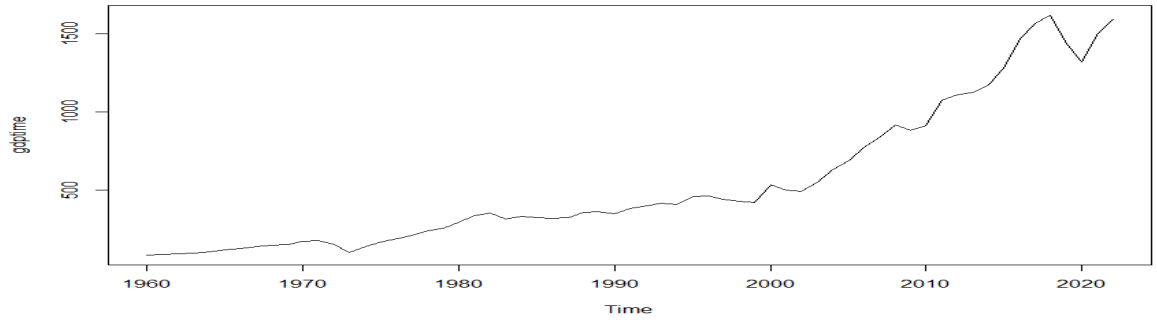

Figure 2 (b): GDP time series data of Pakistan

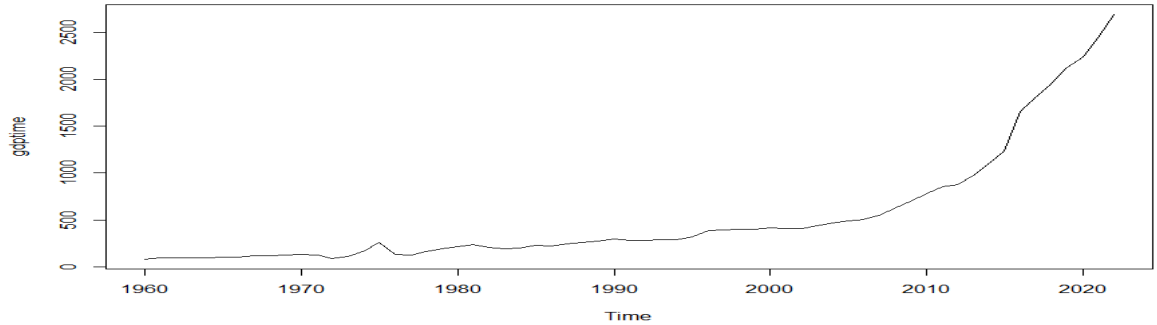

Figure 2 (c): GDP time series data of Bangladesh

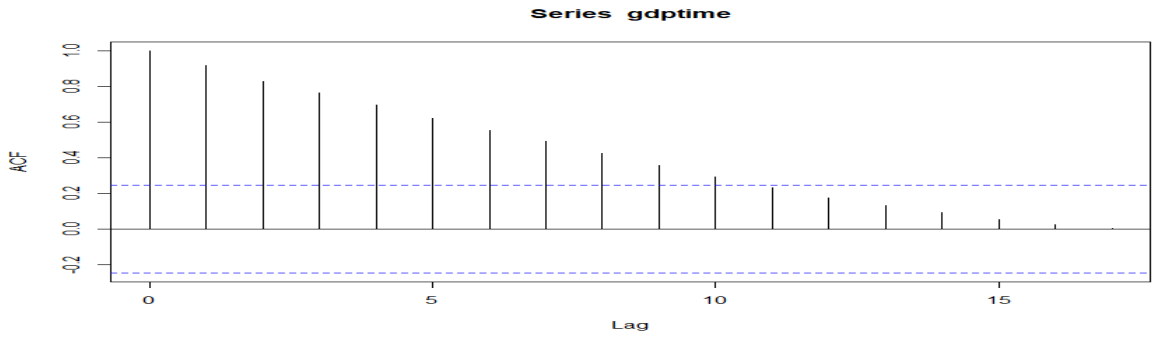

Figure 3(a): Autocorrelation function graphs of the GDP of China.

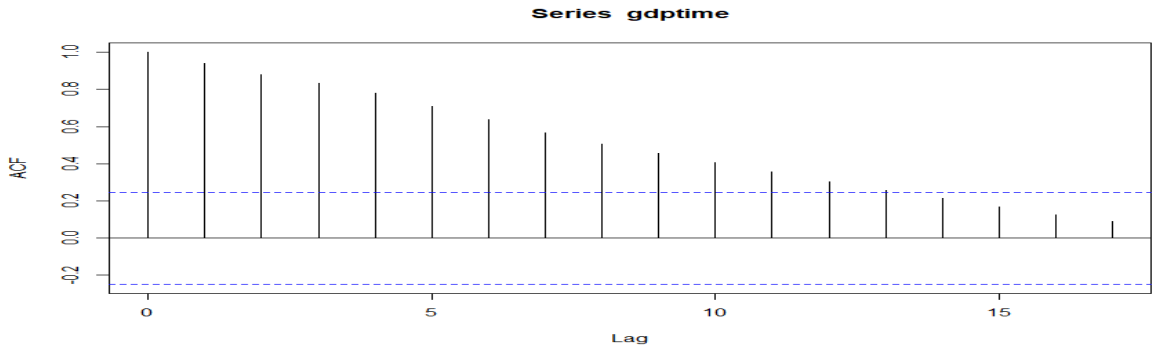

Figure 3(b): Autocorrelation function graphs of the GDP of Pakistan.

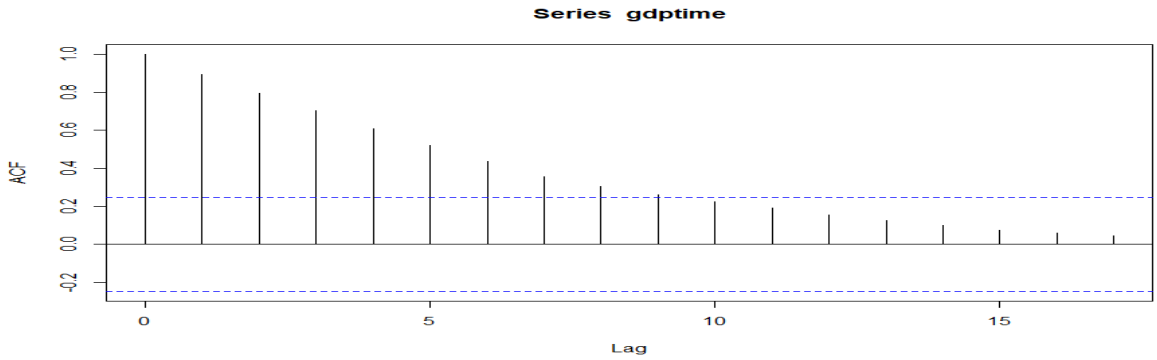

Figure 3(c): Autocorrelation function graphs of the GDP of Bangladesh.

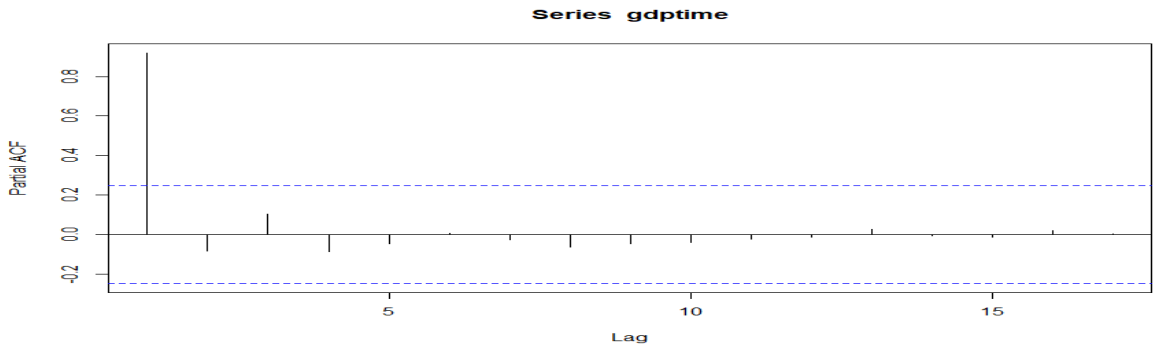

Figure 4(a): Partial autocorrelation function graphs of the GDP China.

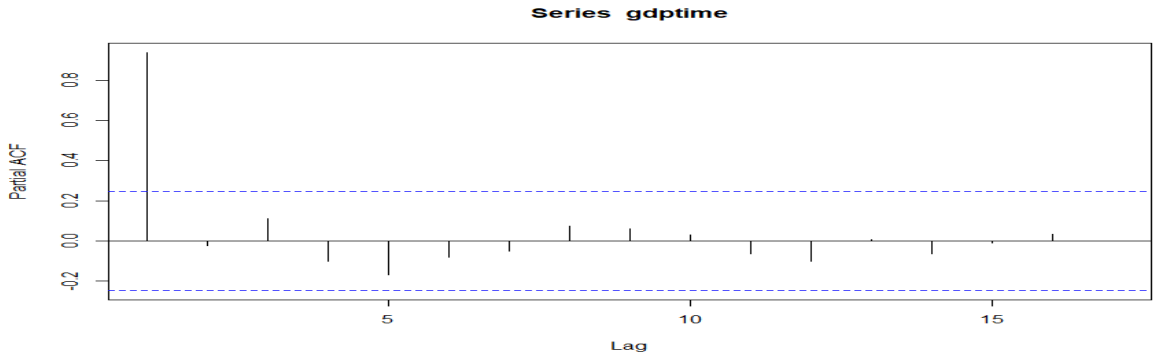

Figure 4(b): Partial autocorrelation function graphs of the GDP Pakistan.

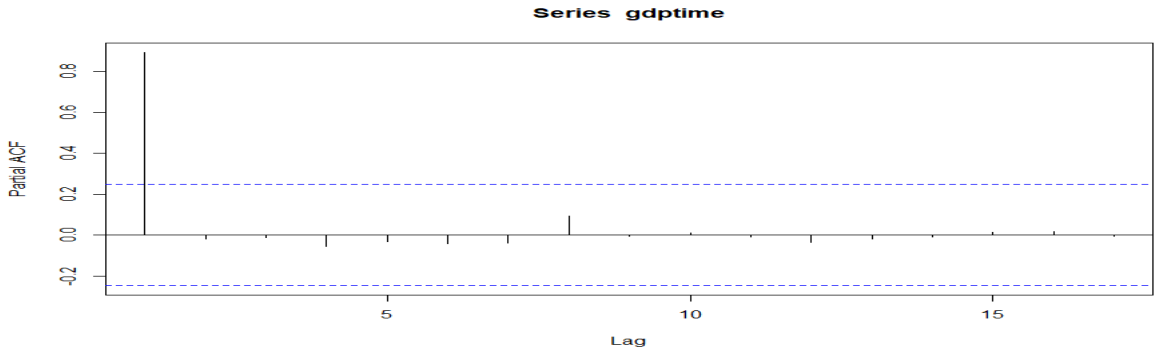

Figure 4 (c): Partial autocorrelation function graphs of the GDP Bangladesh.

5.2 Estimation and Diagnostics for GDP

Based on GDP time chronological data for the period 1960 – 2022, we consider fifteen tentative ARIMA (p, d, q) models (Table 2) and estimate the parameters using R interface. The model with minimum AIC is deemed to fit best and will be referred to as Model I, henceforth.

Table 2: Tentative ARIMA (p, d, q) models for GDP of China, Pakistan, and Bangladesh

Country	China		Pakistan		Bangladesh	
(p, d, q)	Model-I	Model-II	Model-I	Model-II	Model-I	Model-II
(2,2,2)	Inf	**970.3199**	667.2518	744.7817	673.6429	752.0899
(0,2,0)	909.948	1031.373	693.5868	778.6011	688.1801	770.0405
(1,2,0)	889.3717	1000.376	693.7556	779.3334	678.3299	758.7156
(0,2,1)	874.2851	987.401	675.0575	755.7337	**668.5931**	**747.1659**
(1,2,1)	872.3334	981.1997	673.4915	753.9566	670.5099	749.0751
(2,2,1)	Inf	974.4929	**665.5214**	**742.957**		
(1,2,2)	867.1352	971.0277	668.4335	747.1461	671.7747	750.2496
(0,2,2)	**865.1353**	972.1543			670.4941	749.058
(2,2,0)			681.8224	763.2556		
(0,2,3)	867.1352					
(1,2,3)	867.5644	972.2159				
(3,2,1)		973.7107	667.3552	744.8297		
(3,2,3)		974.1534				
(3,2,0)			677.0172	758.2316		
(3,2,2)		972.1993	668.7293	746.0844		

If a white noise sequence for residuals is obtained, then Model I is considered suitable for forecast. If not, then the model needs improving. In this paper, the ACF graph Figure 5(a), Figure 5(b), and Figure 5(c) and PACF graph Figure 6(a), Figure 6(b), and Figure 6(c) of residual sequence exhibit white noise process. Hence, ARIMA (0,2,2), ARIMA (2,2,1), and ARIMA (0,2,1), well fits respectively the considered time series GDP data from China, Pakistan, and Bangladesh.

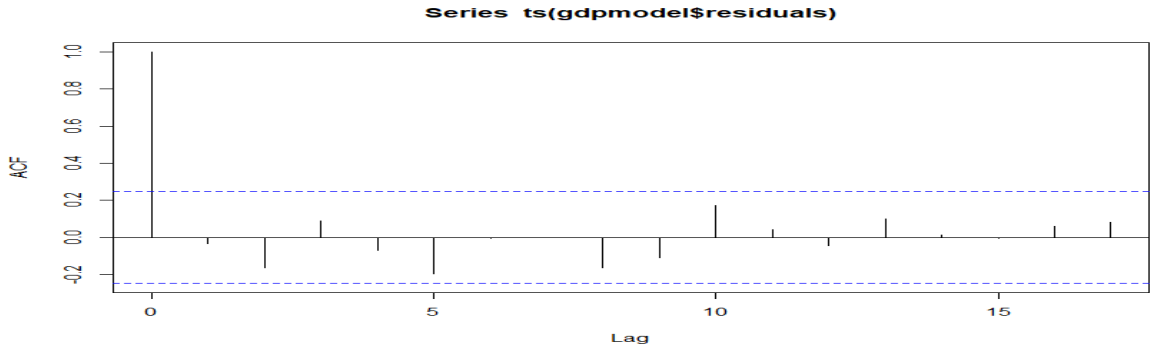

Figure 5 (a): Autocorrelation function graphs of the residual series of China.

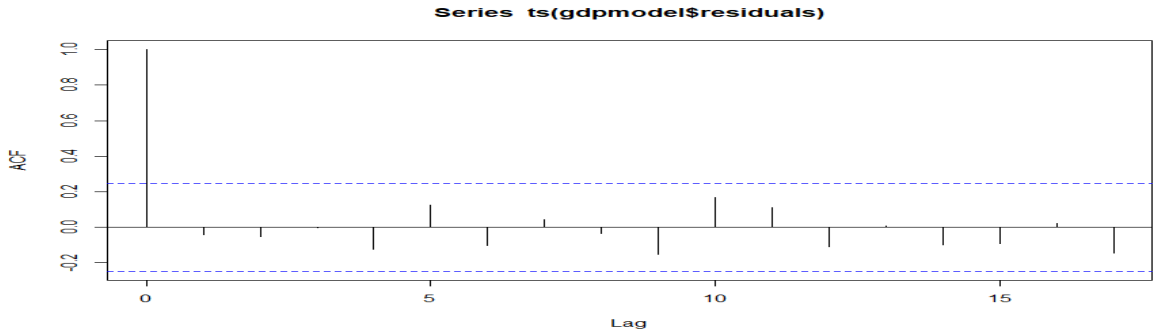

Figure 5 (b): Autocorrelation function graphs of the residual series of Pakistan.

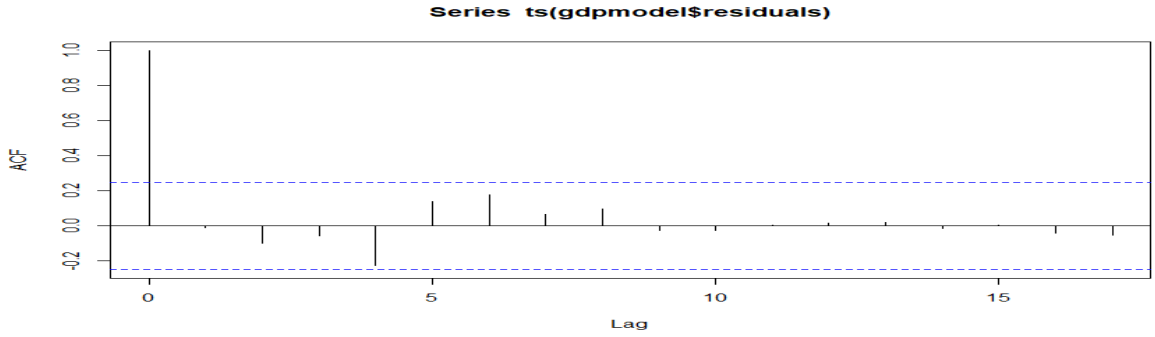

Figure 5 (c): Autocorrelation function graphs of the residual series of Bangladesh.

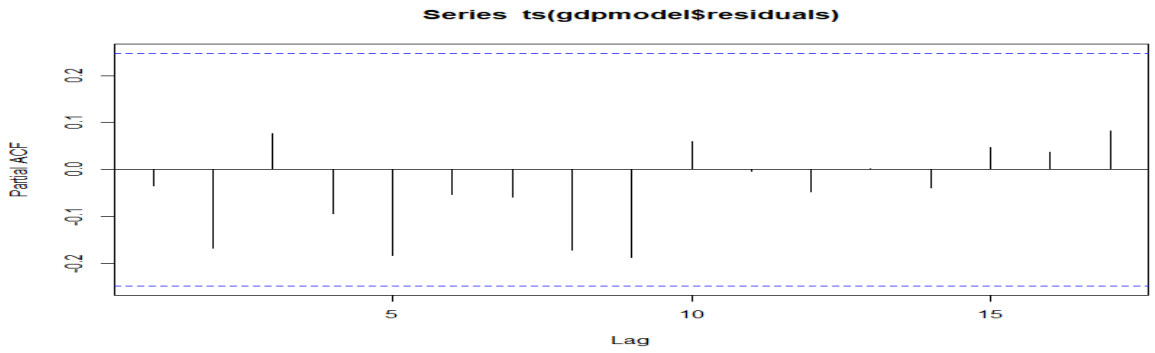

Figure 6 (a): Partial autocorrelation function graphs of the residual series of China.

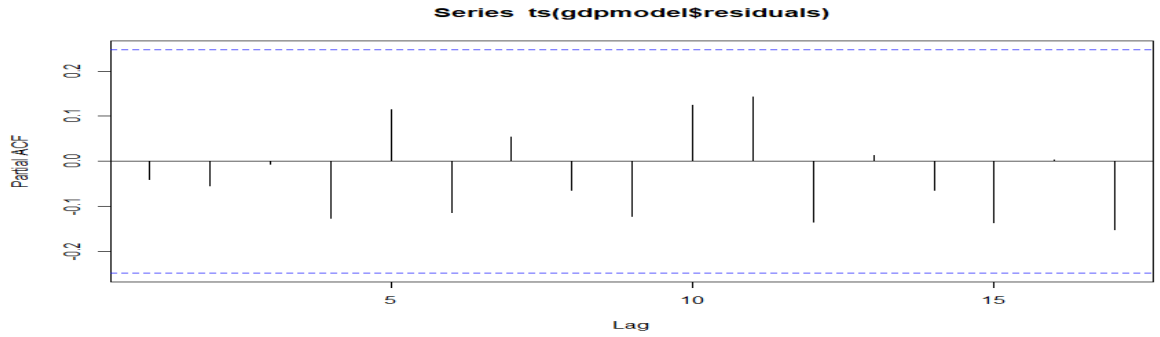

Figure 6 (b): Partial autocorrelation function graphs of the residual series of Pakistan.

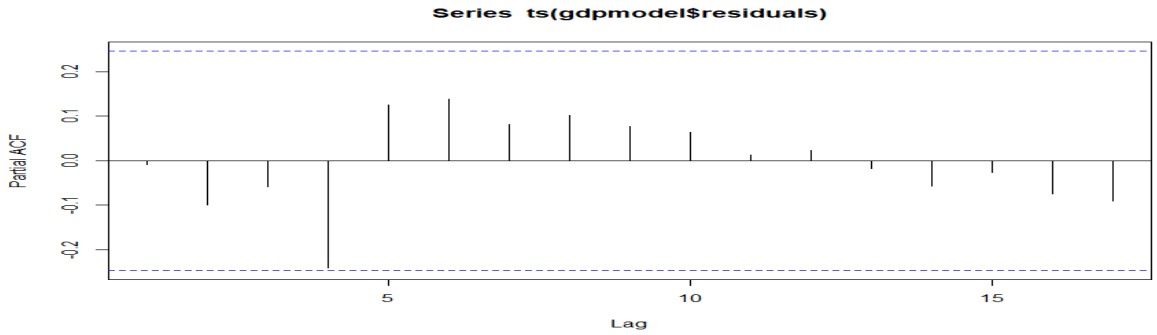

Figure 6 (c): Partial autocorrelation function graphs of the residual series of Bangladesh.

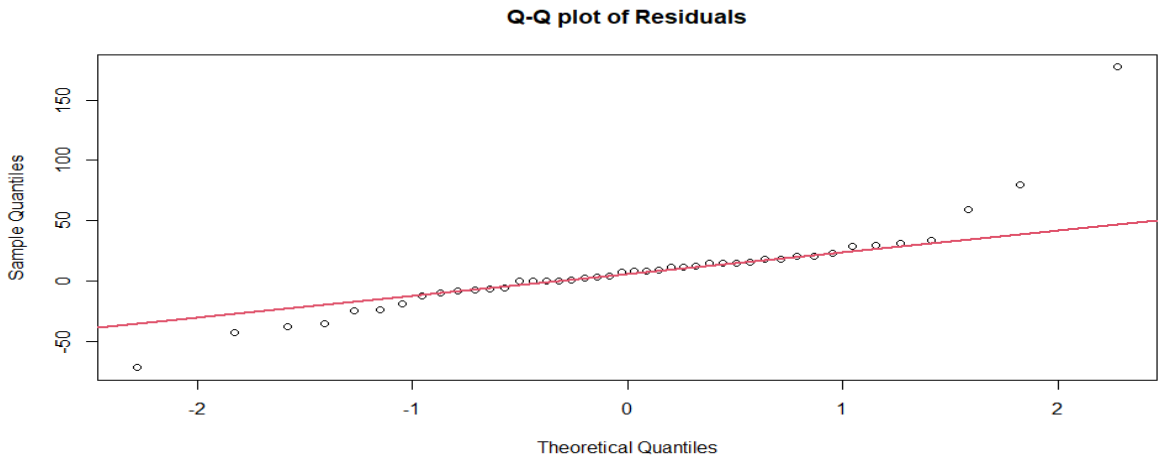

Figure 7 (a): Q-Q plot of the residual series of China.

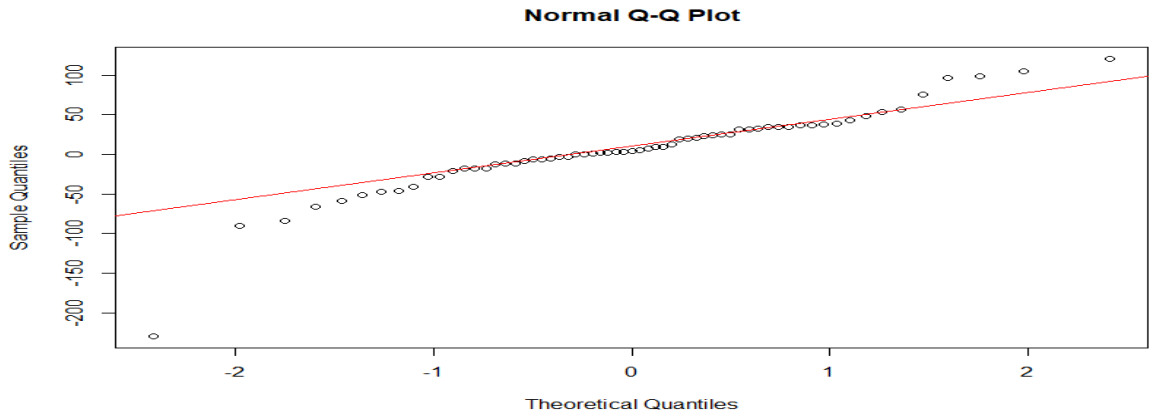

Figure 7 (b): Q-Q plot of the residual series of Pakistan.

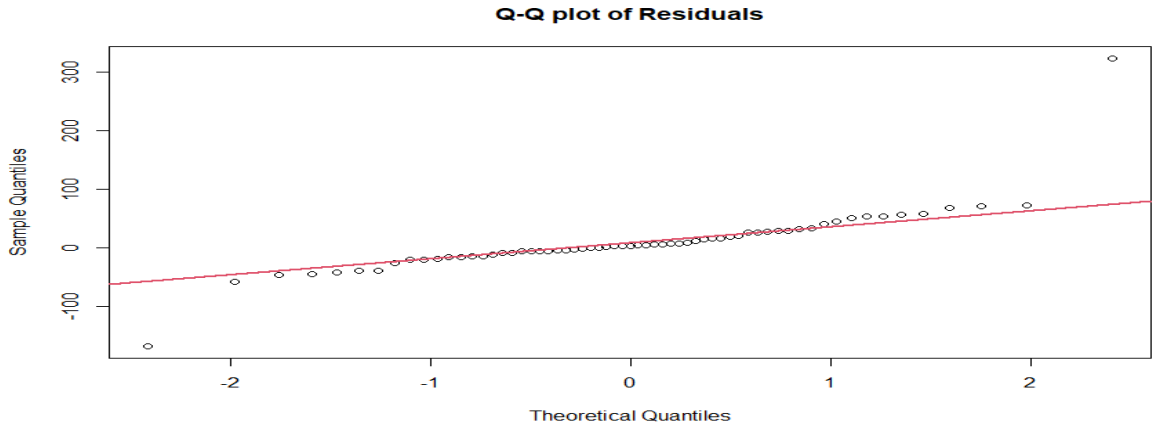

Figure 7 (c): Q-Q plot of the residual series of Bangladesh.

Figure 7(a), Figure 7(b), and Figure 7(c), illustrates the Normal QQ plot for GDP data as maximum data points fall on or near the straight line. So, it is conceivable that the model residuals are normally distributed for the GDP data of China, Pakistan, and Bangladesh.

Table 3 (a): Estimated Coefficients and Model Adequacy Criterion for China

Model	I		II			
Process	MA_1	MA_2	AR_1	AR_2	MA_1	MA_2
Coefficients	-1.1479	0.7306	-0.1016	-0.2427	-1.0485	0.7091
Standard Error	0.0907	0.1336	0.2246	0.1510	0.1962	0.1809
AIC	865.14		970.32			
BIC	871.47		981.49			

Table 3 (b): Estimated Coefficients and Model Adequacy Criterion for Pakistan

Model	I			II		
Process	AR_1	AR_2	MA_1	AR_1	AR_2	MA_1
Coefficients	0.2820	-0.4247	-0.8956	0.2826	-0.4262	-0.8977
Standard Error	0.1223	0.1273	0.0696	0.1131	0.1098	0.0636
AIC	665.52			742.96		
BIC	673.96			751.89		

Table 3 (c): Estimated Coefficients and Model Adequacy Criterion for Bangladesh

Model	I	II
Process	MA_1	MA_1
Coefficients	-0.6870	-0.6881
Standard Error	0.0846	0.0776
AIC	668.59	747.17
BIC	672.81	751.63

Table 4: Model Comparison Measures

Country	Model	RMSE	MAE	MPE	MAPE	MASE
China	I	267.6721	133.6117	1.847274	9.238099	0.6440269
	II	247.1423	121.6493	1.835241	8.169301	0.3848659
Pakistan	I	51.22353	34.56317	0.6717808	7.030863	0.8147661
	II	48.24209	30.72384	0.6064447	6.244254	0.7433239
Bangladesh	I	54.99159	30.16532	0.01790265	9.132468	0.6025871
	II	51.79984	26.76427	0.0175891	8.10052	0.4038902

5.3 Forecasting for GDP

One use of a model is to anticipate the future values of a time series after the model has been discovered, its parameters determined, and its diagnostics examined. Table 6 (a), Table 6 (b) and Table 6 (c) provides the GDP projections for the time window 2023 – 2037. Figure 8 (a), Figure 9 (a), and Figure 10 (a) shows the trend of the actual and forecasted GDP values with their 95% confidence limits for the years 1960 – 2022. Based on these 63 years, the next 15 years forecasted GDP values for respectively China, Pakistan and Bangladesh is proposed as ARIMA (0,2,2), ARIMA (2,2,1) and ARIMA (0,2,1) based on model I similarly Figure 8 (b), Figure 9 (b), and Figure 10 (b) based on model II. Since the national economy is a complex and dynamic system, and that the outcome is simply a predicted number, therefore in order to prevent the economy from suffering from strong fluctuations, the administrators should maintain

the stability and continuity of microeconomic regulation and control with special attention to the risk of adjustment in economic operation (Wabomba *et al.* 2016). One should also adjust the corresponding target value in light of the current situation. Thus, to assess robustness of the model-based prediction we next include the first eight predicted values for the years 2023 – 2030 in the original time series data base. The same R program is now re-run for the composite period 1960 – 2030. The ARIMA (2, 2, 2) model for China emerges as the best fit Model II on the new compounded data model on the basis of AIC from among the twelve considered models. Table 3 (a), Table 3 (b), and Table 3 (c) represent the estimated coefficients and model adequacy criterion for both Model I and Model II for respectively China, Pakistan, and Bangladesh under study. Model II estimates have smaller standard errors but AIC and BIC are greater than that of Model I. Model II estimates have smaller RMSE, MAE, MPE, MAPE and MASE (Table 4) for all the three countries, which indicates smaller associated residuals for Model II fit. However, from the viewpoint of sample-based information, of AIC and BIC, Model I of all the three countries are a better representative for the considered actual time series. We predict the next seven annual GDP values for the period 2031 – 2037. 95% confidence interval for Model II are found to be shorter as given in Table 5(a), Table 5(b), and Table 5(c). Thus, retrieving that Model II is more efficient for predictive purpose. However, for all the three selected countries Model I 95% However, for all the three countries model I with 95% confidence band is much wider than that of Model II indicating a less variable model II and therefore better fit.

Table 5 (a): Forecasted values of GDP of China

Year	Forecasted GDP per capita		95% Confidence Interval			
	Model -I	Model-II	Model-I		Model-II	
			Lower limit	Upper limit	Lower limit	Upper limit
2023	14123.90		13581.78	14666.02		
2024	15246.67		14534.42	15958.91		
2025	16369.43		15314.76	17424.11		
2026	17492.20		15972.79	19011.61		
2027	18614.97		16542.36	20687.57		
2028	19737.73		17040.86	22434.61		
2029	20860.50		17478.11	24242.89		
2030	21983.27		17860.46	26106.07		
2031	23106.04	23085.49	18192.42	28019.65	22579.23	23591.74
2032	24228.80	24196.53	18477.42	29980.19	23532.12	24860.94
2033	25351.57	25311.67	18718.21	31984.93	24382.48	26240.85
2034	26474.34	26424.24	18917.06	34031.61	25073.64	27774.84
2035	27597.10	27536.09	19075.91	36118.30	25710.81	29361.36
2036	28719.87	28648.62	19196.42	38243.32	26313.24	30984.01
2037	29842.64	29761.27	19280.05	40405.22	26868.00	32654.55

Table 5 (b): Forecasted values of GDP of Pakistan

Year	Forecasted GDP per capita		95% Confidence Interval			
	Model -I	Model-II	Model-I		Model-II	
			Lower limit	Upper limit	Lower limit	Upper limit
2023	1589.066		1484.432	1693.700		
2024	1592.068		1413.204	1770.932		
2025	1640.259		1423.212	1857.306		
2026	1696.676		1453.135	1857.306		
2027	1736.221		1461.435	2011.007		

2028	1767.513		1455.299	2079.727		
2029	1803.644		1453.762	2153.527		
2030	1844.645		1458.792	2230.499		
2031	1884.964	1884.979	1462.988	2306.941	1786.910	1983.048
2032	1923.023	1923.049	1463.461	2382.585	1755.528	2090.569
2033	1960.733	1960.763	1462.425	2459.041	1757.727	2163.800
2034	1999.306	1999.342	1461.683	2536.929	1771.806	2226.878
2035	2038.269	2038.317	1460.794	2615.744	1781.849	2294.785
2036	2076.977	2077.035	1458.881	2695.072	1785.841	2368.229
2037	2115.446	2115.512	1455.883	2775.009	1789.403	2441.621

Table 5 ©: Forecasted values of GDP of Bangladesh

Year	Forecasted GDP per capita		95% Confidence Interval			
			Model-I		Model-II	
	Model -I	Model-II	Lower limit	Upper limit	Lower limit	Upper limit
2023	2880.167		2769.724	2990.610		
2024	3072.034		2889.757	3254.310		
2025	3263.901		3008.029	3519.772		
2026	3455.767		3122.115	3789.420		
2027	3647.634		3122.115	4063.777		
2028	3839.501		3336.101	4342.902		
2029	4031.368		3436.032	4626.705		
2030	4223.235		3531.423	4915.047		
2031	4415.102	4415.100	3622.425	5207.779	4311.358	4518.841
2032	4606.969	4606.964	3709.186	5504.751	4435.834	4778.094
2033	4798.836	4798.829	3791.848	5805.823	4558.695	5038.962
2034	4990.702	4990.693	3870.544	6110.861	4677.656	5303.730
2035	5182.569	5182.558	3945.395	6419.743	4792.220	5572.896
2036	5374.436	5374.423	4016.517	6732.355	4902.328	5846.518
2037	5566.303	5566.287	4084.014	7048.592	5008.062	6124.513

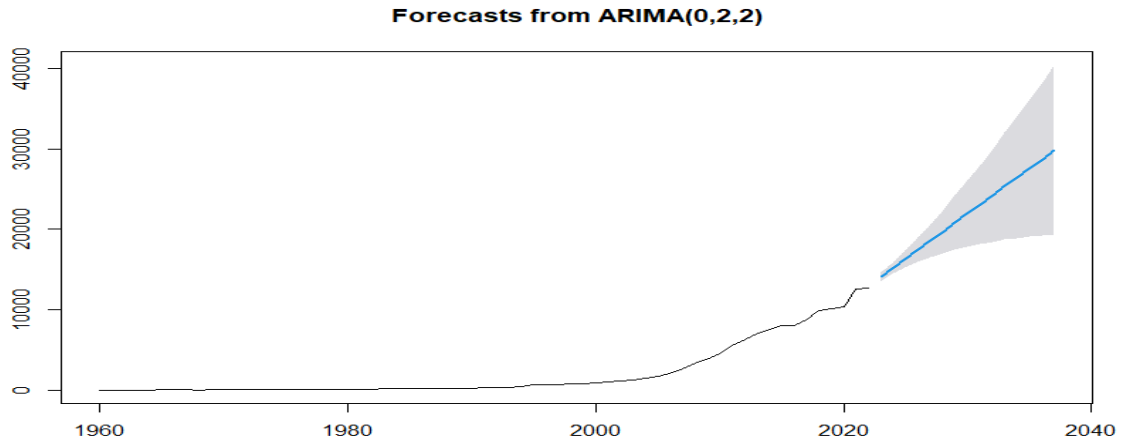

Figure 8 (a): Time series plot for actual and forecasted GDP values for model I of China.

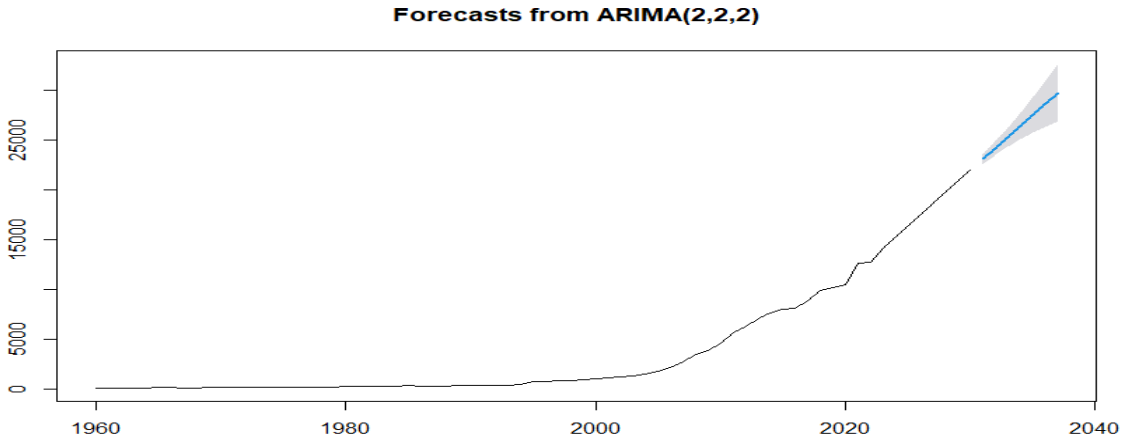

Figure 8 (b): Time series plot for actual and forecasted GDP values for model II of China.

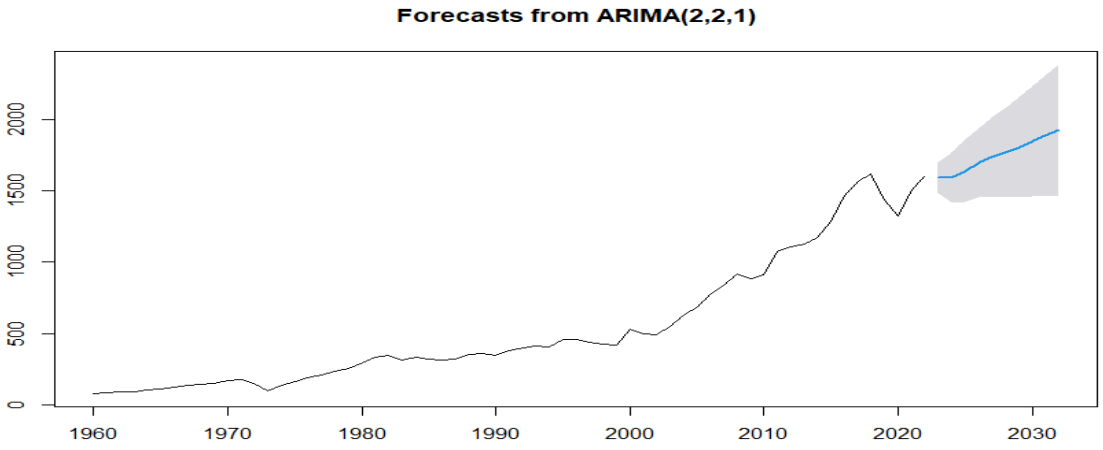

Figure 9 (a): Time series plot for actual and forecasted GDP values for model I of Pakistan.

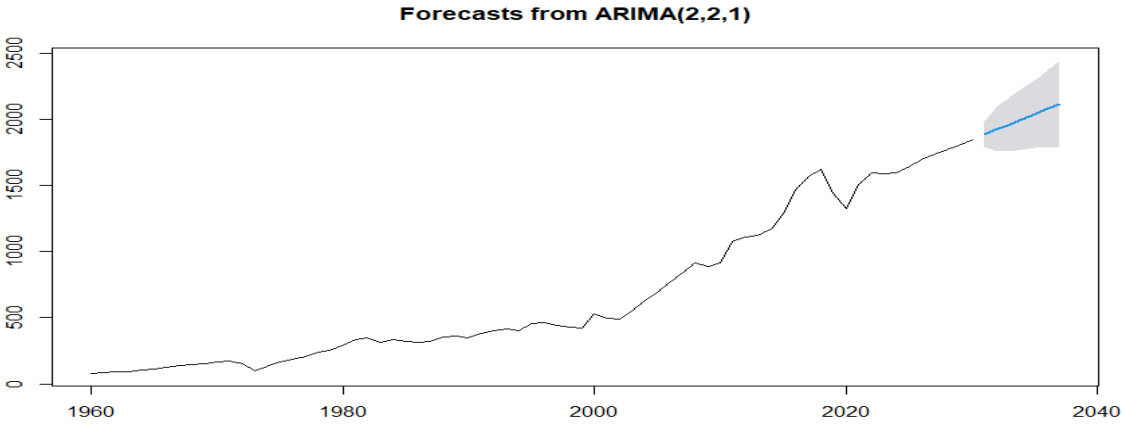

Figure 9 (b): Time series plot for actual and forecasted GDP values for model II of Pakistan.

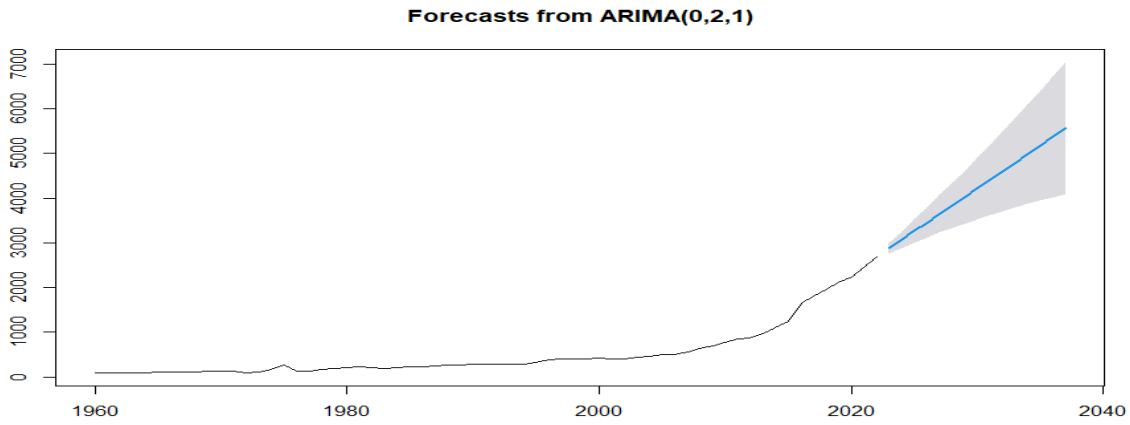

Figure 10 (a): Time series plot for actual and forecasted GDP values for model I of Bangladesh.

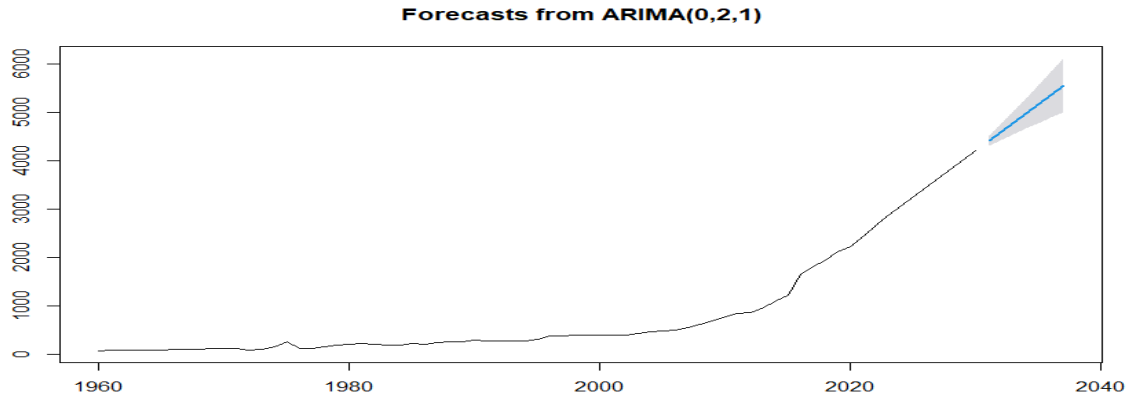

Figure 10 (b): Time series plot for actual and forecasted GDP values for model II of Bangladesh.

VI. CONCLUSION AND RECOMMENDATIONS

Our study discovers that the proposed ARIMA models (Table 2) are useful for future GDP per capita prediction in China, Pakistan, and Bangladesh. For the development and assessment of different ARIMA models, we have used annual data from 1960 – 2022 and found ARIMA (0, 2, 2) model is the most appropriate for GDP of China, ARIMA (2, 2, 1) model is the most appropriate for GDP of Pakistan GDP, and ARIMA (0, 2, 1) model is the most appropriate for Bangladesh GDP. Our findings are in line with earlier research, which discovered that ARIMA models as effective tools of forecasting economic indicators like GDP. Our present study makes a practical contribution by providing in-depth explanations of how ARIMA models might be used to predict per-capita GDP. The best fitted ARIMA model has been used to obtain forecast values for next one and half decade. The finding shows that the forecast values of China's GDP will be $14123.90 per capita in 2023 and $29842.64 per capita in 2037. Forecast values of Pakistan's GDP will be $1589.066 per capita in 2023 and $2115.446 per capita in 2037 and forecast values of Bangladesh's GDP will be $2880.167 per capita in 2023 and $5566.303 per capita in 2037. The results show that all the three economies are in a growing phase. It is therefore suggested to the policy maker to diversify investment on areas of infrastructure development, research, and development, and to facilitate establishment of more startups with focus on green investment and sustainability.

Model II for each considered economy reinforces that short- term prediction of GDP is more precise Table 5(a), Table 5(b), and Table 5(c). Model based prediction enable planners to address specific economic challenges such as resource allocation. A robust GDP prediction could guide the government about the expected revenue generation, and expenditure optimization. Business and governments could plan investment, inventory management and volume of production Statistical prediction thus empowers a decision maker with scope for evidence informed decision-making. However, one must be always aware that any model is sustainable as long as the background conditions such as other influencing market forces remain at the current level. Since GDP addresses only the recorded income on an average, therefore it is not an adequate measure on measuring sustainable development of people in the economy, which can be addressed through Human Development Index which is currently focus of our future research.

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Declarations

Ethical Approval

Not Applicable

Conflict of Interest

The authors declare no competing interests.

REFERENCES

1. Abonazel, M. R., and Abd-Elftah, A. I. (2019). Forecasting Egyptian GDP Using ARIMA Models. Reports on Economics and Finance, 5(1), 35-47.
2. Agrawal, V. (2018). GDP Modeling and forecasting using ARIMA: an empirical study from India. Doctoral dissertation, Central European University.
3. Ahmed, A., & Salan, M. S. A. (2019). Forecasting GDP Of Bangladesh Using Time Series Analysis. International Journal of Mathematics and Statistics Invention (IJMSI), (1).
4. Akaike, H. (1973). Information theory and an extension of the maxmum likelihood principale. In 2nd International Symposium of Information Theory (pp. 267-281). Akademia Kiado.
5. Amir, M. W., Bibi, A., Akhtar, N., & Raza, Z. (2021). Modeling and Forecasting of Gross Domestic Product Percentage Share of Education Sector: A Statistical Study in Pakistan. Transactions in Mathematical and Computational Sciences, 1(1), 75-84. Bangladesh: An ARIMA approach. Journal of Mechanics of Continua and Mathematical
6. Box, G. E. P., and Jenkins, G., (1970). Time Series Analysis, Forecasting and Control, Holden- Day, San Francisco.
7. Chatfield. C. (2016). The Analysis of Time Series: An Introduction. CRC Press.
8. Chowdhury, M. H., & Hosna, K. A. (2016) Modeling and forecasting per capita GDP of Bangladesh: an ARIMA modeling approach. Journal of Science and Technology, 6(1 & 2): 137-151
9. Datta, M., Mahfuzur, M., Sultana, Z., & Arifur, F. M. (2023). An ARCH volatility analysis of real GDP, real gross capital formation, and foreign direct investment in Bangladesh. Asian Economic and Financial Review, 13(4), 228-240.
10. Dinh, D. V. (2020). Forecasting domestic credit growth based on ARIMA model: Evidence from Vietnam and China. Management Science Letters, 10(5), 1001-1010.
11. Dritsaki, C. (2015). Forecasting real GDP rate through econometric models: an empirical study from Greece. Journal of International Business and Economics, 3(1), 13-19.
12. Dritsakis, N., & Klazoglou, P. (2019) Time series analysis using ARIMA models: An approach to forecasting health expenditures in USA. Volume 72, Issue 1 – February, 77-106
13. Eissa, N. (2020). Forecasting the GDP per Capita for Egypt and Saudi Arabia Using

ARIMA Models. *Research in World Economy*, *11*(1), 247-258.
14. Farooqi, A. (2014). ARIMA model building and forecasting on imports and exports of Pakistan. Pakistan Journal of Statistics and Operation Research, 157-168.
15. Gao, J. (2023). Research on Stock Price Forecast Based on ARIMA-GARCH Model. In MSIEID 2022: Proceedings of the 4th Management Science Informatization and Economic Innovation Development Conference, MSIEID 2022, December 9-11, 2022, Chongqing, China (p. 317). European Alliance for Innovation.
16. Ghazo, A. (2021). Applying the ARIMA Model to the Process of Forecasting GDP and CPI in the Jordanian Economy. International Journal of Financial Research, 12(3), 70.
17. Granger C. W., Newbold P. (1986). Forecasting Economic Time Series, Academic Press.
18. Hussain, M. E., & Haque, M. (2017). Empirical analysis of the relationship between money supply and per capita GDP growth rate in Bangladesh. Journal of Advances in Economics and Finance, 2(1), 54-66
19. Hussain, M. W., & Nasir, W. (2021). The empirical analysis of gross domestic product of Pakistan. Proc. 18th International Conference on Statistical Sciences Lahore, Pakistan – February 18-20, 2021, Vol. 35, pp. 169-180
20. Ingsrisawang, L., & Wongoutong, C. (2023). A Novel Approach for Combined Forecasting Model Systems Based on the Correlation Coefficient Ranking of the Individual Forecasting Models. Thailand Statistician, 21(4), 887-909.
21. Jahan, N. (2021). Predicting Economic Performance of Bangladesh using Autoregressive Integrated Moving Average (ARIMA) model. Journal of Applied Finance and Banking, 11(2), 129-148.
22. Kiriakidis, M., and Kargas, A. (2013). Greek GDP forecast estimates. Applied Economics Letters, 20(8), 767-772.
23. Lidiema, C. (2017). Modelling and forecasting inflation rate in Kenya using SARIMA and Holt-Winters triple exponential smoothing. American Journal of Theoretical and Applied Statistics, 6(3), 161-169.
24. Lin, W., & Shi, Y. (2023). A Study on the Development of China's Financial Leasing Industry Based on Principal Component Analysis and ARIMA Model. Sustainability, 15(13), 9913.
25. Lngale, K. Y., & Senan, R. (2023). Predictive analysis of GDP by using ARIMA approach. The Pharma Innovation Journal 2023; 12(5): 309-315
26. Lu, S. (2021). Research on GDP forecast analysis combining BP neural network and ARIMA model. Computational Intelligence and Neuroscience, Volume 2021 | Article ID 1026978, 10 pages
27. Miah, M. M., Tabassum, M., & Rana, M. S. (2019). Modelling and forecasting of GDP in model. Computational Intelligence and Neuroscience, 2021. Model. European Journal of Business and Management Research, 5(5).
28. Mohamed, A. O. (2022). Modelling and Forecasting Somali Economic Growth Using ARIMA Models. Forecasting, 4(4), 1038-1050.
29. Ning, W., Kuan-jiang, B. and Zhi-fa, Y. (2010), Analysis and forecast of Shaanxi GDP based on the ARIMA Model, Asian Agricultural Research, Vol. 2 No. 1, pp. 34-41.
30. Polintan, S. N., Cabauatan, A. L. L., Nepomuceno, J. P., Mabborang, R. C., & Lagos, J. C. (2023). Forecasting Gross Domestic Product in the Philippines Using Autoregressive Integrated Moving Average (ARIMA) Model. European Journal of Computer Science and Information Technology, 11(2), 100-124
31. Saleem, N., Akbar, A., Imon, A. R., & Al Mamun, A. S. M. (2022). Time series analysis modeling and forecasting of gross domestic product of Pakistan. Journal of Mechanics of Continua and Mathematical Sciences, Vol.-17, No.-2, February (2022) pp 52-7
32. Schwarz, G. (1978). Estimating the dimension of a model. The annals of statistics, 461-464. Science, 14(3), 150-166.
33. Streimikiene, D., Rizwan Raheem, A., Vveinhardt, J., Pervaiz Ghauri, S., & Zahid, S. (2018). Forecasting tax revenues using time series techniques–a case of Pakistan.

Economic research-Ekonomska istraživanja, 31(1), 722-754.
34. Thomakos, D. D., & Bhattacharya, P. S. (2005). Forecasting inflation, industrial output and exchange rates: A template study for India. Indian Economic Review, 145-165.
35. Tiwari, A. K. (2012). On the Dynamics of Energy Consumption, CO_2 Emissions and Economic Growth: Evidence from India. Indian Economic Review, 57-87.
36. Tolulope, J. O., Babyemi, A. W., Shayau, S. A., & Shehu, B. (2023). Model for Forecasting Nigerian Real Gross Domestics Product (GDP) Using Autoregressive Integrated Moving Average (ARIMA). Journal of Mathematical Sciences & Computational Mathematics, 4(2), 152-168.
37. Voumik, L. C., & Smrity, D. Y. (2020). Forecasting GDP Per Capita In Bangladesh: Using Arima Model. *European Journal of Business and Management Research*, *5*(5).
38. Wabomba, M. S., Mutwiri, M. P., & Mungai, F. (2016). Modeling and forecasting Kenyan GDP using autoregressive integrated moving average (arima) models. Science Journal of Applied Mathematics and Statistics, 4(2), 64-73.
39. World Bank (2022). World Development Indicators Database. Washington D.C Yang, B., Li, C., Li, M., Pan, K., & Wang, D. (2016).
40. Application of ARIMA model in the prediction of the gross domestic product. In 2016 6th International Conference on Mechatronics, Computer and Education Informationization (MCEI 2016) (pp. 1258-1262). Atlantis Press.
41. Zakai, M. (2014). A time series modeling on GDP of Pakistan. Journal of Contemporary Issues in Business Research, 3(4), 200-210
42. Zhang, Y., Ma, Q., & Du, L. (2023, August). Analysis and Forecast of Total Investment in Environmental Pollution Treatment in China Based on ARIMA Model. In Proceedings of the 2nd International Academic Conference on Blockchain, Information Technology and Smart Finance (ICBIS 2023) (pp. 1296-1307). Atlantis Press.
43. Links for various data sources used in the present work have been listed below: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=CN
44. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=PK
45. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=BD

Study on Well-Being in Bolívar State what Life is Like in Bolívar State

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ABSTRACT

The development model implemented in Guayana, based on industrialization and the exploitation of natural resources, has entered a deep crisis. Changes in the economic and political context, along with the implementation of new strategies such as the Orinoco Mining Arc, have generated a series of social and environmental problems that require urgent attention. In light of these issues and the absence of official data reflecting the well-being or distress of the inhabitants of Bolívar state, a study on well-being in the region was conducted from a local perspective, considering inequalities and living conditions of the population. This project adopts an approach that integrates individuals' material living conditions and their satisfaction with those conditions in order to calculate the well-being index. The objective is to share information that can guide the design of public policies that address the real needs of Bolívar state's society. The inclusion of a subjective dimension in the applied survey allowed the results to reflect the necessity of recognizing that each individual values quality of life from their own perspective and that their individual capacities and opportunities influence their perceptions. The study aims to further explore disparities among the inhabitants by incorporating analyses of territorial, age, and gender inequalities. This study underscores the need for a more comprehensive and human-centered approach to regional development that considers the needs and aspirations of the local population.

Keywords: human well-being, material conditions, satisfaction, well-being index.

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Study on Well-Being in Bolívar State what Life is Like in Bolívar State

Estudio De Bienestar Del Estado Bolívar De Qué Va La Vida En El Estado Bolívar

Aiskel Andrade Mantilla[α], Marian Ojeda Carrillo[σ], Otaiza Cupare[ρ] & Jesús E. Medina M.[Ω]

RESUMEN

El modelo de desarrollo implementado en Guayana, basado en la industrialización y la explotación de recursos naturales, ha entrado en una profunda crisis. Los cambios en el contexto económico y político, junto con la implementación de nuevas estrategias como el Arco Minero del Orinoco, han generado una serie de problemas sociales y ambientales que requieren una atención urgente. Ante estos problemas y la ausencia de datos oficiales que den cuenta del estado de bienestar / malestar de los habitantes del estado Bolívar, se desarrolló un estudio sobre el bienestar en la región, abordado desde una perspectiva local, considerando las desigualdades y las condiciones de vida de la población. Este proyecto asume, para el cálculo del índice de bienestar, la integración de las condiciones materiales de vida de las personas y la satisfacción que, de esas condiciones, tienen las propias personas, con el propósito de compartir información que oriente el diseño de políticas públicas que respondan a las necesidades reales de la sociedad en el estado Bolívar. La incorporación de la dimensión subjetiva en la encuesta aplicada permitió que los resultados obtenidos den cuenta de la necesidad de reconocer que cada individuo valora la calidad de vida desde su perspectiva, y que sus capacidades individuales y las oportunidades influyen en sus percepciones. Se pretende continuar ahondando en el estudio incorporando el análisis de las brechas entre los habitantes por desigualdades territoriales, etarias y de género. Este estudio enfatiza la necesidad de un enfoque más integral y humano en el desarrollo de la región, que tome en cuenta las necesidades y aspiraciones de la población local.

Palabrasclave: bienestar humano, condiciones materiales, satisfacción, índice de bienestar.

ABSTRACT

The development model implemented in Guayana, based on industrialization and the exploitation of natural resources, has entered a deep crisis. Changes in the economic and political context, along with the implementation of new strategies such as the Orinoco Mining Arc, have generated a series of social and environmental problems that require urgent attention. In light of these issues and the absence of official data reflecting the well-being or distress of the inhabitants of Bolívar state, a study on well-being in the region was conducted from a local perspective, considering inequalities and living conditions of the population. This project adopts an approach that integrates individuals' material living conditions and their satisfaction with those conditions in order to calculate the well-being index. The objective is to share information that can guide the design of public policies that address the real needs of Bolívar state's society. The inclusion of a subjective dimension in the applied survey allowed the results to reflect the necessity of recognizing that each individual values quality of life from their own perspective and that their individual capacities and opportunities influence their perceptions. The study aims to further explore disparities among the inhabitants by incorporating analyses of territorial, age, and gender inequalities. This study underscores the need for a more comprehensive and human-centered approach to regional development that considers the needs and aspirations of the local population.

Keywords: human well-being, material conditions, satisfaction, well-being index.

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I. INTRODUCCIÓN

A finales de la década de los 50, bajo la influencia de la teoría de los polos de desarrollo se decidió localizar en Ciudad Guayana un complejo industrial basado en la existencia de recursos minerales, sirviéndose principalmente de las ventajas de su ubicación cerca de los yacimientos de hierro y bauxita, el potencial hidroeléctrico del Caroní y la navegabilidad del Orinoco. [1] Este potencial sería canalizado por el Estado mediante industrias básicas para el procesamiento de los minerales y sistemas de generación de energía eléctrica. Se justificó esta estrategia en la necesidad de diversificación y fortalecimiento de la base de exportación del país, la descentralización de las actividades productivas y la redistribución de la población[2]. Este polo de desarrollo serviría al mismo tiempo para proyectar sus efectos positivos a toda la Región Guayana. Sin embargo, la economía terminó concentrada en Ciudad Guayana, dependiente del complejo industrial del hierro, el acero y el aluminio, y de la ejecución de los proyectos hidroeléctricos todos gestionados por el Estado. Ese modelo de gestión es altamente sensible a los ciclos económicos y políticos nacionales e internacionales y con poca influencia para lograr la articulación económica de la Región. [3]

En efecto, el "colapso macroeconómico del año 1988… producto de condiciones externas muy adversas, de un agotamiento del régimen de controles" y del programa de liberalización de la economía[4], precedió la crisis política institucional venezolana, marcada por un deterioro de las expectativas de mejoramiento y bienestar individual y colectivo,[5] y por sucesos como el "Caracazo" de 1989; los golpes de estado de 1992; la destitución del Presidente de la República en 1993; la crisis financiera de 1994-1995; la disputa entre el Ejecutivo y el Legislativo en torno al decreto de suspensión de garantías constitucionales de 1994. A partir de 1999 se producen cambios en la estructura político-institucional del país, pero permanece la inestabilidad y la confrontación política, cuyo resultado económico más importante ha sido un severo proceso de desindustrialización y decrecimiento de la economía.[6]

En el caso de Guayana, objeto de este estudio, el modelo de desarrollo implementado, dependiente del Estado y concentrado en el parque industrial y, era sensible a las fluctuaciones económicas y los procesos políticos. Ya desde finales del siglo pasado se podían identificar claros signos del deterioro del parque industrial[7] y de su

[1] Como señala Rivas "al momento de creación de la CVG se plantearon tres objetivos fundamentales: Aprovechamiento del potencial hidroeléctrico del río Caroní; Desarrollo integral del sector minero metalúrgico; creación de un polo de desarrollo como base de asentamiento poblacional. Rivas Lairet A., *El modelo de desarrollo industrial de Guayana*, Guayana Sustentable Vol. 14 Núm. 14, UCAB 2014

[2] Friedmann John. *Desarrollo de la "Guayana" venezolana en una perspectiva regional"* https://revistasdex.uchile.cl/index.php/pvcr/article/download/11854/11881/27656

[3] Thismon Mañe, Lyzbeth M. *La Teoría de los Polos y su relación con las políticas de Desarrollo Regional en Venezuela: El caso de Ciudad Guayana*. Arg.: Instituto Torcuato Di Tella, 1975.

[4] Vera Leonardo, *Cambio estructural, desindustrialización y pérdidas de productividad: evidencia para Venezuela,* Cuadernos del Cendes, *versión impresa* ISSN 1012-2508*versión On-line* ISSN 2443-468XCDC v.26 n.71 Caracas agosto, 2009

[5] Andrade Mantilla, Aiskel S. *Democracia participativa y representación popular en Venezuela:(1999-2011).,* UNED 2013

[6] Programa de las Naciones Unidas para el Desarrollo (PNUD) *Desempeño Macroeconómico de Venezuela*. Cuarto trimestre 2023, y perspectiva 2024 reporte económico, Oficina país de Venezuela. 2024

[7] En el Foro Guayana Sustentable en el 2015 Adrián Vázquez, del equipo de estudio sobre las empresas de Guayana, planteó que "la evaluación de la situación de las empresas básicas muestra como resultado una severa crisis en todos sus aspectos operativos, administrativos y financieros. Abandono de las instalaciones, falta de mantenimiento e inversión, así como desvalorización de la moral y responsabilidad laboral de los trabajadores, son escenarios de similares características para el conjunto de factorías industriales ubicadas en Ciudad Guayana." Vázquez Adrián, Proyecto Guayana, Vol. 15 Núm. 15, UCAB 2015

imposibilidad para promover el desarrollo de la Región.

De acuerdo con Matheus, en el año 2000, el desempleo en Ciudad Guayana estaba alrededor del 18%, y de la fuerza laboral ocupada el 38% trabajaba por cuenta propia asociada al sector informal y con bajos ingresos.[8]

En ese contexto de crisis del modelo de Guayana como polo de desarrollo, el Gobierno Nacional, en el año 2016, mediante el decreto N° 2.248 crea la Zona de Desarrollo Estratégico Nacional "Arco Minero del Orinoco"[9]. Este proyecto de extracción minera, principalmente de oro, fue implementado sin las debidas consideraciones técnicas acerca de los impactos sociales y medioambientales que una estrategia económica de esta característica tendría en un territorio complejo social, ambiental y culturalmente, como el que abarca la zona decretada.

El desmantelamiento del parque industrial de Guayana y la implementación de la estrategia extractiva en el sur del Estado Bolívar ha generado en esos territorios: consolidación de la ilicitud y la violencia; control territorial de organizaciones criminales; alteración de las costumbres de pueblos y comunidades de la región; cambios sociodemográficos; precarización de los servicios públicos y deterioro de la vialidad urbana e interurbana; pérdida y deterioro de la biodiversidad de los ecosistemas; obstáculos y vulneraciones de derechos económicos, sociales y culturales. [10]

El estudio de estas transformaciones que se han producido en la región Guayana y su zona de influencia, se encontraban con la dificultad de no contar con datos oficiales económicos, ni sociales, que permitieran dimensionarlos con rigurosidad. Así que, junto a los escasos datos disponibles, fuimos documentando las dinámicas sociales y económicas de las localidades del Estado Bolívar, en especial en el municipio Caroní y los municipios del Sur del Estado Bolívar; utilizando fundamentalmente métodos y técnicas de investigación cualitativa, tales como entrevistas a profundidad con actores locales, grupos de discusión para identificación de problemas y estados anímicos, y la observación participante, entre otros. Información recolectada por el Centro de Estudios Regionales que está disponible en el Observatorio de la Región Guayana[11].

En 2020, como parte del Proyecto ENCOVI, se presentaron indicadores básicos a nivel de estados y municipios[12]. Esta investigación, junto a los resultados de la indagación cualitativa mencionada en el párrafo anterior, nos hizo preguntarnos: ¿cómo vive y siente una sociedad en la que el 96% de las personas son pobres y el 54% de la población está desocupada?, ¿qué significa esto y cuáles son las valoraciones que las personas hacen de sus propias vidas en función de sus anhelos?, ¿cuál es la respuesta de la gente frente a sus condiciones?, ¿qué dinámicas sociales y culturales emergen en contextos de pobreza?. Estas interrogantes nos acercaron al enfoque de desarrollo humano, de acuerdo con el cual el bienestar está centrado en las oportunidades y las capacidades que tienen las personas, o que podrían llegar a tener mediante la implementación de políticas públicas adecuadas, para asegurarse una vida plena. [13]

Igualmente, nos interesaba indagar acerca de las valoraciones que las personas hacen de sus condiciones de vida. Sin embargo, no se disponía de información sobre las oportunidades o condiciones materiales de existencia en el estado Bolívar, pues después del 2020 Encovi ha

[8] Matheus Freitas, Lucas G. *Ciudad Guayana; ¿Una ciudad con o sin futuro? Guayana Sustentable* Vol. 14 Núm. 4, UCAB 2015

[9] Decreto N°. 2.248, publicado en la Gaceta Oficial' N°40.855, de 24 de febrero de 2016

[10] Andrade Mantilla A., El *Arco Minero: un "problema maldito",* en *Petróleo y extractivismo en Venezuela: propiedad, diversificación y Estado.* Ronald Balza Guanipa, Ramón Key y Luis Zambrano Sequín (coord.) © Universidad Católica Andrés Bello, Primera edición, 2021

[11] https://observatorioguayana.ucab.edu.ve/

[12] ENCOVI. Resumen de indicadores de condiciones de vida en Venezuela – Tipología por clústeres a nivel de municipios del estado Bolívar. Recuperado de: https://insoencovi.ucab.edu.ve/resumen/. 2020

[13] Cfr. Sen, A., *Capacidad y Bienestar*. En: Nusbaum, M.C. y Sen, A. *La Calidad de Vida*. Fondo de Cultura Económica, primera reimpresión en español, México D.F. 1996. Nusbaum, M. C., *Crear capacidades: Propuesta para el desarrollo humano. 2a Edición Paidós, Barcelona 2012.*

publicado solo datos Nacionales. De allí que, debíamos plantear en el diseño de la investigación la captura de datos sobre las condiciones objetivas. Eso hizo que nos preguntáramos: ¿cómo se define y mide el bienestar en contextos de pobreza y sin datos locales?, ¿qué factores contribuyen al malestar en estas comunidades? y ¿qué estrategias utilizan las personas para enfrentar sus condiciones adversas y mejorar su bienestar?

Dada la multidimensionalidad que contiene la idea de bienestar/malestar y la complejidad para su medición, revisamos principalmente la investigación sobre bienestar en América Latina realizada por la Organización para la Cooperación y el Desarrollo Económico (OCDE) [14], las investigaciones sobre bienestar subjetivo de la CEPAL[15] y los estudios de la Iniciativa para el Desarrollo Humano y la Reducción de la Pobreza (OPHI) [16].

Nos propusimos igualmente indagar las autovaloraciones de los individuos desde una perspectiva local. Este enfoque parecía acertado porque el bienestar es un asunto que, estudiado desde lo local y regional, puede darnos perspectivas de comparación. En cambio, si las mediciones de bienestar se realizan con variables, ya sea nacional o estadal, sin tener en cuenta las particularidades locales, se subestiman las desigualdades y se afecta la efectividad de las decisiones, porque se "pasan por alto las fuertes diferencias en cuanto a los niveles de desarrollo que alcanzan distintos grupos sociales y/o territorios dentro de un país…y no se capturan de forma correcta las condiciones reales de bienestar de los individuos". [17]

Estudiar las posibilidades de una medición territorializada del bienestar nos permite tener una imagen más completa y justa del bienestar humano; pues, tal y como plantean Bebbington y otros, en América Latina "existen trampas de pobreza, de vulnerabilidad y de falta de oportunidades que tienen una expresión territorial bien definida… se manifiestan en la existencia de localidades con indicadores de bienestar permanentemente rezagados frente al resto del país". [18]

Estimulados por las interrogantes enunciadas nos propusimos evaluar el bienestar objetivo y subjetivo del estado Bolívar con enfoque local. Para ello, debíamos identificar los indicadores para medir el bienestar objetivo y la forma cómo medir el bienestar subjetivo, determinar un método de medición que incorporara ambas medidas de bienestar. El objetivo del estudio fue comprender las valoraciones que hacen las personas del estado Bolívar de sus condiciones objetivas de vida, a partir de las desigualdades territoriales, etarias y de género, para coadyuvar al diseño de políticas públicas que respondan a las demandas reales de la sociedad.

[14] Las dimensiones utilizadas en este estudio son; trabajo y calidad del empleo; ingreso y patrimonio; vivienda; salud; conocimientos y competencias; calidad del medioambiente; bienestar subjetivo; seguridad; conciliación vida personal-laboral; relaciones sociales y compromiso cívico OCDE (2022). ¿Cómo va la vida en América Latina? Medición del bienestar para la formulación de políticas públicas. OECD, Publishing Paris. Recuperado de: https://doi.org/10.1787/7f6a948f-es

[15] Villatoro Pablo, *La medición del bienestar a través de indicadores subjetivos: Una revisión*., CEPAL 2012.

[16] En esta investigación se propusieron incorporar las siguientes dimensiones a los estudios de pobreza: "1. Empoderamiento y agencia. Actuar bajo presión u obligación, no poder ser uno mismo; 2. Seguridad física, ser víctima de robo a la propiedad. Violencia física o muerte; 3. La capacidad de ir por la vida sin sentir vergüenza, estigma de la pobreza, discriminación, humillación, falta de dignidad, discriminación; 4. Calidad del empleo, informalidad, malas condiciones en el lugar de trabajo, subempleo; 5. Conectividad social, aislamiento social, falta de redes de protección, contactos sociales, soledad 6. Bienestar psicológico y subjetivo, o falta de significado en la vida, anomia, insatisfacción." Corporación Andina de Fomento (CAF), *Las dimensiones faltantes en la medición de la pobreza*, Colombia 2015

[17] Bebbington, Anthony; Javier Escobal, Isidro Soloaga y Andrés Tomaselli (2016). Trampas territoriales de pobreza, desigualdad y baja movilidad social: los casos de Chile, México y Perú. México, DF: Centro de Estudios Espinosa Yglesias y Rimisp. Universidad Iberoamericana Ciudad de México

[18] *Ibidem*

II. DISEÑO DE LA INVESTIGACIÓN: MÉTODO PARA LA MEDICIÓN DE BIENESTAR

2.1 Diseño del estudio.

Este estudio es de tipo descriptivo, con un enfoque cuantitativo y un diseño de campo, que implicó la aplicación de un cuestionario a sujetos residentes en el estado Bolívar. El objetivo del estudio fue Analizar la valoración que hacen las personas del estado Bolívar de sus condiciones objetivas de vida. Este estudio se ha desarrollado durante los años 2022 y 2023. La encuesta aplicada en el año 2022 fue considerada una prueba piloto. La experiencia permitió optimizar el diseño del instrumento de recolección de datos.

Primero, se calculó el promedio de las condiciones objetivas obtenidas. Luego, se calculó el promedio para las valoraciones o satisfacción de estas condiciones. Con estos dos datos, se obtuvo el promedio de bienestar en cada una de las dimensiones propuestas. Finalmente, se consolidó el promedio general de bienestar del estado, asignando la misma ponderación a cada una de las dimensiones trabajadas.

Para la determinación de los promedios de Bienestar por cada dimensión estudiada, se establecieron valores máximos y mínimos que permitieron la estandarización de los resultados, empleando una escala desde el 0 al 1; donde el 0 se corresponde con el valor mínimo posible y el 1 el máximo valor que se puede obtener.

Para determinar la dimensión objetiva, los organismos internacionales encargados de producir información referente al bienestar, como la OCDE y la CEPAL, utilizan índices evaluativos comparables que permiten analizar la situación de progreso o desarrollo de las sociedades en distintos países. Por ejemplo, para evaluar el componente de salud, toman como referencia los índices de esperanza de vida al nacer, las tasas de morbilidad y mortalidad, entre otros. Sin embargo, debido a las limitaciones en cuanto al acceso a la información sobre los componentes establecidos y a la ausencia de datos estadísticos referentes al estado Bolívar por municipios, se recurrió a la construcción de indicadores por cada uno de los componentes del bienestar, que se aproximen a una medida objetiva obtenida por los propios individuos encuestados, teniendo como resultado final promedios en escalas del 0 al 1.

Para establecer la dimensión subjetiva de este estudio, se seleccionó el elemento cognitivo - valorativo a partir de la satisfacción de las personas, con una escala del 1 al 5, que va desde totalmente insatisfecho hasta totalmente satisfecho. Los encuestados pudieron realizar una evaluación sobre sus propias condiciones materiales a partir de las experiencias vividas en relación a cada uno de los componentes del bienestar determinados en el estudio. Esto permitió obtener información complementaria que reflejó las valoraciones que hacen las personas sobre sus propias condiciones objetivas de vida, permitiendo conocer cómo se sienten las personas ante la situación que viven en relación a las dimensiones trabajadas.

III. POBLACIÓN Y MUESTRA

Para la primera encuesta la población estuvo representada por habitantes de los municipios del estado Bolívar, que según el último censo poblacional levantado por el Instituto Nacional de Estadística (INE)[19] en 2011, ascendían a 1.413.115 personas; de ellas 709.368 son hombres y 703.747 son mujeres. En esta primera aplicación, dadas las dificultades de acceso, los altos costos económicos asociados a los traslados y el nivel de inseguridad en algunos municipios, la muestra seleccionada fue de entre los habitantes de los municipios Angostura del Orinoco, Caroní, Cedeño, Gran Sabana, Piar, Roscio, Sifontes, Sucre; excluyendo los municipios Bolivariano Angostura y Padre Pedro Chein. Se consideraron, como punto de partida, las localidades que son cabeceras de los municipios mencionados.

El cálculo del tamaño de la muestra se determinó considerando un error máximo admisible del 5% para estimaciones y un nivel de significación del 5%, lo cual da una confianza del 95%. Se determinó que debían ser seleccionadas 442 personas.

[19] XIV Censo Nacional de Población y Vivienda de Venezuela (2011). Recuperado de: https://ine.gob.ve/

Tabla 1: Asignación de la muestra por municipios

Municipio	Habitantes	N° de sujetos	% de representatividad
Angostura del Orinoco	337.625	97 sujetos	21,9%
Caroní	706.736	216 sujetos	48,9%
Cedeño	39.054	26 sujetos	5,9%
El Callao	21.769	16 sujetos	3,6%
Gran Sabana	28.450	16 sujetos	3,6%
Piar	98.274	28 sujetos	6,3%
Roscio	21.750	16 sujetos	3,6%
Sifontes	50.082	11 sujetos	2,5%
Sucre	20.359	16 sujetos	3,6%
Total población del estado	1.413.115	442 sujetos	100%

Fuente: Elaboración propia Fuente: Elaboración propia. (2022)

La población proyectada del estado Bolívar para el año 2023 se calculó mediante un análisis de regresión basado en los resultados de los censos realizados por el Instituto Nacional de Estadística (INE) desde 1950 hasta 2011. La mejor regresión obtenida fue la polinómica, con una correlación de 0.992, lo que arrojó una estimación de 2.068.148 habitantes para 2023. Considerando la diáspora venezolana actual, que según ACNUR (s/f) supera los 7,7 millones de personas[20] es decir, una reducción del 20 %, se aplicó este porcentaje a la población estimada del estado Bolívar. Así, se obtiene que la población actual del estado Bolívar es de 1.654.518 habitantes.

Para la segunda aplicación se incorporaron el municipio Bolivariano Angostura y el municipio Padre Pedro Chein, a fin de hacer la aplicación en todos los municipios del estado. Calculando el tamaño de la muestra para un 96% de confianza, se obtuvo una muestra total estratificada del estado de 656 sujetos, distribuidos de la siguiente manera:

Tabla 2: Distribución porcentual de la población por municipios.

Municipio	Habitantes	N° de sujetos	% de representatividad
Angostura del Orinoco	402.048	159 sujetos	24,3%
Bolivariano Angostura	47.981	19 sujetos	2,9%
Caroní	828.914	329 sujetos	50,1%
Cedeño	77.762	31 sujetos	4,7%
El Callao	24.818	10 sujetos	1,5%
Gran Sabana	33.090	13 sujetos	2,0%
Piar	115.816	46 sujetos	7,0%
Roscio	24.818	10 sujetos	1,5%
Sifontes	57.908	23 sujetos	3,5%
Sucre	23.163	9 sujetos	1,4%
Padre Pedro Chien	18.200	7 sujetos	1,1%
Total, población del estado	1.654.518	656 sujetos	100%

Fuente: Elaboración propia Fuente: Elaboración propia. (2023)

3.2 Estratificación de la muestra

Para la determinación final de la muestra, en ambos estudios, se emplearon los siguientes criterios de estratificación:

[20] https://www.acnur.org/emergencias/situacion-de-venezuela,

Género: se distinguieron dos opciones de respuesta que son femenino y masculino.

Tabla 3: Distribución estratificada por sexo.

Género	N° de sujetos	% de representatividad
Femenino	239 sujetos	54,07%
Masculino	203 sujetos	45,93%
Total, de la muestra	442 sujetos	100%

Fuente: Elaboración propia. (2022)

Tabla 4: Distribución estratificada por sexo.

Género	N° de sujetos	% de representatividad
Femenino	327 sujetos	49,85%
Masculino	329 sujetos	50,15%
Total, de la muestra	656 sujetos	100%

Fuente: Elaboración propia. (2023)

Grupos etarios: los encuestados se diferenciaron por la edad y serán separados por grupos etarios atendiendo a las generaciones; considerando obtener los datos diferenciados según la percepción de cada generación se plantearon cinco grupos: entre 15 y 25 años, entre 26 y 39 años, entre 40 y 56 años, y mayores de 57 años. El instrumento fue aplicado solo a personas mayores de18 años, por lo que el primer grupo estuvo compuesto por individuos entre 18 y 25 años de edad.

Tabla 5: Distribución estratificada por grupo etario.

Grupo etario	N° de sujetos	% de representatividad
15 y 25 años	131 sujetos	29,6%
26 y 39 años	141 sujetos	31,9%
40 y 56 años	107 sujetos	24,2%
mayores de 57 años	63 sujetos	14,3%
Total, de la muestra	442 sujetos	100%

Fuente: Elaboración propia. (2022)

Tabla 6: Distribución estratificada por grupo etario.

Grupo etario	N° de sujetos	% de representatividad
15 y 25 años	140 sujetos	21,4%
26 y 39 años	183 sujetos	27,9%
40 y 56 años	223 sujetos	33,9%
mayores de 57 años	110 sujetos	16,8%
Total, de la muestra	656 sujetos	100%

Fuente: Elaboración propia. (2023)

3.2 Instrumento de recolección de datos

Para la recolección de datos se diseñó un cuestionario que, para la primera aplicación, incorporaba siete (07) secciones que contenían 108 reactivos. La primera sección correspondió a las preguntas básicas de identificación personal, seguidamente se presentaron las seis (06) dimensiones en las que se subdividió, para efectos de esta investigación, el concepto de Bienestar, a saber: Ingreso y consumo, Vida saludable, Trabajo y calidad del empleo, Conocimientos y competencias, Vivienda y acceso a servicios, Seguridad ciudadana y Relaciones sociales.

Para la aplicación de la segunda encuesta se hizo una revisión del instrumento, quedando con un total de ciento treinta y tres (133) reactivos. Se mantiene la primera sección con las preguntas básicas de identificación del entrevistado, luego se presentan las nueve (09) dimensiones que redefinieron el concepto de Bienestar, a saber: Ingreso y consumo, Vida saludable, Trabajo y calidad del empleo, Conocimientos y competencias, Hogar digno, Acceso a servicios, Seguridad ciudadana, Relaciones sociales y Participación comunitaria.

En ambos casos, para cada dimensión del estudio se plantearon preguntas que permitieron recolectar información sobre las condiciones objetivas de vida de los entrevistados; así como el nivel de valoración o su satisfacción con cada una de las dimensiones desarrolladas.

El proceso[21] de recolección de datos se realizó mediante entrevistas de forma directa y personal empleando la plataforma Kobo Toolbox, utilizando dispositivos móviles; lo que permite la georreferenciación de cada encuesta aplicada. En ambos casos, la recolección de los datos se realizó entre la última semana del mes de octubre y el mes de noviembre de los mencionados años.

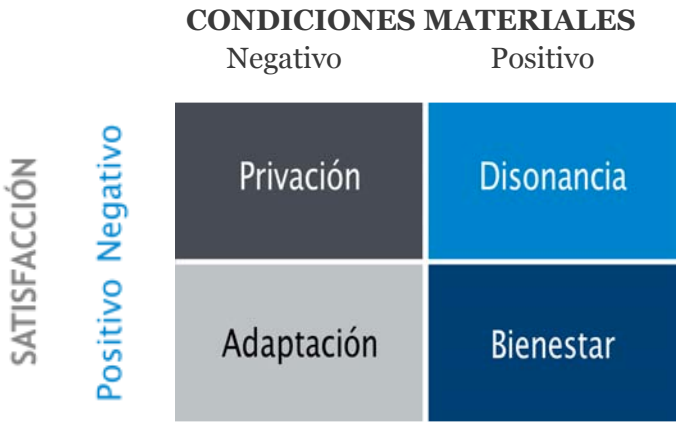
3.3 Análisis Estadístico.

Los datos recolectados se dispusieron en bases de datos. Para la obtención de los promedios de bienestar de cada una de las dimensiones estudiadas y el promedio general del estado, se correlacionaron las condiciones materiales y la valoración o satisfacción con esas condiciones, en el entendido de que las condiciones de vida son importantes como requerimiento básico de toda sociedad, pero resultan incompletas sin la evaluación de cada individuo sobre su vida, a partir de su propia experiencia y apreciación.

Una vez obtenido el índice de bienestar por cada una de las dimensiones, se tomó como referencia metodológica el cuadro de combinaciones binarias establecido por Zapf citado por Manfredi & Di Pasquale, para ubicarlo en uno de los cuadrantes, tal y como se observa en el Grafico 1.

Gráfico 1 Medición del bienestar objetivo y subjetivo: una propuesta de desarrollo humano integral" Manfredi & Di Pasquale (2020)

[21] Manfredi, M., & Actis Di Pasquale, E., Medición del bienestar objetivo y subjetivo: una propuesta de índice de desarrollo humano integral. Revista De Economía Mundial, (57). https://- doi.org/10.33776/rem.v0i57.4648 (2020).



Fuente: La vida en el estado Bolívar. Febrero2023

Zapf propuso cuatro resultados posibles de las combinaciones entre la autovaloración o apreciación que una persona hace y sus condiciones objetivas de vida, de acuerdo con ello, cuando las condiciones de vida son objetivamente positivas y el individuo las aprecia también de forma positiva, entonces hay un estado de bienestar, cuando el individuo valora negativamente sus condiciones de vida, que también son negativas, lo denomina privación. Cuando las condiciones de vida son objetivamente positivas, pero la apreciación de la persona es negativa, se aplica el término disonancia, y la combinación de condiciones de vida negativas y la autovaloración es negativa la denomina adaptación.[22] En el estado de privación están claramente limitadas las capacidades y la libertad del individuo, lo que a su vez puede generar sentimientos de frustración, y un mayor riesgo de exclusión social.

Además de comprender la privación, se sugiere tener en cuenta el contexto social y económico en el que ocurren estas experiencias, y los grupos sociales particulares en esos territorios, por ejemplo, los jóvenes o indígenas. Por ejemplo, la privación puede ser más pronunciada en grupos sociales desfavorecidos o en regiones con recursos limitados. Por lo tanto, es importante considerar los factores estructurales que contribuyen a la privación a una escala regional o local.

[22] ZAPF citado por VEENHOVEN R., *Las cuatro calidades de vida organización de conceptos y medidas de la buena vida*, pág. Recuperado de https://personal.eur.nl/ veenhoven/Pub2000s/2000c-fulls.pdf

IV. RESULTADOS (HALLAZGOS EN TÉRMINOS DESCRIPTIVOS)

Después de recolectar, organizar y procesar los resultados se obtuvieron los siguientes resultados por cada una de las dimensiones trabajadas:

4.1 Ingreso y consumo

El 67.2 % de los ingresos de las personas entrevistadas, correspondió a trabajos, pensiones y remesas. Un 75% de la muestra recibe, adicionalmente, ingresos por bonos otorgados por el gobierno. El 90.2 % de las personas entrevistadas reciben sus ingresos en bolívares y, de éstos, un 47.5%, percibe una cantidad superior a los 50 $ por mes. De igual forma, el ingreso total del grupo familiar supera esta cantidad. El 67.7% de los entrevistados cubren los gastos de alimentación e higiene personal con los ingresos mensuales recibidos. Solo el 0,9% de los entrevistados logra cubrir los gastos de entretenimiento con sus ingresos mensuales. El 68.3% de los entrevistados están insatisfechos con los ingresos percibidos. El 81.7 % de los entrevistados consideran que con los ingresos que perciben no tienen la vida que merecen.

Una vez obtenidos los promedios de las condiciones materiales y la valoración, en términos de satisfacción, se combinaron los

valores obteniéndose el índice que se expresa a continuación:

Promedio Objetivo: 0,24
Promedio Subjetivo: 0,21
Índice de Bienestar: 0,22

Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones objetivas en torno al ingreso percibido por los encuestados muestran un valor de 0,24; el cual resulta inferior al requerimiento mínimo necesario para cubrir las necesidades básicas de vida. Así también, la valoración de 0,21 que hacen sobre estas condiciones objetivas es inferior a los estándares mundialmente aceptados. Esta dimensión refleja el menor de los índices obtenidos en este estudio, 0,22, ubicándose en el cuadrante de privación, muy distante de un nivel aceptable de bienestar.

4.2 Vida saludable

El 75 % de los entrevistados declararon no haberse enfermado en los últimos 6 meses. El 72 % de los entrevistados que se enfermaron en los últimos 6 meses, manifestaron haber tenido enfermedades distintas a las consultadas (dengue, gripe, malaria, entre otros). Un 75 % de las personas que enfermaron en los últimos seis meses, acudieron a un centro de salud para su atención. Un 73% acudió a servicios públicos. Y en estos centros hubo menor disponibilidad de personal, equipos e insumos médicos, con respecto a los centros privados.

Un 70 % de las personas encuestadas están insatisfechas con el sistema de salud en general. De igual forma, un 77.3% manifiesta no tener acceso a un sistema de salud público para la atención de una enfermedad; y un 78.8 % no se siente seguro para la atención de una enfermedad en el sistema de salud público.

Un 74 % de las personas encuestadas, realiza actividades físicas. Y de éstas el 92% lo hace al menos 3 horas semanales

Un 79% ha consumido dos comidas en los últimos seis meses. Los alimentos ingeridos fueron en un 38% entre proteína y carbohidratos. Los vegetales, lácteos, granos, frutas y aceite tuvieron un consumo equitativo cercano a un 20%. Otros alimentos no fueron consumidos por sus altos costos y por no ser considerados prioritarios, de acuerdo las respuestas de un 90%.

Un 47 % de las personas entrevistadas, consumen el agua comprando botellones de agua tratada. Un 58% de los entrevistados se cepillan los dientes cada vez que comen. 99% se bañan diariamente, se lavan las manos y usan ropa limpia diariamente. Un 66% de los entrevistados consideran que gozan de buena salud.

Los promedios de las condiciones materiales y la valoración permitieron establecer el índice en la dimensión vida saludable:
Promedio Objetivo: 0,64
Promedio Subjetivo: 0,32
Índice de Bienestar: 0,48

Adaptación de Manfredi & Di Pasquale (2020)

La baja incidencia de enfermedades en la población consultada, así como la existencia de centros de salud, de administración pública y privada, que cuentan con médicos que atienden los casos que se presentan, hacen que el promedio de las condiciones objetivas se ubique en 0,64; lo cual resulta medianamente favorable. En cuanto a la valoración que las personas hacen de las condiciones de salud y el sistema de salud en general es de 0,32, un valor inferior. De ahí que el índice de bienestar se ubique por debajo del nivel mínimo de los estándares de bienestar aceptados mundialmente con 0,48, en el cuadrante de privación

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4.3 Trabajo y calidad de empleo

El 50,0 % de los entrevistados están trabajando. Sin embargo, un 41,2 % son empleados y un 57,9% trabajan independientemente. El 79% de los entrevistados viven con personas que están en edad de trabajar (más de 16 años) y son 1129 personas; de las cuales 777 personas (68,8%) están trabajando actualmente. Un 85% de los entrevistados recibe dinero como salario por su trabajo. El 58% de los trabajos son del sector público y el 39% del privado. Solo el 2,1% de los encuestados que trabajan lo hacen mediante trabajo remoto; mientras que el resto lo hace de manera presencial en empresas, locales comerciales u otros sitios. El 75% de los consultados manifestó que su trabajo no está ligado a su formación. Un 48% indicó que en su trabajo no se promueven condiciones que generen un ambiente seguro y saludable, al no tener seguro de salud, ni protección para la maternidad, paternidad, vejez, discapacidad, enfermedades o accidentes. Un 77% de los entrevistados manifestó no tener oportunidades de capacitación. A pesar de todo lo expuesto, un 53,2%está entre satisfecho y totalmente satisfecho con su trabajo, mientras que el 67,2% considera que posee condiciones de trabajo aceptables, toda vez que a un 74,3% les proporciona independencia.

El índice obtenido para la dimensión trabajo y calidad de empleo es el siguiente:

Promedio Objetivo: 0,44
Promedio Subjetivo: 0,66
Índice de Bienestar: 0,55

Adaptación de Manfredi & Di Pasquale (2020)

El valor de las condiciones objetivas en torno al ingreso percibido por los encuestados es de 0,44; el cual resulta inferior al requerimiento mínimo necesario para cubrir las necesidades básicas de vida. De otro lado, la valoración que hacen sobre estas condiciones objetivas es de 0,66; ligeramente superior a los estándares mundialmente aceptados. Esta dimensión refleja un índice de bienestar de 0,55; lo cual indica que los habitantes están en estado de privación.

4.4 Conocimiento y competencias

El 78,5 % de los entrevistados tienen un nivel de instrucción hasta bachillerato y/o técnico. El 67% de los hogares de las personas entrevistadas, tienen entre una y tres personas en edad de estudiar (entre 2 y 26 años), siendo un total de 966 personas; sin embargo, de estas personas solo 747 (79%) estudian actualmente. El 81% de los encuestados recibió educación en instituciones públicas. Un 82% lo hizo porque considera que es de mejor calidad y por ser la opción más cercana a su vivienda. Del total de los encuestados el 74,4% está entre satisfecho y totalmente satisfecho con el sistema educativo empleado. El 46% afirma que sus estudios le han generado oportunidades de empleo; mientras que el 68% manifiesta que la educación recibida le ha permitido tener un empleo adecuado. De la encuesta se obtuvo que solo en el 10% de las comunidades donde se encuestó ofrecen oportunidad para estudios superiores. Es importante acotar que el 89% de los encuestados señaló no haber tenido obstáculos para estudiar y en el 78% de los casos están entre de acuerdo y totalmente de acuerdo en que las habilidades técnicas, sociales y emocionales aprendidas les permiten hacer frente a los desafíos en la vida.

Los promedios de las condiciones materiales y la valoración permitieron establecer el índice en la dimensión conocimientos y competencias:

Promedio Objetivo: 0,58
Promedio Subjetivo: 0,68
Índice de Bienestar: 0,56

Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones objetivas son favorables para de acuerdo a la opinión de quienes han recibido educación formal en instituciones públicas y han logrado conseguir empleos, de ahí el promedio de 0,58. Adicionalmente, las personas valoran de manera positiva, con promedio de 0,68, el sistema educativo utilizado y las habilidades desarrolladas para superar dificultades. Sin embargo, el índice se encuentra en 0,63, por debajo del nivel mínimo entre los parámetros mundialmente aceptados.

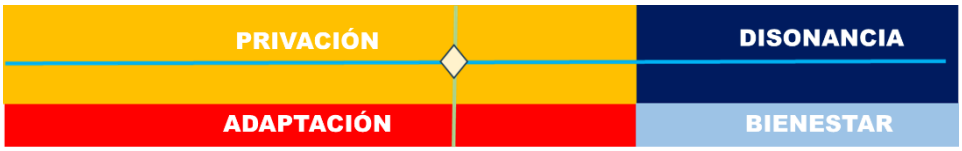
4.5 Participación ciudadana

El 52% de los entrevistados no votó en el último proceso electoral. Un 65% no ha participado en actividades comunitarias, ni manifiestan interés en participar. De otro lado, el 26% que participó, lo hizo ayudando a los vecinos a mejorar el entorno de su comunidad. Un 56% no ha participado en estas actividades por falta de tiempo. Pero de tenerlo lo harían mejorando las condiciones de la comunidad.

El 81% de los que participaron en alguna actividad comunitaria indicaron sentirse satisfechos con la experiencia. Cabe destacar que el 68% considera que en su comunidad no hay oportunidades de participación.

El índice obtenido para la dimensión participación ciudadana es el siguiente:

Promedio Objetivo: 0,48
Promedio Subjetivo: 0,46
Índice de Bienestar: 0,47



Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones objetivas dan cuenta de la poca participación de los ciudadanos en actividades comunitarias, por lo que el promedio se ubica en 0,31. Y, adicionalmente, la valoración que hacen de las oportunidades de participación, de 0,46, es inferior al nivel mínimo de los estándares de bienestar aceptados mundialmente. Es por ello que el índice de bienestar es de 0,47, ubicado en el cuadrante de privación.

4.6 Hogar digno

El 78 % de los hogares entrevistados están ocupados por grupos menores a 6 personas. El 80% de los entrevistados tienen vivienda propia, de ellos el 78% con documentación en regla. El 31% de los hogares visitados tienen habitaciones ocupadas con 3 personas o más. El 95% declara no haber tenido situaciones de violencia por parte de sus habitantes.

Un 86% de los encuestados manifestaron estar entre medianamente y totalmente satisfechos con las condiciones de su hogar. De estas personas un 81% considera su hogar muy cómodo. También un 86% lo cataloga como seguro y un 90% con ambiente armónico.

El 91% de las viviendas visitadas son del tipo "casa", con piso de cemento en un 70% y, de estos, un 27% revestidos con cerámica, terracota, ladrillos, entre otros. En el 89% de los casos las paredes son de bloque frisado. Finalmente, el 65% de estas casas poseen techo de láminas metálicas de zinc, aluminio o similar.

Los promedios de las condiciones materiales y la valoración permitieron establecer el índice en la dimensión hogar digno:

Promedio Objetivo: 0,50
Promedio Subjetivo: 0,73
Índice de Bienestar: 0,62

Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones de tenencia y propiedad de la vivienda y la incidencia, reportada por los encuestados, de situaciones de violencia en la familia hacen que las condiciones objetivas referidas al hogar digno sean favorables, con un 0,50 de promedio. De igual manera, la valoración de 0,73 que las personas hace de las condiciones de comodidad, seguridad y armonía de su vivienda considerable. Sin embargo, el nivel de bienestar se ubica por debajo del mínimo aceptado mundialmente en 0,62 y en el cuadrante de privación.

4.7 Acceso a servicios públicos

Entre los encuestados, el 77% indica contar con suministro de agua, 100% de electricidad y 87% de gas. Un 70% posee servicio de transporte en su comunidad. Un 79% tuvo servicio de agua diario, un 95% tuvo servicio de electricidad, un 97% tuvo acceso a telefonía, un 92% tuvo servicio de recolección de basura 1 o 2 veces por semana. Un 93% tuvo conexión a internet diaria y un 98% a telefonía celular.

En cuanto a la calidad de los servicios públicos en su comunidad, un 64 % está entre medianamente y totalmente satisfecho. Respecto del suministro de combustible, solo un 24% surte combustible en estaciones de servicios y un 76% de alguna otra forma. Un 79% indicó haber tenido inconvenientes con dicho servicio. El 89% ha tenido que hacer largas colas para surtir. Y un 22,8% afirma que el referido combustible es de calidad.

Solamente un 33% considera que los servicios públicos que posee su comunidad le brindan unas condiciones cómodas de vida.

El índice para la dimensión acceso a servicios públicos se expresa a continuación:

Promedio Objetivo: 0,67
Promedio Subjetivo: 0,48
Índice de Bienestar: 0,58

Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones objetivas relacionadas con el acceso a los servicios públicos resultaron favorables, en cuanto a cobertura y frecuencia; las personas le otorgan un valor promedio de 0,67. De otro lado, al determinar la valoración que las personas hacen de la calidad de los servicios y las condiciones de comodidad que estos le generan para vivir se observa que la población se siente insatisfecha, mostrando un valor promedio de 0,48. Lo que posiciona en el nivel mínimo de los estándares de bienestar aceptados mundialmente, ubicados en el cuadrante de disonancia, con un valor de 0,58.

4.8 Seguridad ciudadana

En cuanto a la seguridad en las comunidades, un 97,6 % señaló no haber sido víctima de algún delito en los últimos 6 meses, ni miembros de su familia (87,0%)

Un 59% informó que en su comunidad no existe algún organismo de seguridad donde realizar denuncias por algún delito. El 42% de los encuestados ha tomado medidas propias para evitar ser víctima de algún delito. Entre las que destacan el resguardo de objetos de valor (51%) y evitar salir de noche a zonas poco concurrida (89%). El 64% de los encuestados están insatisfechos con los organismos de seguridad del Estado. Pero, a pesar de ello, un 56,8% considera su comunidad segura.

El índice obtenido para la dimensión participación ciudadana es el siguiente:

Promedio Objetivo: 0,50
Promedio Subjetivo: 0,43
Índice de Bienestar: 0,46

Adaptación de Manfredi & Di Pasquale (2020)

La inexistencia de organismos de seguridad en las comunidades hace que las condiciones objetivas sean poco favorables para la seguridad ciudadana; y esto conlleva a que las personas deban tomar acciones para resguardarse, lo refleja el promedio de 0,50. De la misma manera, su valoración sobre la seguridad en su comunidad obtuvo un promedio de 0,43. De ahí que, el índice de bienestar se ubique en 046, por debajo de los estándares de bienestar aceptados mundialmente, en el cuadrante de adaptación.

4.9 Relaciones sociales

Los encuestados refieren que, al requerir apoyo para sus actividades cotidianas, acuden el 69% a sus familiares y el 37% a sus parejas. Si requieren apoyo de una organización, en un 76% de los casos recurren al consejo comunal.

En un 52% de las comunidades existen organizaciones que desarrollan actividades sociales; de ellas 80% son grupos religiosos y 39% son grupos deportivos.

Es importante destacar que un 79% de los encuestados, están entre medianamente y totalmente satisfechos con sus vínculos personales. Un 48% se sienten apoyados por las redes en su comunidad.

Los promedios de las condiciones materiales y la valoración permitieron establecer el índice en la dimensión relaciones sociales:

Promedio Objetivo: 0,61
Promedio Subjetivo: 0,65
Índice de Bienestar: 0,*63*

Adaptación de Manfredi & Di Pasquale (2020)

Las condiciones objetivas son favorables para propiciar las relaciones sociales con familiares, parejas y vecinos; por ello que el promedio refiere un 0,61. Las personas consultadas también hacen una valoración positiva de sus redes, expresado en un promedio de 0,65. A pesar de ello, el índice se encuentra por debajo del nivel mínimo entre los parámetros mundialmente aceptados en 0,63, ubicado en el cuadrante de adaptación, pero muy cercano al bienestar.

V. DESIGUALDADES TERRITORIALES EN LOS ÍNDICES DE BIENESTAR. CASO ESTADO BOLÍVAR

Tal como se muestra en la tabla 1 sobre el índice de bienestar en los municipios del estado Bolívar, es posible identificar los principales componentes críticos del bienestar; así como identificar una diferencia en el perfil de los municipios rurales como el municipio Sucre, o el decaimiento de un municipio otrora industrial como Caroní.

Tabla 1: Índice de bienestar por municipios y dimensiones. Encuesta de bienestar estado Bolívar, 2022
Fuente: Elaboración propia a partir de datos del Estudio de bienestar estado Bolívar, 2022

PROMEDIOS DE BIENESTAR HUMANO POR MUNICIPIO Y DIMENSIÓN 2022

MUNICIPIO	DIMENSIONES									
	INGRESO Y CONSUMO	VIDA SALUDABLE	CONOCIMIENTOS Y COMPETENCIAS	HOGAR DIGNO	ACCESO A SERVICIOS	SEGURIDAD CIUDADANA	RELACIONES SOCIALES	TRABAJO Y CALIDAD DE EMPLEO	PARTICIPACIÓN COMUNITARIA	Promedio por municipios
Sucre	0,22	0,46	0,40	0,38	0,38	0,63	0,60	0,29		0,44
Sifontes	0,25	0,67	0,55	0,67	0,67	0,65	0,64	0,56		0,56
Roscio	0,31	0,62	0,61	0,62	0,62	0,50	0,57	0,28		0,51
Piar	0,19	0,65	0,41	0,50	0,50	0,56	0,60	0,33		0,53
Padre Pedro Chien										
Gran Sabana	0,32	0,63	0,51	0,64	0,64	0,60	0,68	0,50		0,53
El Callao	0,36	0,61	0,32	0,50	0,50	0,45	0,61	0,33		0,46
Cedeño	0,21	0,55	0,58	0,50	0,50	0,56	0,70	0,43		0,59
Caroní	0,21	0,58	0,52	0,57	0,57	0,50	0,56	0,31		0,51
Bolivariano Angostura										
Angostura del Orinoco	0,21	0,61	0,48	0,60	0,60	0,50	0,60	0,33		0,53
Promedio del Estado Bolívar	0,25	0,59	0,48	0,55	0,55	0,55	0,62	0,37		0,53

Tabla 2: Índice de bienestar por municipios y dimensiones. Encuesta de bienestar estado Bolívar, 2023

PROMEDIOS DE BIENESTAR HUMANO POR MUNICIPIO Y DIMENSIÓN 2023

MUNICIPIO	DIMENSIONES									
	INGRESO Y CONSUMO	VIDA SALUDABLE	CONOCIMIENTOS Y COMPETENCIAS	HOGAR DIGNO	ACCESO A SERVICIOS	SEGURIDAD CIUDADANA	RELACIONES SOCIALES	TRABAJO Y CALIDAD DE EMPLEO	PARTICIPACIÓN COMUNITARIA	Promedio por municipios
Sucre	0,34	0,53	0,42	0,62	0,39	0,60	0,51	0,30	0,28	0,44
Sifontes	0,29	0,56	0,76	0,56	0,59	0,59	0,72	0,57	0,42	0,56
Roscio	0,23	0,50	0,67	0,51	0,55	0,52	0,60	0,57	0,47	0,51
Piar	0,32	0,58	0,57	0,52	0,65	0,60	0,53	0,50	0,48	0,53
Padre Pedro Chien	0,32	0,69	0,62	0,65	0,79	0,39	0,76	0,64	0,43	0,59
Gran Sabana	0,22	0,46	0,54	0,52	0,74	0,53	0,69	0,57	0,54	0,53
El Callao	0,23	0,46	0,54	0,54	0,68	0,53	0,50	0,40	0,31	0,46
Cedeño	0,25	0,55	0,60	0,60	0,82	0,61	1,00	0,54	0,38	0,59
Caroní	0,42	0,57	0,63	0,50	0,50	0,59	0,50	0,54	0,38	0,51
Bolivariano Angostura	0,27	0,55	0,63	0,58	0,77	0,70	0,64	0,44	0,46	0,56
Angostura del Orinoco	0,34	0,55	0,59	0,55	0,72	0,66	0,50	0,50	0,38	0,53
Promedio del Estado Bolívar	0,29	0,54	0,59	0,56	0,65	0,57	0,63	0,50	0,42	0,53

Fuente: Elaboración propia a partir de datos del Estudio de bienestar estado Bolívar, 2023

Este estudio permitió valorar la importancia de los promedios locales por dimensiones y la identificación de las privaciones para los datos estadales; sin embargo, es necesario incorporar el análisis de las privaciones a nivel local. De esa manera será posible contextualizar el bienestar y las dimensiones que lo componen.

VI. DISCUSIÓN

Como resultado del diseño y la aplicación de un estudio de bienestar para el estado Bolívar, se deben considerar una serie de aprendizajes que reflejan la importancia de utilizar una perspectiva evaluativa para comprender, no solo las condiciones de vida en un territorio caracterizado por dinámicas socioeconómicas complejas, sino también la situación de las personas en términos de necesidades, aspiraciones, limitaciones y posibilidades alternativas para alcanzar el estilo de vida deseado, en función de sus capacidades individuales.

En primer lugar, dentro de los hallazgos producto de esta investigación, podemos afirmar que el estudio sobre bienestar funciona como un instrumento de complementariedad a los estudios de pobreza multidimensional, los cuales van más allá del enfoque economicista basado en el ingreso como dimensión principal para medir la calidad de vida de las personas.

Esta propuesta normativa establecida en principio como una crítica al paradigma de la economía de bienestar, cuya premisa netamente cuantitativa estuvo asociada al crecimiento económico como principal fuente de satisfacción de los individuos, además del único impulsor del desarrollo en las sociedades, logró transformarse en un enfoque teórico con la intención de extender una base conceptual sobre la complejidad de la felicidad; centrándose en las capacidades humanas "entendidas como libertades sustantivas de las personas para ser y hacer aquello que valoran y de cuyo valor pueden dar razones"[23]
Adicional a ello, no resultan suficientes los análisis cuantitativos de acuerdo a parámetros internacionales que indiquen lo que las personas deberían tener o hacer para evaluar sus condiciones de vida, ya que la felicidad o satisfacción no necesariamente tienen que ver con aspectos materiales, sino más bien con la percepción subjetiva e individual sobre la vida. Es así como la adopción de este enfoque requiere un análisis cualitativo sobre las valoraciones que le otorgan las personas a la vida que tienen, partiendo de diagnósticos más comprehensivos sobre las carencias y anhelos individuales, y las reacciones cognitivas ante los acontecimientos. [24]

Como segunda afirmación, se puede esclarecer entonces que la obtención de un marco evaluativo centrado en los individuos permite comprender que la calidad de vida es un elemento esencial en la toma de decisiones individuales, conformada por aspectos plurales y cualitativamente diferentes, que, a su vez, se encuentran vinculados con el entorno social y cultural. Por lo tanto, el bienestar no solo se refiere a la ausencia de pobreza, sino que abarca una serie de dimensiones que incluyen la salud, la educación, la seguridad y, en general, un conjunto de componentes cuyo valor y prioridad depende únicamente del individuo. [25]

Considerando este planteamiento, la identificación de las autovaloraciones individuales y realidades locales específicas es lo que de alguna manera aproxima a las desigualdades que afectan a diversas comunidades en diferentes dimensiones por género, grupos etarios y nivel socioeconómico. Al visibilizar la implicancia que tienen estas diferencias en la vida de las personas, se construye una ruta para diseñar acciones más efectivas y contextualizadas que respondan a las demandas reales de la sociedad, con el propósito de ampliar las libertades de las personas para la toma de decisiones.

Asimismo, la determinación de desigualdades sociales y territoriales está asociada a la posibilidad de realizar interrelaciones entre las dimensiones seleccionadas para la aplicación del estudio, facilitando la construcción de nuevas dimensiones para la medición del bienestar, lo cual conduce a la tercera afirmación.

[23] Alkire, S., & Foster, J. *Counting and Multidimensional Poverty Measurement*. Journal of Public Economics 2011.: https://ophi.org.uk/sites/default/files/ophi-wp7_vs2.pdf

[24] Diener, E., Oishi, S., & Lucas, R. E. *Subjective Well-Being: The Science of Happiness and Life Satisfaction. In Handbook of Well-Being,* 2018: https://greatergood.berkeley.edu/images/uploads/Diener-Subjective_Well-Being.pdf

[25] Nussbaum, M. (2011). *Creating Capabilities: The Human Development Approach*. Harvard University Press:

De acuerdo al paradigma de Sen[26], la libertad individual conduce al desarrollo social, debido a que los logros de las personas estarán siempre condicionados por las oportunidades estructurales otorgadas a partir de las condiciones de vida que poseen. En otras palabras, lo que las personas podrían lograr en la vida dependerá de la capacidad económica para satisfacer sus necesidades básicas, la libertad de participación para tomar decisiones, contar con una buena salud para realizar actividades cotidianas, adquirir una educación básica para la vinculación con su entorno, obtener un empleo digno para su desarrollo personal; entre otras oportunidades adecuadas que les permita a las personas construir su destino y alcanzar su satisfacción global.

El hecho de que los conceptos de calidad de vida tengan diferente valor a nivel individual, abre la posibilidad de realizar interconexiones entre dimensiones que conduzcan a nuevos hallazgos significativos, obtener una visión holística que dé cuenta de las condiciones actuales, y realizar investigaciones futuras sobre indicadores especiales para contextos particulares.

REFERENCIAS BIBLIOGRÁFICAS

1. Alkire, S., & Foster, J., Counting and Multidimensional Poverty Measurement. Journal of Public Economics: (2011). Recuperado de: https://ophi.org.uk/sites/default/files/ophi-wp7_vs2.pdf
2. Alkire, S., & Foster, J., *Counting and Multidimensional Poverty Measurement*. Journal of Public Economics 2011. Recuperado de:https://ophi.org.uk/sites/default/files/ophi-wp7_vs2.pdf
3. Andrade, A., Democracia participativa y representación popular en Venezuela: (1999-2011)., UNED 2013
4. Andrade, A., El *Arco Minero: un "problema maldito"*, en *Petróleo y extractivismo en Venezuela: propiedad, diversificación y Estado*. Universidad Católica Andrés Bello, Primera edición, 2021
5. Bebbington, A., Escobal, J., Soloaga, I. y Tomaselli, A., Trampas territoriales de pobreza, desigualdad y baja movilidad social: los casos de Chile, México y Perú. México, DF: Centro de Estudios Espinosa Yglesias y Rimisp. Universidad Iberoamericana Ciudad de México. (2016).
6. Corporación Andina de Fomento, *Las dimensiones faltantes en la medición de la pobreza*, Colombia. 2015
7. Decreto N°. 2.248, publicado en la Gaceta Oficial' N°40.855, de 24 de febrero de 2016
8. Diener, E., Oishi, S., & Lucas, R. E. Subjective Well-Being: The Science of Happiness and Life Satisfaction. In Handbook of Well-Being. (2018). Recuperado de: https://greatergood.berkeley.edu/images/uploads/Diener-Subjective_Well-Being.pdf
9. Diener, E., Oishi, S., & Lucas, R. E., *Subjective Well-Being: The Science of Happiness and Life Satisfaction. In Handbook of Well-Being*, 2018. Recuperado de:: https://greatergood.berkeley.edu/images/uploads/Diener-Subjective_Well-Being.pdf
10. ENCOVI., Resumen de indicadores de condiciones de vida en Venezuela – Tipología por clústeres a nivel de municipios del estado Bolívar. 2020. Recuperado de: https://insoencovi.ucab.edu.ve/resumen/.
11. Friedmann J., Desarrollo de la "Guayana" venezolana en una perspectiva regional". Recuperado de: https://revistasdex.uchile.cl/index.php/pvcr/article/download/11854/11881/27656
12. Instituto Nacional de Estadística de Venezuela, XIV Censo Nacional de Población y Vivienda. Caracas: INE, 2011. Recuperado de: http://www.ine.gob.ve/documentos/Demografia/CensodePoblacionyVivienda/pdf/nacional.pdf
13. Manfredi, M., & Actis Di Pasquale, E., Medición del bienestar objetivo y subjetivo: una propuesta de índice de desarrollo humano integral. Revista De Economía Mundial, (57). (2020). Recuperado de:https://-doi.org/10.33776/rem.v0i57.4648
14. Nusbaum, M.C. y Sen, A., *Crear capacidades: Propuesta para el desarrollo humano. 2a Edición Paidós, Barcelona 2012.*

[26] Sen 1999

15. Nussbaum, M., Creating Capabilities: The Human Development Approach. Harvard University Press. (2011). Recuperado de: https://books.google.co.ve/books?id=Gg7Q2V8fi8gC&pg=PA17&hl=es&source=gbs_toc_r&cad=1#v=onepage&q&f=false
16. Observatorio de la Región Guayana. S.f. *Observatorio de la Región Guayana*. Universidad Católica Andrés Bello. https://observatorioguayana.ucab.edu.ve/
17. Organización para la Cooperación y el Desarrollo Económico., Medición del bienestar para la formulación de políticas públicas. OECD, Publishing Paris. 2022. Recuperado de: https://doi.org/10.1787/7f6a948f-es
18. Programa de las Naciones Unidas para el Desarrollo (PNUD), *Desempeño Macro-económico de Venezuela*. Cuarto trimestre 2023, y perspectiva 2024 reporte económico, Oficina país de Venezuela. 2024
19. Revista Guayana Sustentable. Matheus, Lucas G., "*Ciudad Guayana; ¿Una ciudad con o sin futuro?"* Vol. 14 Núm. 4, UCAB 2015
20. Revista Guayana Sustentable. Vázquez, A., "Proyecto Guayana." Vol. 15 Núm. 15, UCAB 2015
21. Rivas Lairet A., *El modelo de desarrollo industrial de Guayana*, Guayana Sustentable Vol. 14 Núm. 14, UCAB 2014
22. Sen, A., Development as Freedom. Knopf:. (1999). Recuperado de: http://www.c3l.uni-oldenburg.de/cde/OMDE625/Sen/Sen-intro.pdf
23. Thismon M., Lyzbeth M. La Teoría de los Polos y su relación con las políticas de Desarrollo Regional enVenezuela: El caso de Ciudad Guayana. Arg.: Instituto Torcuato Di Tella, 1975.
24. Veenhovenr, R., *Las cuatro calidades de vida organización de conceptos y medidas de la buena vida*. s.f. Recuperado de https://personal.eur.nl/veenhoven/Pub2000s/2000c-fulls.pdf
25. Vera, L, Cambio estructural, desindustr-ialización y pérdidas de productividad: evidencia para Venezuela, Cuadernos del Cendes, versión On-line ISSN 2443-468X CDC v.26 n.71 Caracas agosto, 2009
26. Villatoro, P., *La medición del bienestar a través de indicadores subjetivos: Una revisión*., CEPAL 2012.

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