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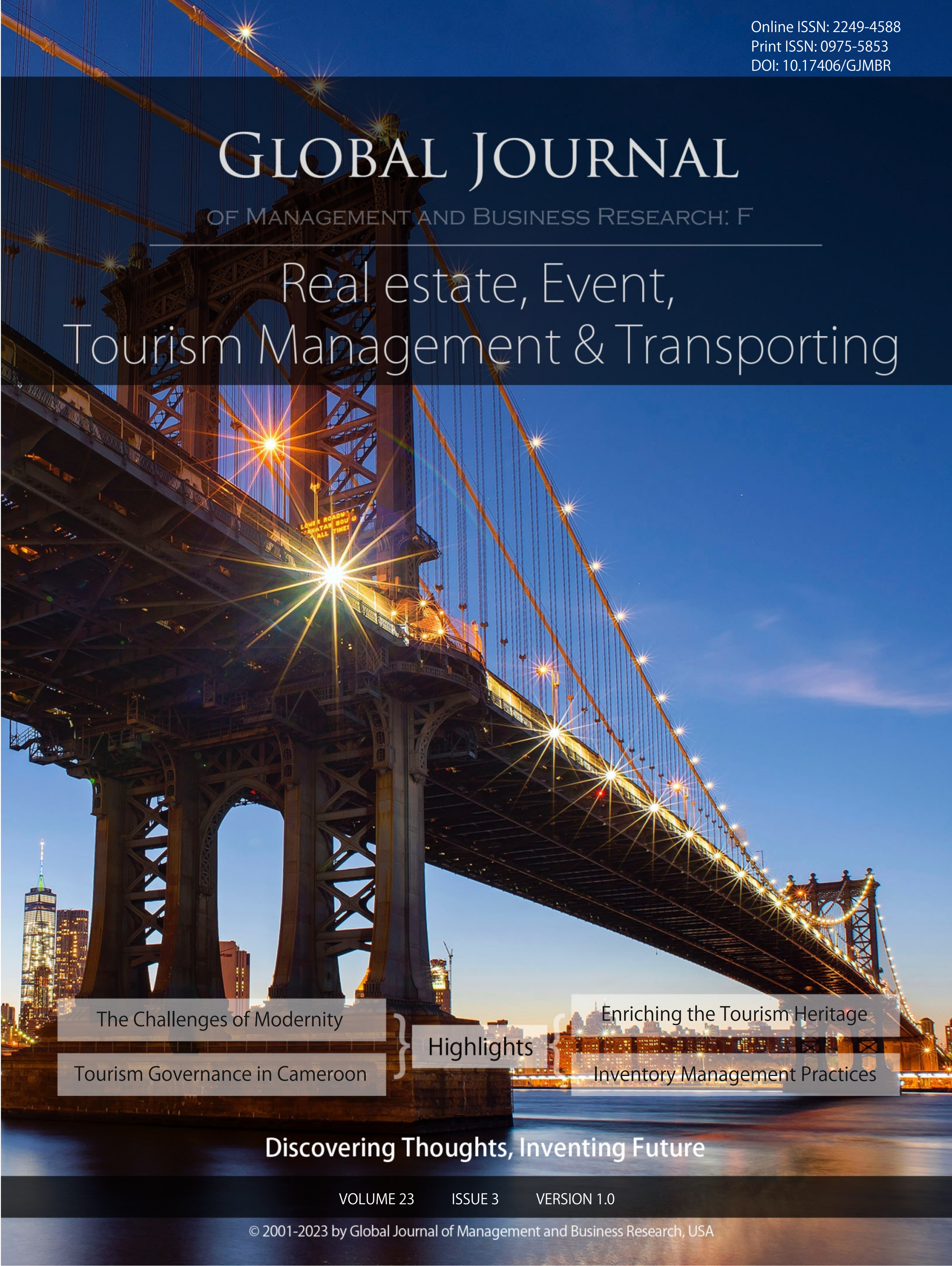

Highlights

- The Challenges of Modernity
- Tourism Governance in Cameroon
- Enriching the Tourism Heritage
- Inventory Management Practices

Discovering Thoughts, Inventing Future

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Buzzing Opportunities: Integrating Apitourism for Enriching the Tourism Heritage of the Republic of Benin

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Université de Parakou

Abstract- Tourism is the third most crucial socio-economic sector that generates income and employment in the Republic of Benin, where it occupies a prominent place in the country's development policies. In response to the sustainable development requirements, tourists are worldwide more and more demanding on the quality and diversity of the services they receive. As such, strengthening the tourism sector requires environmentally and socio-economically sustainable innovations. Bees, with their great ecological and socio-economic functions, offer many facets which can be valued to support the well-diversified tourism heritage of the Republic of Benin. This review analyses existing tourism heritage, the diversity of bees and apicultural practices in the country and their susceptibility to apitourism development. Tourism promotion strategies based on the products and the ecological services of social, and solitary bee species were analysed per suggested ecotourism region of the country. The involved actors, their roles, and responsibilities, as well as the challenges that may emerge from integrating the bee sector into the tourism heritage of the country, were also analysed.

Keywords: *apitourism, beekeeping, benin, biodiversity, culture, heritage, pollinator, tourism, visitor.*

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BUZZINGOPPORTUNITIESINTEGRATINGAPITOURISMFORENRICHINGTHETOURISMHERITAGEOFTHEREPUBLICOFBENIN

Buzzing Opportunities: Integrating Apitourism for Enriching the Tourism Heritage of the Republic of Benin

Felicien Amakpe [α], Dirk De Graaf [σ], Brice Sinsin [ρ] & Honore S. Biaou [ω]

Abstract- Tourism is the third most crucial socio-economic sector that generates income and employment in the Republic of Benin, where it occupies a prominent place in the country's development policies. In response to the sustainable development requirements, tourists are worldwide more and more demanding on the quality and diversity of the services they receive. As such, strengthening the tourism sector requires environmentally and socio-economically sustainable innovations. Bees, with their great ecological and socio-economic functions, offer many facets which can be valued to support the well-diversified tourism heritage of the Republic of Benin. This review analyses existing tourism heritage, the diversity of bees and apicultural practices in the country and their susceptibility to apitourism development. Tourism promotion strategies based on the products and the ecological services of social, and solitary bee species were analysed per suggested ecotourism region of the country. The involved actors, their roles, and responsibilities, as well as the challenges that may emerge from integrating the bee sector into the tourism heritage of the country, were also analysed. This opens up prospects for the diversification of income for riparian communities of reserved forests and relevant tourism sites and constitutes excellent opportunities for the sustainable conservation of bees, which are threatened worldwide.

Keywords: apitourism, beekeeping, benin, biodiversity, culture, heritage, pollinator, tourism, visitor.

I. Introduction

In response to the challenges of sustainable development, tourists are increasingly demanding on the quality, the diversity of the elements to discover, their environmental sustainability, and the contribution of tourism heritage to the strengthening of their human capital (Bruce *et al.*, 2012). Thus, tourism sites with positive environmental impacts, which also offer visitors, learning and practice opportunities to make them be part of the solutions to the global environmental and development challenges, are likely to maintain the highest attendance rates (Duvat, 2006; Pantoja *et al.*, 2017).

With their undeniable ecological and socio-economic functions, bees are of great interest to the science community, and friends of nature who also demonstrate their attachment to the mitigation of pollution, diseases, and fragmentation of habitats, which threaten bee populations worldwide (Domanski *et al.*, 2017). Thus, integrating bees, their services and products into tourism circuits may be an efficient approach for improving the required optimum attendance rate to achieve a profitable tourism enterprise. This will ensure better sharing and acceptance of the roles and responsibilities of visitors and communities as far as the challenges that prevent the bees from fully playing their biodiversity conservation, and sustainable development functions are concerned (Goulson *et al.*, 2015).

Tourism is the second source of foreign exchange and the third sector that sustains jobs after agriculture and trade in the Republic of Benin. Indeed, according to the 2013-2025 Benin Tourism Strategic Plan document (PST, 2013), the number of tourists increased from 138,000 in 1995 to more than 325,000 in 2020, when it generated 1.3% of the country's gross domestic product (GDP). The government's ambitions favoured this sector in the different development strategies, and following the country's national development plan (MEPD, 2018), the contribution of tourism to the country's (GDP) should reach 8% in 2025.

Despite the strong and recognized potential of the tourism sector in the economy and social well-being of the country, the sector is still understudied. In fact, the best investigations on tourism in Benin are often limited to descriptions of key tourism sites and some fair contributions for improving reception facilities (Corali & Houenoude, 2013; Agbaka, 2022). With such limited scientific analyses available on classic tourism in the country, apitourism, which is an emerging field in most countries, is almost unknown despite the favourable conditions for its implementation in Benin. This constitutes an obstacle to the total valuation of the tourism potential and bee diversity of the country. The present study filled this gap by analysing the possibilities of integrating bees into the country's tourism heritage, and proposes strategies for a new ecologically and socio-economically smart bee-based tourism for sustainable biodiversity conservation and development in the Republic of Benin. The investigations established a universal process for integrating the bees, their products, and services in the tourism heritage of any socio-geographic area. Targeting on the particular socio-economic, political et ecological situation of the

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Republic of Benin, located in West Africa, we analysed the traditional tourism heritage of the country, the bee diversity, the principles of a sustainable bee-based tourism and how a profitable apitouristic site could be managed.

II. Bees and Tourism Potentials in the Republic of Benin

a) Existing Tourism Heritage

The tourism heritage of the Republic of Benin is very rich and well preserved by indigenous knowledge, most of which has resisted the cultural pollutions imposed by globalization and cultural hybridization from the slavery era and the colonial periods to date (Corali & Houenoude, 2013; Agbaka, 2022). The most critical heritages, based on the classification of the National Tourism Policy document of the country (PST, 2013) are the cultural and religious heritage, the historical and architectural heritage, the natural heritage, and the heritage of memories. They are interconnected, and constantly improve their facets and attractiveness through governmental initiatives in cooperation with the civil society.

i. *The Cultural and Religious Heritage*

It consists of the sites of the royal palaces of the city of Abomey, listed as UNESCO heritage in 1985, and the Glede dance of Nago tribes in the list of intangible heritage of humanity in 2001. The relics of colonial and slavery periods, the temples of Vodoun, which is the endogenous religion of populations of Ghana, Togo, Benin, and Nigeria, also belong to this group.

The Republic of Benin is worldwide known as the land of Vodun which determines the daily life of most people (INSAE, 2015). Vodun is so crucial in the country that the government established in 1990, the national Vodun day to celebrate the numerous endogenous religions of the country every 10 January. According to Agbaka (2022), the Vodoun temples, and the numerous sacred groves of Benin are great tourism opportunities available to satisfy and maintain adepts and visitors if efficient care is taken to prevent the desecration of intrinsic endogenous values. Likewise, some communities have developed, and preserved identity festivals, initiation rituals, pilgrimage sites and endogenous fishing and hunting technologies that deserve particular attention. All these original sites are reinforced by a much-diversified indigenous craft industry that remains active all year round (Corali & Houenoude, 2013).

In order to strengthen the rich Vodun tourism heritage of the country, the government recently established the so-called Vodun Rite Committee through a decree of 13 September 2023. Following this decree, the Vodun Rite committee, made up of nine members, will help establish the labelling of the rites, ceremonies, and practices of Vodun temples and rites, and support all initiative related to the Vodun tourism heritage development.

ii. *The Historical and Architectural Heritage*

It consists of the precolonial architecture of the historic cities of Abomey, Ouidah, Porto-Novo and numerous unique buildings scattered countrywide (Agbaka, 2022). The water-born-habitats of the Toffin people of Ganvié in the south, the Tata Somba, and the Tata Betamaribe huts in the North-West, the war holes and the traditional iron extraction furnaces in Zou, Collines and Borgou departments belong to this group. The Museums of the Kings of Abomey, Porto-Novo, the slavery memory sites of Ouidah, the Gaani site of Nikki are sites of great touristic value that are constantly improving their reception capacity with the government's support.

iii. *The Natural Heritage*

It is used for ecotourism. It is made up of the natural landscapes of the Atacora chains in the northwest, the reserved forests, the sacred groves, and the natural landscapes in the south according to the decree No. 2017-331 of July 6, 2017, that dealt with the Protected Areas categorization in the Republic of Benin. The natural landscapes of the Atacora chains are made up of the Pendjari biosphere reserves and the W parks. They bear panoramic sites, falls, cascades, caves, natural pools, and large wildlife that have been well-protected for decades. The parks and their ecological environments also offer the possibility of extensive hunting tourism, animated by the village hunting areas, which support the Safaris of lions and buffalos living in the same area with protected species such as elephants, leopards, cheetahs, and crocodiles. In the southern parts, the natural landscapes are made up of lakes and mangrove complexes, the mouth of Mono River, and beaches with various socio-cultural activities.

The reserved forests are areas that benefit from a restrictive regime of use rights relating to the land and the born resources by an administrative act following the provisions of law No. 93-229 of July 2, 1993, relating to the forest regime in the Republic of Benin. There are 58 forest areas, which are parks, hunting areas, reserved forests, and reforestation areas. Sacred forests serve as habitats for deities or socio-cultural principles the populations venerated (Djdaoun *et al.*, 2022). The existence of a coastline of more than 120 km with a warm beach all year round supports seaside and eco-social tourism in the city of Grand-Popo, the lakeside city of Ganvié and Nokoue and the marshes of So-Ava, and Aguegue.

These sites are increasingly secured by the government with participatory development plans that support the sustainable conservation of rare, endemic, and emblematic species they host.

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iv. *The Country's Memory Heritage*

It comprises the itineraries of slavery and the history of precolonial period kings (Lohento, 1999; Girard and Scheou, 2012). We can mention here, the Slavery Road and the Ouidah history museum, the war holes in Abomey, and those of the tailed men of the district of Dogbo. In November 2022, the government succeeded in obtaining the restitution of 26 royal treasures looted by French colonial forces in 1892 from the kingdom of Dahomey with the deportation of King Behanzin. They constitute powerful curiosities both at the national and international level, which will significantly revolutionize the tourism industry of the country.

b) *Bee Biodiversity in the Republic of Benin*

The Republic of Benin is located in an area of great diversity of social and solitary bees. As everywhere in the world, social bees are the most studied, while much effort remains for the solitary bees (Johnson *et al.*, 2023).

As far as the social bees are concerned, the honey bee *Apis mellifera. Linnaeus* 1758 and the non-stinging bee *Hypotrigona ruspolii.* Cockerell 1934 are the two widespread native species (Amakpe *et al.*, 2019). *A. mellifera*, the honey-producing species under the provisions of CODEX Alimentarius (1981) is known as the domestic bee. But most honey bee populations in Benin are still in the wild where they nest in trees, termite mounds and houses. Morphometric and molecular genetic analyses (Amakpe *et al.*, 2018), showed that they belonged to three races which were *adansonii, scutellata* and *iberiensis.* These races are distributed in the dry Benino-Guinean ecotype, the Benino-Soudanian ecotype, and the Benino-dry tropical honeybee ecotype as the consequences of their adaption to the different ecological areas of the country.

Hypotrigona ruspolii, the non-stinging bee, is found in the wild, as in the entire tropical regions (Gruter, 2020; Chakuya *et al.*, 2022). In rural areas of Zou and Borgou departments, more, and more people are keeping this species (melliponiculture) in special “hives” to satisfy the growing magico-pharmacological needs of its products in tropical areas (Kiprono *et al.*, 2022; Grando *et al.*, 2023; Mduda *et al.*, 2023). As such, any initiative targeted at integrating this species into the production system constitutes an opportunity for its conservation, deeper scientific knowledge and to add value to its economic, and ecological services.

Regarding the solitary bees, Amakpe *et al.* (2019) identified at industrial quarries located in the southwest of the country, two species of Apidae family (*Xylocopa luteola* and *Xylocopa nigrita*), two species of Halictidae (*Seladonia jucunda* and *Pachynomia amoenula*), and two species of Megachilidae family (*Chalicodoma cincta* and *Eutricharaea sp*.). Unlike social bees, which benefit from the recognition of their ecological services and the different products they issue, which justify their domestication for millennia (Etxegarai-Legarreta & Sanchez-Famos, 2022), solitary bees, and their ecological functions are poorly known in the tropical region. In the Republic of Benin, as in many countries, they are sometimes considered as crop pests (Silva *et al.*, 2023). Such a situation constitutes, apart from the climatic factors that are increasingly worsening for all biological entities, additional risks to their disappearance (LeBuhn & Vargas, 2021; Johnson *et al.*, 2023). Their maintenance on tourism sites constitutes a tangible contribution to their conservation (Silva *et al.*, 2023).

c) *Beekeeping Systems and their Challenges*

Communities in Benin have developed and preserved practices of harvesting honey and other hive products from ancient times (Botoyiye, 1999). The widespread method used to obtain honey is honey bee and Melipona hunting. In this system, social colonies are raided at night with fire, and such a method persists in some areas of the centre and north of the country. But it constitutes, along with deforestation and anarchic land use/land over, one of the leading causes of the disappearance of natural colonies of social bees (Johnson *et al.*, 2023).

Alongside this problematic system, beekeeping and melliponiculture with actively kept hives are very old in the regions of Atacora, Borgou and Zou. The materials used for this purpose are hives made of clay, jars, or hollowed-out tree trunks (figure 1). These traditional hives are set high in the trees that the owner harvest in the dry season (Ahouandjinou *et al.*, 1997; Paraizo *et al.*, 2012). The system of hives with removable combs set by a beekeeper who works with a smoker and bee suit is recent and started only in 1972 (Botoyiye, 1999). The average size of apiaries is five hives, dominated by traditional hives made in jars, and sometimes in plastic cans and Kenyan top bars hives. A few professional beekeepers in the departments of Zou, Borgou and Donga have apiaries with more than 50 Kenyan, or frame hives, the colonies of which are obtained by trapping hives, fragmenting colonies or rarely by queen rearing.

The significant challenges of beekeeping in the country are poor management skills, extensive agriculture and livestock farming, bushfires, uncontrolled pesticide use, pollution, and habitat fragmentation. In addition to these problems, which are common to the entire tropical areas (Johnson *et al.*, 2023), beekeeping in the Republic of Benin is particularly impacted by night time theft and vandalism of colonies. No beekeeper is spared from this phenomenon, during which unidentified looters break the hives, burn the colonies, and take away any comb they find (figure 2).

Figure 1: Traditional Honey Bee Hive in Clay Mud (Left) and Hollowed-out Tree Trunks (Right) in the District of Keru (Benin).

Figure 2: A Vandalised Apiary in the District Of Djidja (Benin). More than 20 Hives are Destroyed at this Apiary Each Year.

III. Operational Apitourism Circuits in the Republic of Benin

a) Favorable Ecological Conditions for the Bee Species

The Republic of Benin is located in a particular area of the Guinean Gulf called the Dahomeyan gap, characterized by a break in the rainforest blocks from Liberia to Cameroon (Ern, 1988; Salzmann & Hoelzmann, 2005; Adjossou *et al.*, 2022). This makes the country, a specific ecological entity in West Africa where the savannah reaches the coast.

The country comprises of three large climatic areas bearing an East-West gradient where the East is more humid than the West (ASECNA, 2021). The northern part is characterized by a long dry season of more than six months with 900 mm per year. The centre, with a Sudano-Guinean climate of 1200 mm of water per year, is a transition zone while the south, subequatorial, also has two rainy seasons where rainfall reaches its maximum in the southeast with an average of 1300 mm of water per year over almost eight rainy months.

The Vegetation varies from Guinean forests in the southeast to semi-desertic in the far north regions. Diversity and abundance analyses of the melliferous plants (Amakpe *et al.*, 2015; Balagueman *et al.*, 2017) showed that the country bore five major melliferous regions. These were the southern melliferous region, the central region, the central-western region, the central north region and the far northern melliferous region. Honeys from each region are determined by the pollen, and nectars of exclusive melliferous plant species, which give them specific organoleptic, nutritional, chemical, and pharmacological properties (Brischoux *et al.*, 2013; Mensah *et al.*, 2016).

b) Favorable Ecological Conditions for the Bee Species

Unlike classic tourism, which satisfies visitors though observing the wonders of nature, inventions, achievements, and challenges of humanity, apitourism is the sharing of goods and services of bees in a given social area (Grigorova *et al.*, 2016; Pentoja *et al.*, 2017; Isquierdo-Gascon & Rubio-Gil, 2023;). Integrating apitherapy and the promotion of beehive products in alternative medicine and the diversity of beekeeping systems, it is an interdisciplinary approach to strengthening the interrelationships between human beings, the bees, and floral resources to achieve socio-economic, cultural, environmental, and spiritual needs without compromising the ecological functions necessary for living in harmony with nature (Suligoj, 2021; Etxegarai-Legarreta & Sanchez-Famoso, 2022). In Benin, there is no specifically dedicated site to active visions around the bees. It is, therefore, a new business opportunity available to innovators who may integrate it into existing tourism sites or create new apitourism sites for guaranteed financial, economic, environmental, and social profitability. This will strengthen the operational framework for tourism's contributions to the Sustainable Development Goals (SDGs).

c) *Apitourism and the Worldwide Sustainable Tourism Criteria*

Under the recommendations of the Global Sustainable Tourism Council (GSTC, 2019), any tourism development initiative must comply the principles of site management sustainability, environmental sustainability, and socio-economic sustainability. This allows the optimal exploitation of the tourism aspects, while preserving their authenticity and long term ecological and social values. The integration of bees into existing tourism heritage or the creation of new sites dedicated to tourism around the bees contributes to the strengthening of these three principles, which are the same as the objectives of sustainable development goals (GDB) according to Marcotte & Bourdeau (2010); Drouin (2014) and Duval & Smith (2014).

i. *The Site's Management Sustainability*

It is supported by the responsibility and involvement of key actors and stakeholders in managing the bee-based tourism destinations with relevant themes on the bees, and the implementation of a participatory action plan for the management of the apitourism site for better performance and efficiency. In case biological materials such as social bee colonies and nests are harvested from the wild, this plan will also endure the reduction of socio-economic, cultural, and environmental risks induced by keeping social and solitary bees in compliance with Law No. 2002 on wildlife in Benin. The establishment of a concerted operational framework for the monitoring and evaluation of installations will ensure better resilience with the dynamics of the number of visitors and induced activities from the introduction of apitourism for an optimum carrying capacity at the host sites.

ii. *Socio-Economic Sustainability*

The socio-economic sustainability is ensured by evaluating the contributions of the apitourism complex to the social well-being of the involved actors, the created new jobs, and business opportunities that emerge from the innovation. The possibility of establishing young, women, and disabled people associations to take care of the bee nests and hives constitute an efficient mitigative innovation to the innate fears that limit inclusive beekeeping and wild bee valuation (Ekumankama & Nwankwo, 2002; Deressa *et al.*, 2009, Bradbear, 2010). Likewise, this will help reduce social discrimination as all visitors may be accepted without distinction of sex, religion, and other disadvantaged social categories. In apitourism business, the main targeted products of the bee circuits are vision-based services. But hive products that will emerge from social beekeeping make up additional economic and financial values (Famuyide, 2014; Hanley *et al.*, 2015; Etxegarai-Legarreta & Sanchez-Famoso, 2022). As such, the income of the involved actors will be improved as a consequence of better visibility and promotion of local beekeepers and the material and intangible resources which were formerly dedicated to classic tourism.

iii. *Cultural Sustainability*

The materials and themes required for the bee tour will add more value and protect existing intangible tourism heritage. This will reinforce compliance with the relevant legislation during trades of cultural goods, bee products, and services. Themes relating to beekeeping techniques of the country in relevant national languages to local and foreign visitors will be developed to retain tourists. This will also help create representative sites of the potential and challenges of bees and their services conservation, strengthen, and diversify the ethno-zoological knowledge on bees, their products, and services (Gbesso *et al.*, 2019).

iv. *Environmental Sustainability*

Apitourism will contribute to a better conservation of the country's natural heritage. Its association with sites that were traditionally dedicated to ecotourism will lead to better awareness of visitors of the conservation challenges of these sites, the promotion of environmentally sound behaviours, and reduction of risk factors on delicate habitats and their components (Aryal *et al.*, 2020). In reserved forests, sacred groves, parks, and fragile ecological areas, apitourism represents alternative income activities for local communities which may also help better control conflicting activities such as extensive agriculture, poaching, and pastoralism (Hanley *et al.*, 2015; Yirga & Ftwi, 2010). It also constitutes potential mitigative actions to human-wildlife-conflicts around protected areas in promoting the use of honey bees to repel large wildlife such as elephants, which damages crops and properties of riparian (King *et al.*, 2011; Ridwan *et al.* al., 2023; Raycraft, 2023).

d) *Geospatial Analysis of the Apitourism Potential of the Republic of Benin*

For efficiency and profitability's sake, apitourism sites must be set in such a way as to benefit from the synergy of the diversity of tourism and beekeeping potentials of the bearing ecological regions. As the honey bee morpho-ecotype regions almost cover each tourism regions of the tourism strategic plan of the Republic of Benin (PST, 2013), the apitourism regions are also based on the bee morpho-ecotype regions for easier readability of the geographic distribution of each region (figure 3).

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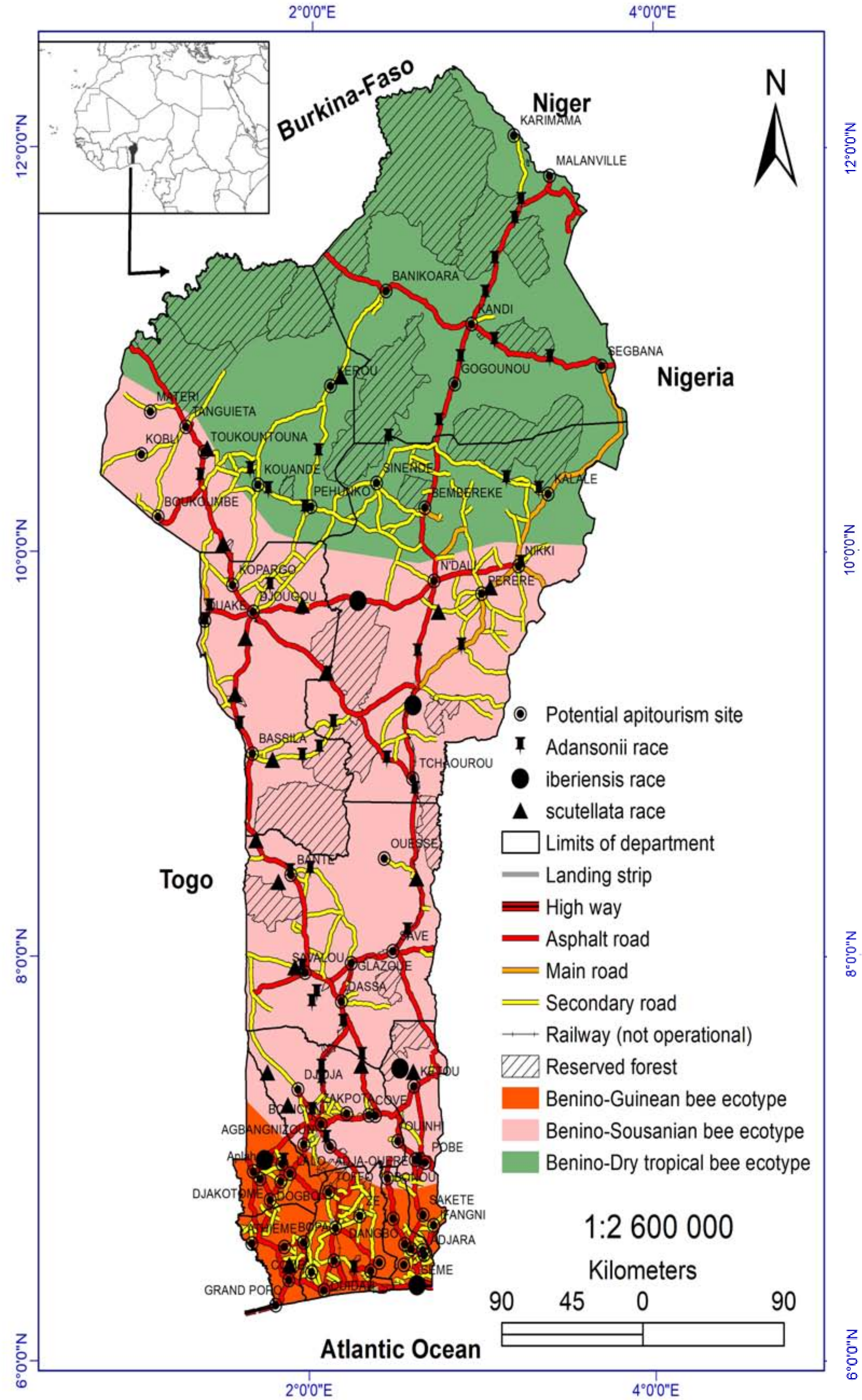

Figure 3: Apitourism regions map of the Republic of Benin based on the bee morphotypes distribution and key administrative traits of the country. Administrative and transport data are from the National Geographic Institute of Benin. The bee ecotypes are the ones from Amakpe et al. (2018).

i. *Apitourism in the Southern Region*

The southern region extends from the coast to the latitude of Abomey, is dominated by small-sized honey bees of *iberiensis and scutellata* genotypes. Very few beekeepers are operational in this poor beekeeping potential area with sparse melliferous plants and higher parasitic pressures (Amakpe *et al.*, 2015; ASECNA, 2021). On the other hand, it is the area of high human concentration and high consumption of all kinds of goods and services in the Republic of Benin. This region hosts more than 75% of tourism reception capacities and receives the maximum number of visitors per year (PST, 2013). With its low beekeeping capacity, apitourism sites will be based on imported materials from relevant beekeeping sites in the district of Djidja. A production chain for vision colonies and specialized equipment must, therefore, be sustained with professional beekeepers who have artificial queen rearing sites and experimental nests for Melipona and solitary bees. The most suitable places to house apitourism sites in this region are museums and private tourism sites in the cities of Ouidah, Porto-Novo, Allada, Seme, Pobe and Lokossa. Some sacred groves are visited by tourists all year round, and may also harbour bee-based circuits to reinforce the respect for the deities and sacred principles they host (Agbaka, 2022).

ii. *Apitourism in the Central Region*

This region extends from the district of Djidja and the Plateau department to the latitude of Bembèrèkè. With *scutellata* and *adansonii* honey bee races, it is the area with the highest melliferous plant diversity and abundance and also home to the largest beekeeper population (Yedomonhan 2016; Balagueman *et al.*, 2017). Serving as the departure zone for ecotourism and hunting trips to the north, it is the second tourism region with 18% of the country's estimated tourism reception capacity (PST, 2013). Apitourism sites in this transition zone will serve for both the launch and closing of traditional tourism hikes for visitors who will enjoy a greater diversity of beekeeping practices and beehive products. Experienced local beekeepers who may serve as bee guides are an opportunity to affordable access to beekeeping equipment, and relevant themes on bees and their services. Apitourism sites in this region will preferentially be established in the cities of Abomey, Bohicon, Djidja, Dassa, Savalou, Ketou, Parakou, Djougou, Bassila and Bembèrèkè whose beekeepers will be strengthened in the supply, use and maintenance of apitourism materials.

iii. *Apitourism in the Northern Region*

The northern region the country, which extends from the district of Bembèrèkè to the far north, is made up of the Niger, Mekrou, Alibori, Sota and Penjari river basins. Parasitic pressures are low in this area where the melliferous flora is dominated by *Vitellaria paradoxa* orchards, inherited from the selective slash-burn agro-system in favour of this species (Glele Kakai et al., 2011; Bidou *et al.*, 2019; Amoako & Gambiza, 2021). In this area, the bee colonies are essentially made up of the aggressive *adansonii* race (Paraizo *et al.*, 2012; Amakpe, 2018). These regions harbour the country's oldest beekeeping practices with traditional hives. With only 8% of the country's tourism reception capacity, it is the area of parks, hunting trails, landscapes, and specific cultural values of the North. In this area, apitourism sites will mainly be integrated into the functional classic tourism itineraries of the parks and hunting areas in cooperation with the highly organized local communities. The cities of Kandi, Banikoara, Malanville, Natitingou, Tanguieta, and Porga are the best places to host the new apitouristic centres in addition to the reception sites of the parks and hunting areas.

e) *Apitourism Sites Establishment and Management Criteria*

The establishment of the apitourism sites must meet the profitability criteria of the tourism enterprise, which are determined by the attendance rates. It should offer the visitors and local communities, a proven level of safety against honey bee attacks.

Regarding the attendance rate improvement, the charged prices for access to tourism sites are not decisive for foreign tourists (Marcotte & Bourdeau., 2010; FPT, 2012). Nevertheless, apitourism site managers would benefit from practicing special attractive costs for social categories such as schoolboys, students, and the elderly to promote a kind of craze for bee tourism at the national and local levels.

Ensuring "zero sting" during visits is key to success with the honey bee races, which are particularly aggressive in the entire country. Inspection and discussion rooms must then be isolated from roads and surrounding properties. They must also be well equipped to prevent accidental honeybee attacks, which are sometimes fatal, during visits to apiaries in tropical areas (Brunet, 2008; Mbengogo *et al.*, 2018; Veado *et al.*, 2020). Likewise, a minimum safety distance from public and private infrastructure or properties is required to ensure that bees are not life-threatening issues for people and domestic herds around apitourism sites (Veado *et al.*, 2020).

For the stability and continuity of apitourism services, social bees' colonies must be provided by professional beekeepers who are skilled in artificial colony delivery. The honey bee queens must be marked and maintained in the hives by appropriate queen excluders to prevent desertions and frequent swarming, which characterize tropical honey bees (Winston *et al.,* 1983; Rubink *et al.*, 1996; Hepburn, 2010). For the non-stinging bee, *Hypotrigona ruspolii*, their nests will be set in bee hotels (figure 4). Although they do not sting, the native *H ruspolii* species causes discomfort by penetrating the nose, eyes, and ears when disturbed. The promoter should then ensure to visitors, the provision of specific clothing in compliance with hygiene rules during the tours (Bauer, 2015).

Regarding the solitary bee species, they may be observed from their nests, which may also be installed in association with the Melipona nests. These nests are made up of pipes, stacked in specific cages or galleries of varying diameters, which are drilled into wooden planks and placed in the bee hotel (Rauf *et al.*, 2022). Many Hymenoptera species, such as wasps, are associated with bee hotels, and some of them may be aggressive with dangerous and allergenic stings (Steiner 1986; Schmidt *et al.*, 1983). The manager is then required to take particular care to them for the safety of visitors.

Figure 4: *Solitary and Melipona Nests Found at a Bee Hotel in the District of Lokossa.*

f) Stakeholders of the Apitourism Industry

The stakeholders are any involved in the development of traditional tourism and those in the beekeeping sector. As apitourism is a multidisciplinary approach involving public-private cooperation, the administration responsible for managing national tourism will ensure an operational framework between beekeepers, promoters of tourism sites, researchers, tourists, and local communities (Marcotte & Bourdeau, 2010). This allows the shared establishment of the roles, and responsibilities of each actor. It also helps define academic curricula to strengthen the institutional and individual capacities of site managers, tourist guides and beekeepers, as well as improving the necessary legal and regulatory framework for good governance and sustainability of the innovations. In the socio-economic, cultural, and political contexts of the Republic of Benin, table 1 analyses the strengths, weaknesses, opportunities, and threats of potentially involved actors in apitourism development.

Table 1: SWOT Analysis of the Involved Actors in Apitourism Development in Benin.

Stakeholders	Role and Responsibilities	Strengths	Weaknesses	Opportunities	Threats
Vodun Rite Committee	Ensure the proper integration of Bee tourism in the Vodun tourism heritage	Established by the government, made up of highly qualified experts in Vodun and tourism	Too young committee Need time to be operational. Not skilled in Apitourism issues	Governmental support	Administrative burden Overwhelmed by political orientations
Tourists	Pay visit fees. Respects country lows. Give feed backs	Acceptable Financial capacity	Some may be foreigners	New opportunity to learn and contri-bute to bee conservation projects	Risk of bee stings
Guides and apitouristic site manager	Satisfy tourists curiosity. Ensure safety at the site	Acceptable knowledge on the country tourism and beekeeping activities	Low professional skills in tourism and apitourism	New business opportunities. Good tourism legal framework in Benin	False advertisement and fake hive products trade

Former tourist guide and site managers	Improve and develop new apitourism materials and communication materials	Proven tourism experiences.	Not skilled in bee management Low reception capacity	A new tourism heritage	Over Carrying capacity of site Incapacity to update their facilities and to comply to new legal framework
Research and training centres	Propose performance and sustainability strategies for the sector	Available staff	Very few are skilled in apitourism	New research and training fields	Loss of notoriety in apitourism
Governmental and local authorities	Secure the different involved actors and their goods	Security guards Ambitious to promote tourism in Benin	Lack of reliable data base on beekeepers and tourism sites	Opportunity for taxes and fees	Increase in informal tourism sites. New security issues
Riparian's of apitourism site	Cooperate with tourists and site owners	Living in their own land	No control on tourists and their behaviours	Additional income and networks	Desecrations and loss of endogenous values Shift of young to prohibited activities

g) Components of the Dedicated Site to Bee-based Visits

The development and establishment of apitourism sites must be based on a sound assessment of the carrying capacity and follow-up of tourist flows which varies according to the seasons and the prevailing local, national, and international events (Song *et al.*, 2023). The site's compartments will also allow visitors to save images of hives, nests, and their components without physical contact with the bees. The two main operational compartments for this purpose are:

– *The Exhibition and Exchange Room:* It is the reception area from which the visits start and end. It bears communication and safety materials and offers the visitors the possibility to taste relevant hive products and learn bee services and functions that they are encouraged to implement at home.
– *The Observation Corridor of Hives and Their Contents:* This compartment is specially equipped with a system of glass, mirror, and light intensity adjustment devices for the effective and secure visualization of the different individuals and functional principles of a hive or bee hotel.

Regarding solitary bees, which do not present much sting hazards, their nests can simply be installed at the bee hotel with those of Melipona while keeping an eye on the associated insects, such as wasps which present some risks as described above.

h) Key Apitourism Communication Themes

Many themes may be developed at the apitourism sites and this calls upon the experiences, knowledge, and skills of the apitourism guides. They mainly focus on the biology, ethology, ecology, socio-economic aspects, apitherapy, and alternative medicine of bees and their products and the challenges they face (Lebuhn & Vargas 2021; Johnson and al., 2023). The apitourism guide may use communication tools such as video projectors, posters, and live materials to convince his audience. The following themes are essential and will be improved in cooperation with the stakeholders, the dynamics of bee conservation challenges and site management requirements.

– *Knowledge of the Hive and its Components:* This is a case-by-case description of the honey bee, and mellipona hives, the different individuals that live in each type of hive, the products it bears and how they are made by the bees. The different types of hives in the country or region may be put in the exhibition room for the gradual reconstruction of the country's beekeeping history.
– *Bee Diseases and Enemies:* The site manager shares with visitors the leading diseases, the biotic and abiotic factors that impact bees in the country. The systematic groups of pathogens, and their mode of propagation will also be analysed without obscuring the socio-cultural factors hindering the beekeeping development in the targeted region. The pathological relationships will help enlighten visitors on the risks of exchanges of diseases between plants, humans, and bees in an ecological area and the possibilities of using these relationships in biological controls against crop pests (Resci & Cilia; 2023)
– *Modern Biotechnology and Bees:* It is an issue of great concern in our area of living-modified organisms (LMOs) development for crop yield improvement, and pest control (Duan *et al.*, 2008; Brookes, 2019). Facilitators will feed visitor expectations by addressing the potential impacts biopesticides, bactericides and plant varieties resulting from modern biotechnology may have on the conservation and sustainable use of bees and their services (Arpaia *et al.*, 2021).
– *Promotion and Tasting of Hive Products:* Will close the apitourism tour. This allows visitors to register recommendations and suggestions for improving the services they received. This will also offer

visitors, the opportunity to address the products and services they can acquire from local beekeepers and tips for creating their beekeeping site, Melipona or solitary bee nests.

IV. Conclusion

Integrating hive products and bee services in tourism heritage is an opportunity for improving and diversifying tourism facets that have long been limited to classic tourism sites in Benin. Apiculture and bee management is key of success in the establishment of any operational apitourism site. But Melipona, and solitary bees' management, requires additional specific skills, and knowledge to fully play their function in the apitourism complex. As any innovation, the development of the new apitourism sector which will open up a perspective for poverty alleviation, will be subject to the constraints, and burdens of adoption in social areas. In order to take the best advantage from the favourable ecological, political, and socio-cultural apitouristic conditions in Benin, the whole West Africa, and beyond, sustained investments, and deeper investigations on each component of the operational apitourism chain are required. Pilot apitourism sites should be established in the historic cities of Abomey and Ouidah as a starting point for progressively extending it, in a trial and adapt process. The technical and managerial capacities of the involved actors must also be strengthened through effective public and private agreed partnerships. It will also be necessary to master and evaluate the national, regional, and international bee-related legislative framework to prevent conflicts, and regulatory challenges that may emerge from the innovations.

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Conflict of Interest

The authors certify that they performed their investigations without any financial, commercial, legal, or professional relationship with other organizations, employers, or funders that may be considered as conflict of interest.

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Tourism Governance in Cameroon and the Challenges of Modernity: An Overview

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Abstract- This article looks at tourism governance in the light of the challenges of modernity. It is set against a rapidly changing global backdrop. In a world where today's realities are rapidly being overtaken by tomorrow's hazards, where modernity is replacing the classical. As tourism is part and parcel of this world of multiple uncertainties, the problem arises of how to adapt. So, looking at the case of Cameroon, we asked ourselves what kind of tourism governance is needed to meet the new challenges of modernity? The method we chose to answer this question was a documentary analysis, based on a review of the literature on the subject. The synthesis of the contributions consulted leads us to believe that a multi-stakeholder approach to tourism governance (public and private, central and local) would be better suited to meeting the challenges of modernity.

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TOURISMGOVERNANCEINCAMEROONANDTHECHALLENGESOFMODERNITYANOVERVIEW

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Dorothée Tsogo Akoa [α] & Marie Pierrette Nnomo [σ]

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I. Introduction

Governance contributes to the development of the tourism sector. With this in mind, a number of countries, like Cameroon, have made governance one of the priority levers in their tourism development strategy, by implementing mechanisms that help to create synergies between stakeholders and contribute to their effectiveness. However, the tourism sector is in rapidly evolving, to the point where it is sometimes referred to as 'post-tourism' (François-Lecompte & Prim-Allaz 1, 2009), or'tourism transition' (Duhamel, 2018). This debate is taking place in a context where tourism has become an integral part of a rapidly changing society. The rise of uncertainty (Latour, 2017), climate change and its socio-economic and political consequences (Latour, 2017), the scale of the phenomenon itself and the prospects for the future mean that the question of adapting tourism and adapting to tourism has to be considered in the context of the 'anthropocene' (Hollenhorst et al., 2014) imposed by the challenges of modernity. Tourism governance is therefore called upon to try and deal with this state of affairs.

With this in mind, this article sets out to address this issue by attempting to take stock of the situation in the context of Cameroon in particular. The first part of our argument presents the main concepts of the subject. In the second, we examine the issue of tourism governance at both international and national levels. The third section attempts to establish the link between tourism and modernity in Cameroon. The fourth and final section looks at the type of governance required to meet the challenges of modernity.

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II. Conceptual Issues

In order to carry out this reflection, it is first necessary to clarify a number of major concepts relating to the issue in question: governance, tourism and modernity.

a) *What does Governance Mean ?*

Governance refers to the diversity of players involved in defining public action (Hounmenou, 2003). It is "a process of coordinating actors, social groups and institutions to achieve collectively discussed and defined goals in fragmented and uncertain environments" (Bagnasco & Le Galès, 1997). The notion of governance requires us to take an interest in the plurality of players. Indeed, the complexity of tourism governance is inherent in the involvement of a multiplicity of players with no leader, and in the cross-cutting nature of this activity.

The governance approach to tourism highlights the link between economic opportunities, political issues and social practices. In this study, governance refers to all the rules and decision-making, information and monitoring bodies that ensure the smooth running and management of a site or area. Its aim is to provide strategic direction, ensure that objectives are achieved, that risks are anticipated and managed, and that resources are used responsibly. It integrates and includes all stakeholders (public authorities, citizens, private partners, etc.), ensuring that their points of view, approaches and needs are taken into account.

b) *The Concept of Tourism*

The World Tourism Organisation (UNWTO) defines tourism as all the activities carried out by people during their travels and stays in places outside their usual environment for a period not exceeding one year, for leisure, business and other purposes not related to the exercise of a remunerated activity in the places visited. This definition is the most commonly used. It is an operational definition which enables tourism statistics to be produced and is used for these purposes.

In fact, the tourism industry brings together all the structures whose main activity relates to the production of one or more services characteristic of tourism: travel agencies and similar activities, tour operators, tourist guides, leisure establishments, hotels and similar establishments, properties and secondary residences, restaurants and similar establishments, air, road, rail and water transport, vehicle rental (Cameroon Holidays, 2011). This involvement of a multitude of actors in the tourism sector has led authors such as Knafou and Stock to define this phenomenon more in terms of a systemic approach: "tourism is a system of actors, practices and spaces which contribute to the "recreation" of individuals through temporary displacement from everyday places" (Gay et al., 2003).

Adopting a systems approach, (Christie & Morrison, 1985) define tourism as a system involving four links: the market, the journey, the destination and marketing. Considering that the fourth component identified by Mill & Morisson is an action variable which facilitates the functioning of the system, (Demers, 1987) considers that the tourism system, taken in its global sense, actually comprises three major components: the market, transport and the product. Similarly, (Gunn, 1988) defines the tourism system in terms of demand and supply (major components). Demand includes the population interested and able to travel, i.e. tourists; and the supply side includes transport, attractions, services, information and promotion. All these elements are highly interrelated, and their dynamics shape the way the system works, which can be influenced by various factors: natural resources, cultural resources, entrepreneurship, finance, etc.

Tourism is considered to be a sector of activity with a strong contribution to territorial development. The UNWTO, for example, sees it as an engine for socio-economic growth, helping to reduce poverty and create jobs, which has led to its international status as a development tool that helps to improve local living conditions (Jeddi, 2022). Each spatial configuration works and seeks to improve its attractiveness by developing its tourist assets and economic potential, while at the same time relying on the development and promotion of its assets and potential as factors of attractiveness (Raif & Zouiten, 2021).

c) *An Understanding of Modernity*

To understand modernity in a general way, we need to lay the foundations for the term modern, which first appeared in the philosophical sciences. In the nineteenth century, its optimistic nature was characterised by ideas of progress and the emergence of changes in social structures ((Bendix, 2002). For the founding fathers, such as Marx Weber and Durkhein, the term modernity was used to describe the changes underway, contrasting the modern with the traditional. Traditional being the characteristic of poor countries, i.e. those with the lowest index of economic development, in contrast to developed countries, which enjoy a high quality of life.

For them, modernity refers to connotations of a new experience of the world determined by a world reconstructed thanks to the active and conscious intervention of actors and a new sense of self. Thus, modernity is characterised more in terms of change in the headings that imply the liberation and increasing autonomy of action associations in almost all areas of society (Berger, 1982). This materialises more in terms of innovations in economic and social organisation, political relations and cultural characteristics that become the symbols of modernity (Habermas, 1985).

In fact, modernity in the tourism industry is a sum of changes and even specific innovations in social, political, economic and cultural terms, carried out with the aim of revolutionising the tourism sector. This is implemented more through the use of a new good or service, or a considerable improvement in terms of its characteristics or uses. This includes a substantial improvement in materials, operation and practical specifications, integrated software, user-friendliness and other working characteristics (Martín-Rios & Ciobanu, 2019). Let's not lose sight of the fact that product innovations are likely to involve new technologies or even rely on new uses or combinations of new knowledge. Thus, modernity in the tourism sector implies the introduction of new services and goods which differ considerably in some cases from previous products, or which have undergone significant improvement.

In fact, modernity can be observed and even materialised in the tourism sectors by the fact that those in charge are able to develop mechanisms enabling them to adapt to new trends by constantly listening to these potential customers, with the specific aim of capturing and seducing them, in order to satisfy them (Caccomo & Solonandrasana, 2001).

III. Institutional and Political Framework for Tourism Governance

While the overall growth of the tourism sector is positive, public authorities are increasingly concerned with devising policies to maximise the economic, environmental and social benefits of tourism while reducing the tensions that arise when its growth is neither planned nor managed. Measures to achieve this have become a priority. Indeed, it appears that the development of a tourism strategy can incite authorities, the tourism industry, local communities and other stakeholders to work together to developand other stakeholders to develop a vision and a course of action for the development of tourism. Public-private cooperation is becoming increasingly important in tourism strategies. This section aims to identify tourism governance practices at international and national levels.

a) Tourism Governance at International Level

Governance in tourism remains a laborious task because it involves a plethora of elements that need to be brought together in order to ensure its survival. It also involves a variety of players who sometimes have little understanding of what tourism is all about. This arduous task observed throughout the world is due to the fact that, the tourism industry cannot be governed as an isolated entity, because it is an organised set of interactions from which emerge the functional properties of the whole exceeding the parts.

According to (Banengaï-Koyama et al., 2021), throughout the world, the tourism sector is very complex, as it brings together interdependent and inseparable activities, both tangible and intangible, such as transport networks, accommodation, catering, guided tours, not forgetting related services such as banking, insurance and security. In many countries, responsibility for tourism lies with central government. As such, its role in the governance of tourism should not be overlooked. Central government seeks to harmonise regional tourism policies to ensure that all sectors are not faced with different policies in the regions in which they operate. It is also generally involved in the development of many important policy areas such as border control or aviation arrangements, and in the development of a national brand which can provide a kind of umbrella under which sub-national brands can operate.

Indeed, given the complexity of the tourism sector, in Europe, for example, the emphasis is on the stability of political institutions, because it is this ultimate stability that attracts tourists, who will then feel safe (Neumayer, 2004), unlike in African countries, where corruption and political instability cause tourism revenues to fall and reduce the number of visitors (Banengaï-Koyama et al., 2021). In terms of tourism governance, Europe continues to dominate. But new destinations, such as Croatia, the Dominican Republic and Vietnam, are emerging on the market with remarkable growth over the last decade.

A study by the OECD (2010) on tourism governance in member countries reveals that governance applicable to tourism proceeds through a planning process involving many parts of the administration at national ministry level, as well as partnerships with industry and with the private sector, whose representatives are often best placed to determine the areas in which government intervention is most needed. Tourism strategies are therefore increasingly driven by the need for an integrated approach to tourism development (OCDE, 2010).

In France, for example, the State implements a national policy and establishes the guiding framework for the tourism sector. The tourism sector is organised at national level by the Ministry of the Economy, Industry and the Digital Economy and the Ministry of Foreign Affairs and International Development. The sector is steered by the Ministry of Foreign Affairs and International Development via the Directorate General for Globalisation and Partnership Development, which is responsible for promoting France as a destination, and by the Ministry of the Economy, Industry and Digital Technologies via the Directorate General for Business, which has a sub-directorate specifically dedicated to the sector : the Tourism Sub-Directorate. These entities therefore help to guide tourism policy (Allias-Denis & Baroin, 2016).

In some Asian countries, such as Japan, a cultural tourism programme has been set up based on the rationale that, in order to attract and keep more tourists coming back, it is important to provide information that is interesting and easy to follow, and to offer an experience that awakens a deep interest in the country's history and traditional culture (OECD, 2010).

Let's not lose sight of the fact that nowadays, thanks to globalisation and the digital economy, many countries around the world have opted to digitise the tourism sector. The advent of the Internet has fundamentally changed the international tourism sector and its relationship with consumers. All tourism services positioned in the value chain can communicate directly with their customers. As a result, consumers are now at the heart of the value chain, rather than outside it. Consumers now have direct access to what's on offer, thanks to the websites of tourist offices, which feature advertising and the presentation of different tourism offers classified by unifying themes (cultural and historical heritage, hotel accommodation, campsites, bed and breakfasts, regional and local culinary and craft specialities, sporting and cultural activities, ecotourism, seasonal events, folklore, festivals and so on) (Mandou, 2002). A wide variety of means are available to help them make their choices. They can switch from a direct to an indirect travel distribution network, benefit from relative cost transparency online, make informed comparisons and sometimes even specify the price of the tourism product they are looking for (OECD, 2010).

b) In Cameroon in Particular

The purpose of the tourism sector is to stimulate a country's economic growth by creating jobs and combating poverty, on the one hand, and to preserve the cultural and natural heritage while promoting the empowerment of local communities, on the other (UNCTAD, 2017). Some emerging and developing countries have made tourism their primary export activity. For this reason, governments are creating a legal framework to support and develop this sector.

In Cameroon in particular, the tourism sector is a complex one, involving a number of socio-political and cultural players. Faced with a plethora of tourism sectors in Cameroon, the state was obliged to organise it by creating a Ministry of Tourism and Leisure, which succeeded the National Tourist Office, with 03 external services: the European, Asian and American information offices, not forgetting several other organisational and trade union partners.

The ministry in charge of the Ministry of Tourism and Leisure at national level plays a coordinating and harmonising role for the many private and public sector companies. The governance of the tourism industries in Cameroon is defined primarily by the policy of the central power (the Head of State). This is done through Law No. 2016/006 of 18 April 2016, which governs tourism and leisure activities in Cameroon by laying down the framework for legislation on commercial activities, the specific rules applicable to tourism and leisure activities with a view to economic development; the promotion of national culture; national integration and the mixing of peoples; the protection and safeguarding of national tourist and cultural values, as well as the environment; and the enhancement of the national tourist heritage. This specifically concerns any activity that contributes to the provision of accommodation and catering services to meet the needs of people travelling either for pleasure or for professional reasons, as well as the provision of leisure services and any activity organised for the sole purpose of entertainment (Décret régissant l'activité touristique et de loisir au Cameroun, 2016). In this law, emphasis is placed on the need for structures involved in tourism and tourist safety to take out an insurance policy.

Generally speaking, the tourism sector in Cameroon is characterised by weak structuring, a lack of technical and financial capacity, and a lack of support despite Cameroon's abundant cultural heritage. Notwithstanding this deficit, a number of projects are being developed with the aim of highlighting tourism potential and thereby meeting certain modern challenges linked to the tourism sectors. Following the example of West Cameroon, a number of local players, including mayors, traditional chiefs, private promoters and cultural and heritage players, have developed a project through the "route des chefferies" programme, which focuses on three points:

- Improve the conservation and scenography of heritage sites, develop a natural site and support the craft industry with its capacity-building and product labelling initiatives;
- Promote and enhance this diversified and attractive tourist offer to the national public and establish the foundations for the structuring needed to attract international customers;
- Structure and consolidate the governance of the system of tourism players in the regions (chiefs, mayors, private tourism promoters, craftsmen, cultural and heritage players), and strengthen their capacities.

In the same vein, tourism training schools have been set up, such as the (Economic and Monetary Community of Central Africa (EMCCA) regional hotel and tourism school in Ngaoundéré, the wildlife school in Garoua, the fine arts institute in Foumban and many others, which are key to the quality of services offered in the tourism sector. Faced with a changing world, tourism has to compete on several fronts. Competition from tourism markets and competition for labour. This desire on the part of the state to create a framework conducive to tourism training in training schools is proving to be relevant, as it constitutes a lever and even a key instrument in the process of developing the tourism sector.

IV. Tourism and Modernism

The tourism industries are a vehicle for the mobility of individuals, currencies and consumption patterns (Makou, 2016). People's mobility is characterised by their own particular motivations. For the most part, it is influenced by factors that contribute to the process of change in urban and rural areas, such as consumption patterns and standards of quality, comfort and safety in transport infrastructure and accommodation. In this sense, tourism is seen as a strategic development sector for countries, because at a systemic level it affects many sectors of society. In the light of modernity, this new sector is seeking to meet global demand by making itself attractive, in order to be competitive both nationally and internationally, and to implement strategies to retain tourists and attract new ones. The modernisation of the tourism sector as a whole is thus becoming the key to attracting people and developing tourism. Below, we look at how Cameroon is succeeding in consolidating tourism and modernity.

a) The Tourism Situation in Cameroon: Between Heritage Preservation and the Demands of Modernity

In Cameroon, the tourism industry occupies a predominant position and is seen as one of the factors that can contribute to the country's economic development, even if results in this sector are slow to materialise. Cameroon has a wealth of artistic, infrastructural, natural, human and cultural tourism potential which, according to (Tchindjang & Kamdem, s. d.), are important tourism factors that could represent the world's leading economic sector in the future. All the more so since Cameroon is recognised as Africa in miniature, and therefore a land of tourism par excellence.

However, on an institutional level, a number of factors hinder the development of the tourism sector.

For this reason, tourism is very sensitive to the political environment, more specifically as regards the safety of tourists. Cameroon is confronted with violence and attacks that are reducing the number of tourist arrivals. Unfortunately, Cameroon's image as a tourist destination is suffering. Some tourist areas are described as high-risk destination, prone to violent events, disease and asymmetric conflicts (Neumayer, 2004; Yap & Saha, 2013).

In fact, the tourism sector remains diversified, with a heritage linked to a legacy to be handed down from more or less ancient times. It has a collective dimension of a general nature, with a value as a resource likely to contribute to the development of the territory that generated it. In Cameroon, cultural heritage can be understood in material terms and is characterised by housing, crafts, pottery, weaving, sculpture, archaeology and architecture. Intangible cultural heritage, which takes into account certain aspects of human creativity, such as the ability to invent original cultural forms that are not necessarily material (for instance, the manufacture of precious objets d'art) (Brillet, 2000).

In essence, heritage represents the identity of an entire people. It is any form of cultural expression inherited from the past by a society. It includes the spoken language, national anthems, songs, handicrafts, gastronomy, dances, festivals, events, folklore celebrations, accounts, legends, poems, the works of great writers, architectural and artistic works and much more.

Preserving this vitality in the face of the demands of modernity is becoming an arduous task. Thus, the use of certain strategies in response to modernity is based on conservative practices in the light of a traditional perspective, such as the use of architectural elements that have been salvaged and reused in the construction of new buildings. In other words, architectural fragments from another era are incorporated into existing buildings. This combination of the traditional and the modern aims to adapt to modernity without undermining its cultural heritage by making it more attractive to the world (the example of conical-roofed dwellings made of mud bricks or bamboo is becoming rarer in the face of modernisation and is now made of hard or semi-hard materials).

Along the same lines, in the past on Mount Cameroon, trees were felled around mountain refuges to heat the refuges and prepare meals for tourists, but it was realised that this practice was destroying bird habitats and causing erosion, which is why tourists now have their own private portable gas cookers (Sumelong, 2012).

Cities are becoming more cosmopolitan, prompting people to change their habits, which is having an impact on cultural heritage in general. However, efforts are being made to preserve heritage. For example, in Bafoussam, a town in the west of Cameroon, there are still museums in Bafoussam 1er, such as the Ecological Museum of Biodiversity, which conserves and exhibits the medicinal plants of the Bafoussam community.

Moreover, modernity remains a difficult factor to combine with cultural heritage, which is under threat in the Cameroonian context, as several biosphere reserves have not escaped the impetus of modernisation. For example, the pygmy peoples living around the Lobé Falls have seen not only their territory confined, but also their camps transformed into crude villages with the surge of modernity in the area (Tchindjang & Etoga, 2014).

b) *What Kind of Tourism Governance is Needed to Meet the Challenges of Modernity ?*

As the years go by, tourism practices evolve, constrained by numerous crises but also driven by constantly changing demand, forcing regions to rethink their strategy, but also to demonstrate permanent flexibility in a world that is constantly changing. Governance applied to tourism therefore appears to be an attempt to respond to this need for permanent adaptability, with clear lines to be defined and precise objectives to be built, starting by emphasising the stability of political institutions through the creation of trustworthy institutions focused on collective national interests.

Tourism governance is a complex system which requires a better understanding of the processes involved, since each player influences the system and is influenced by the system (Butler & Waldbrook, 1991). As a result, each element that comes into play in the tourism industry is essential and must be taken into account within the framework of the interrelationships that can exist in this sector. This inseparability stems from an awareness that integrates in a global way the observational data linked to any problem, however independent it may seem. The system in these characteristics is not only made up of relationships and roles, but also has an organisational and structural dimension that can help to bring a new perspective to the improvement of tourism, which is already suffocated by the lack of infrastructure and the conditions that make its management laborious.

In this way, managing the system means developing processes based on open dialogue with all the stakeholders, on the understanding that all the ministries concerned have a role to play, leading to coordinated government action. This approach needs to involve many parts of government across national ministries, as well as partnerships with industry and the private sector, whose representatives are often best placed to identify areas where government intervention would be most useful. This will make it possible to invest in the development of tourist sites and build infrastructure. In the sense that the tourism sector depends on a number of related activities that require investment in a stable and secure environment. Borders need to be crossed more easily by reducing transport-related red tape, which could help to create a new dynamic in international tourist flows.

Cameroon's decentralisation law could be one of the tools used to give local authorities greater responsibility and ownership of tourism projects. As a result, decentralised cooperation will have a leverage effect, encouraging other national and international players to take an interest and invest in safeguarding and promoting this cultural heritage. According to the (Organisation mondiale du tourisme, 2015) Cameroon should put in place innovative strategies for the development and management of tourism activities that respect and preserve natural, cultural and social resources in the long term, and contribute positively and equitably to economic development and the fulfilment of the individuals who live, work or stay in these areas. The emphasis here is on preserving cultural heritage, helping people to fulfil their potential, and taking account of their participation in the development of tourism activities. This means training qualified staff (Organisation mondiale du tourisme, 2015).

Faced with the structural failure of governance of the tourism sector by unqualified staff who are becoming more and more obsolete, thereby damaging the system. The system in general, in its functional capacities in terms of the systemic approach, must opt for self-regulation or even self-productive capacities by arranging more appropriate training school systems to promote innovation and advance productivity in the tourism sector. This includes a number of considerable financial, human and material investments which should motivate and advance the quality of training.

Furthermore, the structures involved in the tourism sector in the face of globalisation need to develop new architectures that attach importance to the introduction of a digitisation system, with new information and communication technologies coming into play with the aim of revolutionising the tourism sector. This will involve the development of websites with the aim of enhancing the value of cultural and natural heritage sites, thereby promoting Cameroon's image as a tourist destination throughout the world.

This new remote system must take the lead and be used in the best possible conditions, and must be one of the main driving forces behind tourism governance. It facilitates dissemination and the creation of exchange and cooperation networks in the service of tourism production. From an ergonomic point of view, this technological and organisational device must promote the optimisation of interactions by adapting to human capacities, as well as preserving the physical, psychological and social integrity of human beings and preventing undesirable consequences. New ways of managing knowledge infrastructures and transforming skills need to be considered. It must bring about changes in people, their work and their environment.

Tourism is not a monolithic activity that evolves in avacuum; on the contrary, it is part of a whole ecosystem that integrates fields as vast as transport, culture, the local economy and, of course, first and foremost, the local people who live these realities. In this sense, it is important to establish open governance, taking into account all the stakeholders, but also bearing in mind that tourism practices have largely evolved. In fact, the tourism professions have completely exploded, and today everyone has to be capable of providing information, welcoming visitors and communicating with them. In addition, there are other factors that can make governance more complex, such as seasonality, which means that an organisation has to be designed to cater for different flows of visitors throughout the year, and overtourism, which raises the issue of acceptability to local residents, etc.

c) *Concluding Remarks*

The tourism industry is one of the key factors contributing to the social, economic and cultural development of the country. The tourism offer (tangible heritage: housing, handicrafts, pottery, weaving, sculpture, archaeology, architecture, waterfalls, etc.) is abundant in Cameroon and requires appropriate management to make it easier to attract tourists and develop this sector in the face of modernity. It is for this reason that this work is devoted to the study of tourism governance in Cameroon in the face of the challenges of modernity: an inventory.

Indeed, from the outset we have highlighted concepts such as tourism governance, which is a mode of initiative based on a dynamic, flexible organisational mechanism that makes it possible to consolidate the multiple interests of the plurality and diversity of stakeholders involved in the tourism process. We have thus seen that, faced with the diversity offered by the tourism sector, governance remains an obsolete task in view of the demands imposed by the advance of modernity. This is a real threat to the tourism sector. This sector is doing its best to put in place strategies aimed at preserving its cultural heritage and making it more attractive, in order to attract more tourists from all over the world, even if this remains limited.

Faced with this challenge, the tourism industries will have to draw inspiration from tourism governance which, at a systemic level, integrates all the players involved in the tourism sector, as it remains a sector characterised by its diversity and complexity. The policies put in place must promote innovation in tourism and heritage preservation. This can be achieved by promoting behaviour and lifestyles that respect the environment, and by making all stakeholders aware of the need to avoid practices that could compromise the future of the tourism industry. Similarly, the proliferation of training opportunities in the tourism sector means that training content can be aligned with the requirements of modern tourism management. With the arrival of ICTs, the world has become a global village, and every nation should draw inspiration from the new technologies to better communicate and promote its product throughout the world.

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Inventory Management Practices and Challenges in Mega Construction Projects in Bangladesh

By Md. Jamal Mia

Abstract- Inventory management is a very important and vital part of any kind of production business because an efficient supply chain depends on mostly proper inventory management. In any mega construction project, inventory management is more critical for binding international standard rules and regulations and also for containing different characteristics of the project. The main objective of this paper is to study the existing research on inventory management, find existing challenging factors that indicate poor performance of inventory management and also find better tools and techniques practices that create overall value for the project. This research paper will be helpful for the construction industry and get guidelines for better inventory management.

Keywords: inventory, construction, materials, projects, management, etc.

GJMBR-F Classification: NLM: QU 135, QD 502

INVENTORYMANAGEMENTPRACTICESANDCHALLENGESINMEGACONSTRUCTIONPROJECTSINBANGLADESH

Strictly as per the compliance and regulations of:

Inventory Management Practices and Challenges in Mega Construction Projects in Bangladesh

Md. Jamal Mia

Abstract- Inventory management is a very important and vital part of any kind of production business because an efficient supply chain depends on mostly proper inventory management. In any mega construction project, inventory management is more critical for binding international standard rules and regulations and also for containing different characteristics of the project. The main objective of this paper is to study the existing research on inventory management, find existing challenging factors that indicate poor performance of inventory management and also find better tools and techniques practices that create overall value for the project. This research paper will be helpful for the construction industry and get guidelines for better inventory management.

Keywords: inventory, construction, materials, projects, management, etc.

I. Introduction

A few megaprojects are being constructed in Bangladesh and hopefully, they will contribute largely to socioeconomic development in Bangladesh, but this kind of megaprojects is too specific, critical, mostly foreign materials dependent, and follows too much documentation and for this, the inventory management here is not so as usual as others. Generally, almost 60% cost of the project is materials cost, and ensuring an adequate supply of materials according to the schedule, minimizing inventory costs, facilitating purchasing economies, better utilization of available stocks, disposing of inactive & obsolete store items, manufacturing planning, assisting procurement, qualifying production, enabling management in cost comparison, and overall for successful completion of the project it is a must for proper inventory management.

II. Literature Review

Narimah Kasim, Siti Radziah Liwan, Alina Shamsuddin, Rozlin Zainal, and Naadira Che Kamaruddin (2012) studied that there is a need for more sophisticated technology to be implemented in a construction project in order to facilitate the materials tracking process and at the same time, reduce dependency on paper-based reports in inventory management. Finally, they recommend that the use of ICT, for example, RFID in materials tracking could facilitate effective and efficient control over materials in construction [1].

1. *S. Sindhu, Dr. K. Nirmalkumar, and V. Krishnamoorthy:* Studied a few main inventory management risks in construction projects like lack of storage space, problems with de-centralized processing, inadequate training practices, improper financial support in the ordering of materials, difficulty in delivery of long lead materials and he suggested Proper preventive measures like JIT, Supply chain management system concept along with lean production system [2].
2. *Jayanth, V. Sampathkumar:* Analyzed some factors affecting inventory control management and dissect the stock administration control embraced and the compelling usage of stock at the construction site with the assistance of the SPSS programming [3].
3. *Jyoti Sanjeev Mohopadkar and D. P. Patil:* Analyzed some techniques in inventory management like ABC Analysis (Always Better Control), FSN Analysis (Fast Moving, Slow Moving & Non- Moving), SDE Analysis (Scarce, Difficult, Easy), HML Analysis (High, Medium, Low) and GOLF Analysis [4].
4. *Mit Shah and Prof. Ankitkumar Patel:* Also showed the practical use of some techniques in inventory management like ABC Analysis (Always Better Control), FSN Analysis (Fast Moving, Slow Moving & Non-Moving), VED Analysis (Vita, Essential, Desirable), HML Analysis (High, Medium, Low) and ABC-VED Combination approach [5].
5. *Raj Desai and Prof. Dixit Patel:* Analyzed some materials management factors in construction projects and also identified cost overrun factors [6].
6. *Gamane Ankush K. and Prof. Gaurav N. Desai:* Select the Qualitative analysis technique such as Economic order Quantity (EOQ), Break Even Analysis (BEP), and maintaining a sufficient stock of raw materials and Control investment in inventories [7].

III. Research Methodology

Both primary and secondary sources of data were used for the study. The Primary data was collected from the staff of selected five mega projects from different companies by creating survey questions using

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google forms and observation. The selected projects were RNPP, GWTP, DMRP, MUSCCFPP, and DCRP. The selected staffs were the site engineer, project engineer, store manager, safety officer, and site supervisor. The questionnaire contained closed-ended and open- and close-ended questions using a four-point Likert Scale. One part of the survey questions was about existing challenging factors and the total number of questions was nine. The question form was sent to 20 staff of every project and the total number of staffs was 100. The other's part was about existing inventory management tools and the total number of questions was seven. The question form was sent to 14 staff of every project and the total number of staff was 60. The secondary data was collected from public and private websites, journals, and newspapers.

All the questionnaires of the first part and the second part administered were returned representing a 100% response rate. The study then adopted a mixed method that is both quantitative and qualitative methods of data analysis. The quantitative data were analyzed using descriptive statistics. All data were coded and analysis was carried out using the Microsoft Excel 2019 Software to measure the percentage of challenges and the practice of inventory tools of every selected project that had been shown graphically. On qualitative data, content analysis (deduction and inferences) was used. Here the empirical data collected was compared with the underlying theories to verify whether the findings confirm or deny those theories. Finally, the result analyzed was presented in descriptive form.

IV. Inventory Management Challenges for Mega Construction Projects

Currently, several mega construction projects are underway in Bangladesh. Among them, some projects like Rooppor Nuclear Power Plant, Padma Multipurpose Bridge, Matarbari Coal Power Plant, Dhaka Metro Rail, Dhaka Airport Third Terminal, Matarbari Deep Sea Port, Chittagong Cox's Bazar Rail Link, Ghandharbpur Water Treatment Plant, etc. are the most critical, challenging, and some are totally new experiences for Bangladesh. Many local and foreign construction companies that participated in the activities of this project have to face many challenges at every moment. But one of the complex challenges for this type of project is inventory management. Some of the common challenges of inventory management in international construction projects are given below.

a) Efficient Materials Procurement Process

The construction materials Procurement team is responsible for delivering the right materials on time and within budget by following an efficient procurement process. But for the late of estimating materials, drawing changes, lack of effective materials requirement schedule, tight schedule to handover project, facing unknown materials requirement, and lack of availability of materials quality documentation make the challenging of efficient material procurement process. Some studies have suggested several ways to make an effective and efficient procurement system during the initial/ preliminary planning which include Construction team involvement in the estimation of construction material, using computer applications for estimation, identifying needed materials to be used and estimating quantities, identifying locally available materials, request quotations from different suppliers, establish construction materials prices database, rely on the price of material suppliers, rationalize the material prices used in the tender estimation, shortlisting the potential suppliers, plan for materials requisition schedule, evaluate the capability of the supplier's material delivery, select suppliers based on the lowest price, obtain materials requisition schedule, assessment, and updating database [8].

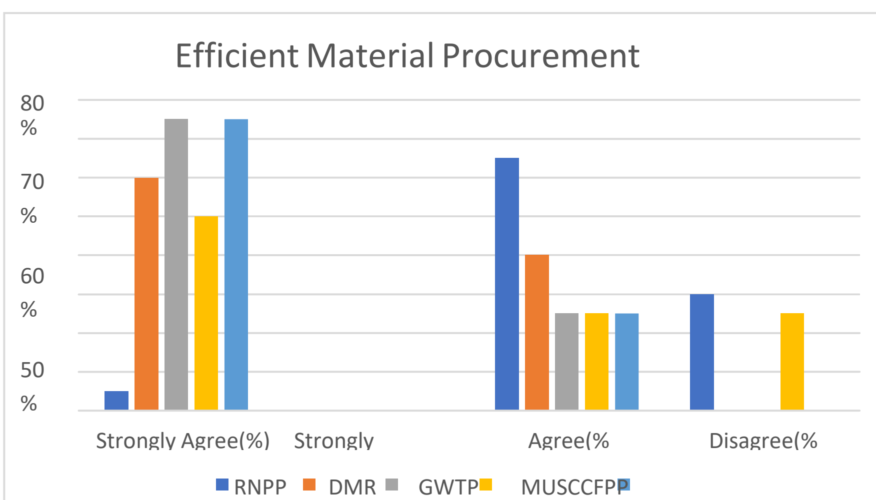

Fig. 01: Efficient Materials Procurement Process Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in the efficient materials procurement process where the project RNPP, DCRP, and GWTP have to face most challenges for tight schedules, unavailability of materials, and also this type of project is new in Bangladesh.

b) Sufficient Storage Space

In an international project, several companies work together and no company can take the place of the office, warehouse, labor shade, and other's facilities as their wish. Generally, the main contractor of the project supervised this which means they fix the space for a fixed company. Every company has to take the approval of the main contractor and make the all infrastructure especially the warehouse by following proper safety rules and guidelines. Not only this, many times may have to move the warehouse and materials after building and storing them for different causes. So, the inventory management personnel have to face the problem of the lack of materials storage space. However, the lack of proper knowledge of the size of materials, and materials delivery schedule, the store personnel have no preparation of storage space. If the goods are not sent when they are needed, there is a shortage of storage space.

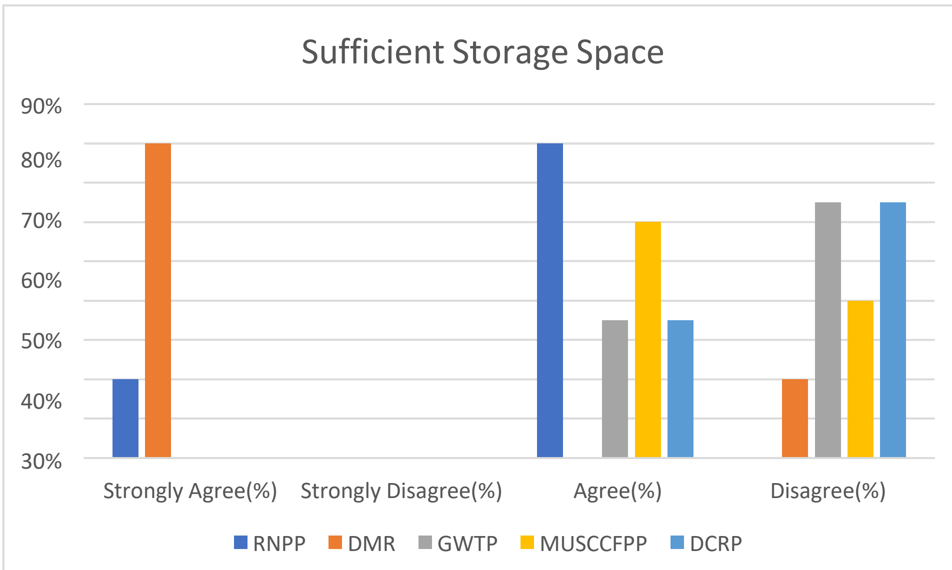

Fig. 02: Sufficient Storage Space Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in sufficient storage space where the project RNPP and DMR have to face the most challenges

c) Tracking of Materials Accurately

Inventory tracking denotes the stock level, stock location, inventory accuracy, inventory turnover, reorder level, stock of damaged goods, return goods, and stock value. In a construction project, it is challenging to track materials accurately because of different types, sizes, brands, codes, colors, grades, the origin of the same goods, moving materials from one location to another continually, lack of enough warehouse, stocking materials in different places, storage materials under the sky, taking away the goods by the user without informing to the store department, especially which materials are kept in open space, due to correct writing of all product information in the issue slip and as a result the wrong entry in the software, etc. By questionnaire survey, I found that the following goods are most challenging to track accurately.

1. Bricks
2. Stone
3. Sand
4. Rebar
5. Hardware goods

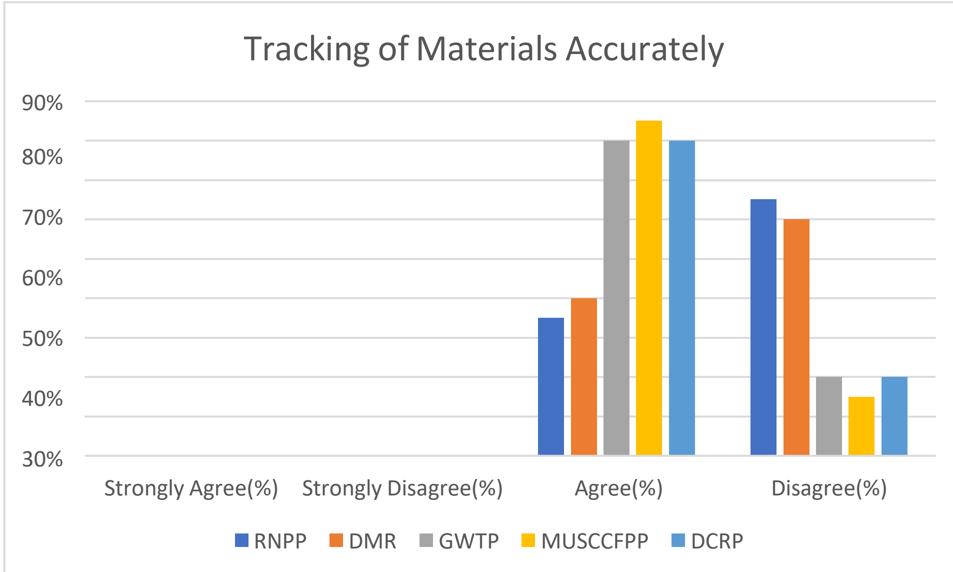

Fig. 03: Accurately Tracking of Materials Challenge

From the questionnaire survey in those five projects, we found that almost all projects have challenges in the tracking of materials accurately where the projects MUSCCFPP, GWTP, and DCRP have to face most challenges for lack of enough storage space and lack of proper inventory management.

d) Availability of Materials

Availability of materials in the construction project is not so easy, especially a project which is dependent on maximumly foreign materials. Due to the late of estimating materials, scope changes, lack of effective materials requirement schedule, facing unknown materials requirement, urgent demand for goods, funding problems, etc. make the problems of availability of materials. However, the global environment affects the availability of materials. Especially in this decade, the COVID -19 pandemic affected supply chains globally and widely. National lockdowns in different countries, entry restricted to the border, stopping the activities of shipping agencies, clearing & forwarding agencies, and due to the government customs office being closed, on-time delivery of goods was uncertain in all construction projects. Now I will give statistics on how COVID -19 affects imports in Bangladesh.

Year	Total import (Million the US $)	Growth Rate (%)
2015-16	49,436.00	5.41
2016-17	59,561.00	21.79
2017-18	67,133.00	16.96
2018-19	68,103.00	3.83
2019-20	64,186.00	-4.91
2020-21	78,211.00	21.89

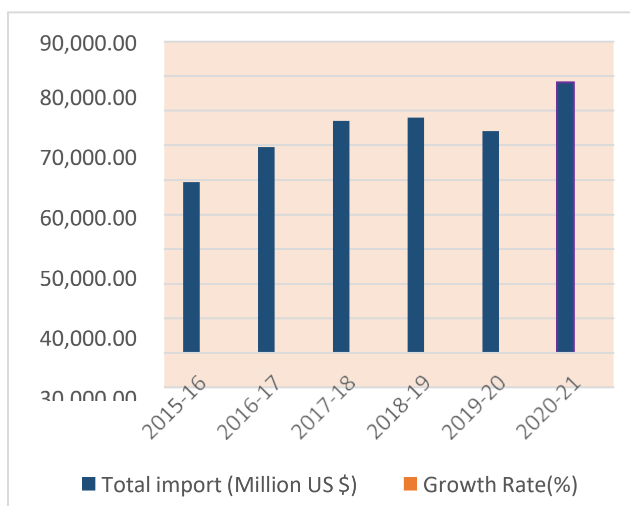

Fig. 04: The flow of import Growth Rate in Bangladesh (Source: Foreign Trade of Statistics of Bangladesh 2019-20 & 2020-21)

Here we are observing that in 2019-20 the import growth rate is lowest because at this time the coronavirus was spread out the world.

The Rooppur Nuclear Power Plant is the largest infrastructure project in Bangladesh, being constructed with the help of Russia. This year (2022) Russia and Ukraine war also affects the supply chain as well as the availability of materials in the project because the maximum materials in this project are imported from Russia.

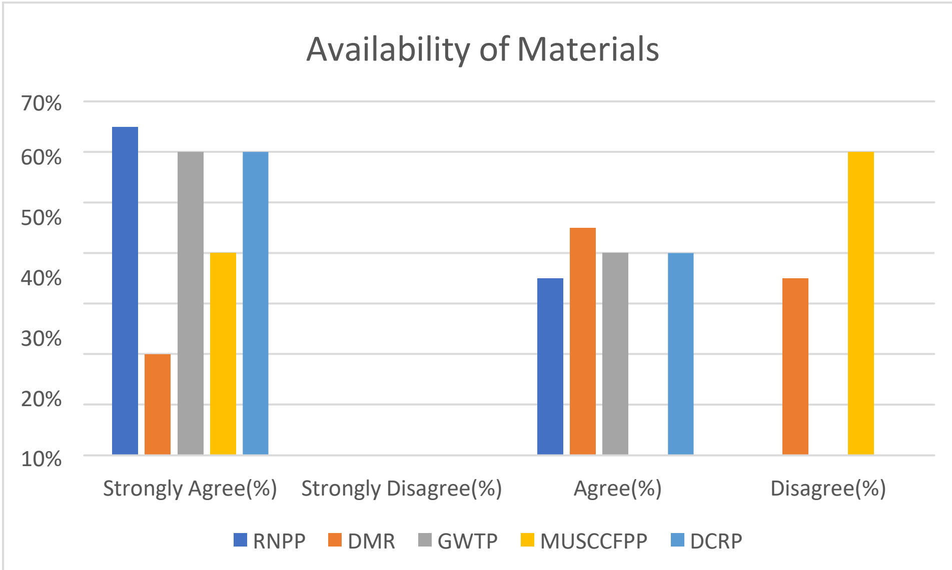

Fig. 05: Availability of Materials Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in the availability of materials where the project RNPP has to face most challenges for being foreign materials dependent project, Covid-19 pandemic situation, Russia -Ukraine war and unavailability of materials in Bangladesh.

e) Overstocking Problems

Overstocking items are those which are not yet used and probably cannot be used anymore and these items are kept for weeks, months, and even a few years without being used. In construction projects overstocking occurs when lack of efficient materials procurement process, inaccurate estimation, inaccurate forecasting, lack of proper documentation, unskilled manpower, lack of inventory control planning, lack of monitoring compliance of BOQ with goods requirement, change of project scope, proper tracking level of stock goods, and also in the case of import when the suppliers don't agree to sell goods without a fixed lot size.

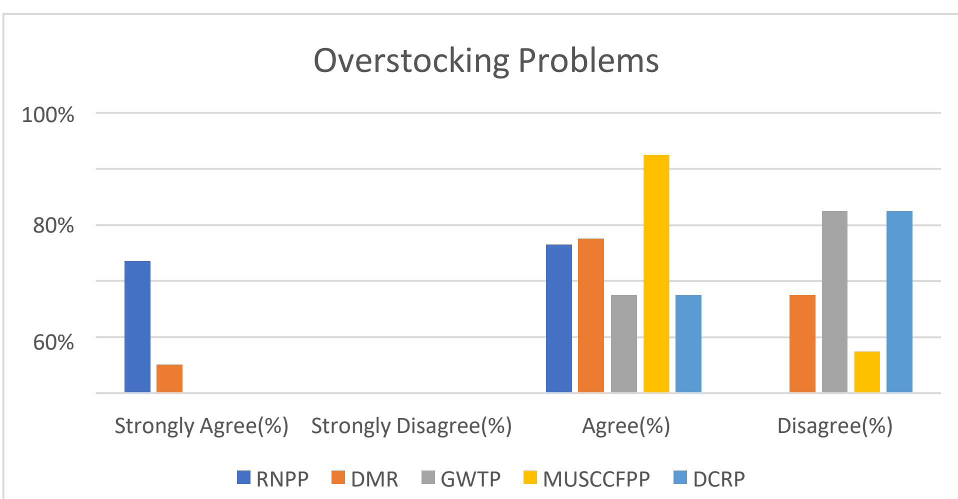

Fig. 06: Overstocking Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in overstocking problems where the project RNPP and MUSCCFPP have to face most challenges for the lack of proper estimation, inventory management, and also proper procurement process.

f) Construction Waste Management

Construction wastes in any project are in the form of building debris from the demolition process, rubble, earth material, concrete waste, steel waste, timber waste, and mixed site clearance construction materials, arising from different construction activities of the project including land excavation or formation on site, civil and building construction materials, site clearance waste, demolition activities waste, roadwork waste, and building renovation waste [9]. Construction waste is a complex problem in the project because it affects the efficiency of the projects and it can make a danger to the environment. Overall, construction waste occupies a lot of space that creates a space problem for necessary goods. Quick recycling and disposal the wastage goods by selling or throwing a fixed place that doesn't pollute the environment, this problem may be solved. Construction waste can also be reduced by using a waste management system on projects. The project activities are to be planned at every stage by every construction personnel, who is involved, in minimizing the overall waste generation at the project [9].

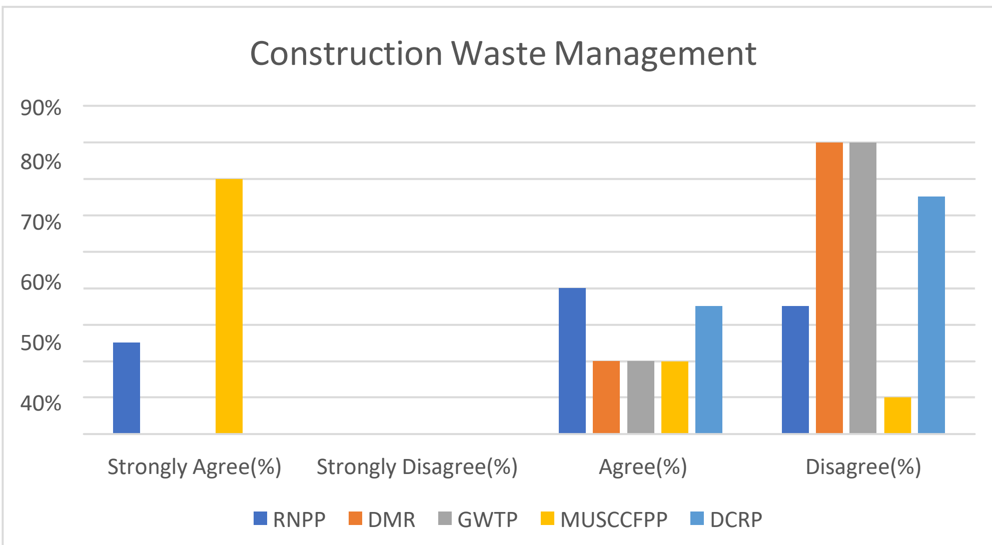

Fig. 07: Construction Wastage Management Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in construction wastage management where the project MUSCCFPP has to face the most challenges for the sea beach area. Actually, it's dependent on the project location.

g) Urgent Demand for Materials

In a construction project, urgent demand for materials is a common practice that makes the problem to deliver the right product at the right time and at the right price. In one word, continuous urgent demand for materials affects the procurement cycle that means to fulfill the urgent demand for materials, the supply chain team has to break up the different steps of the procurement cycle and as a result, an ineffective and inefficient supply chain occurs in the construction industry.

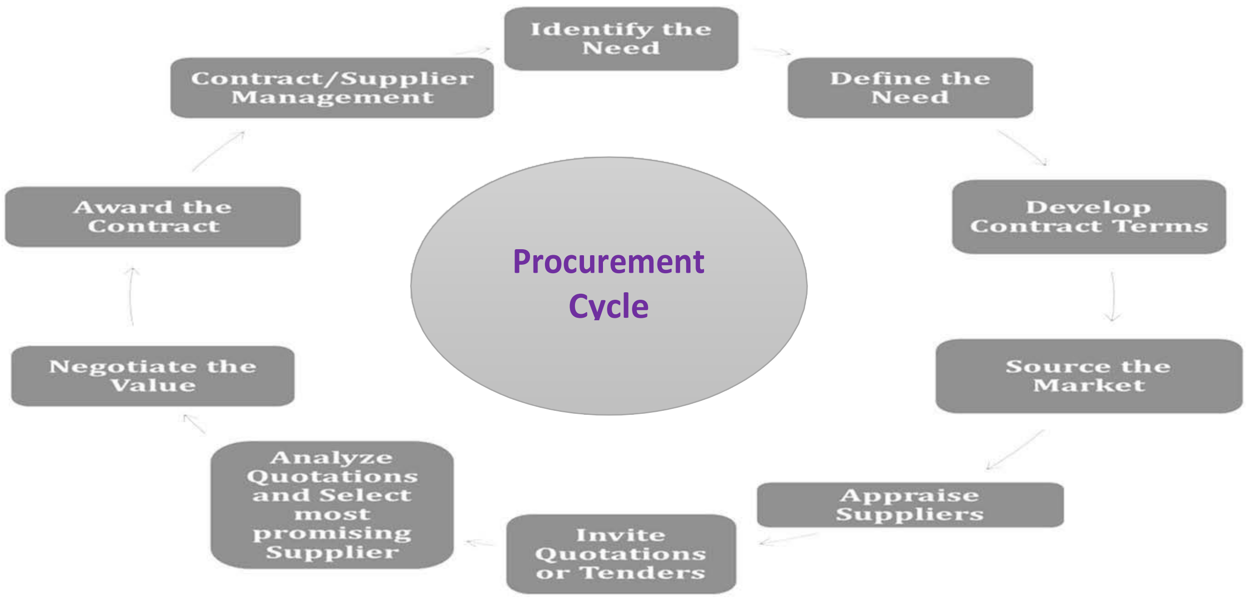

Fig. 08: Procurement Cycle

Lack of Effective materials requirement schedule, estimation of materials at right time, and unskilled manpower create this issue.

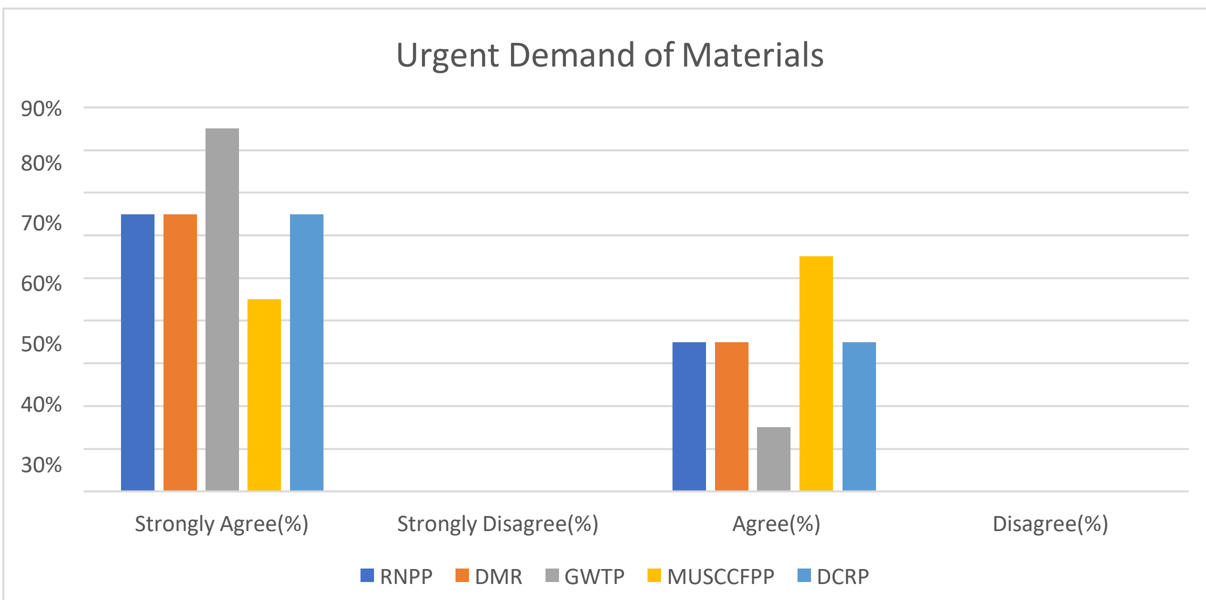

Fig. 09: Urgency Challenges of Materials

From the questionnaire survey in those five projects, we found that almost all projects have challenges in urgent demand of materials where the project GWTP has to face most challenges for the tight schedule of the project, lack of demand forecasting and estimating in proper time.

h) Effective Materials Requirement Schedule

Materials requirement planning (MRP) is the system of materials procurement planning on the basis of production planning that helps to control inventory and makes the supply chain effective and responsive. MRP answers the following questions

- What items are required?
- How many or how much are required?
- When they are required?

Though effective materials requirement schedule makes the effective supply chain of the project, it is challenging to prepare due to the complexity of the project and tight time schedule.

In a construction project, materials account for more than 40% of the total project cost. A small saving in material cost through efficient management of materials can result in a large saving in the total project cost. One of the root causes of improper material management is that materials are ordered based on the information from the project schedule. Hence the study is conducted to optimize the cost through material requirement planning for District road construction based on site scenario. The study involves mainly three stages, namely factors identification, data collection, and analysis. Data collection on factors which are based on time, cost, quality, quantity, and location of various activities acquired. These were analyzed and optimization of cost is done through MRP [10].

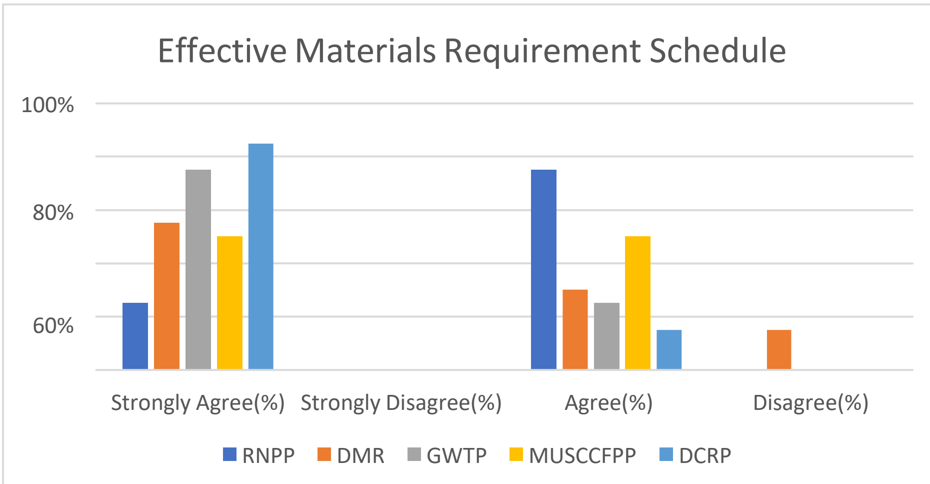

Fig. 10: Effective Materials Requirement Schedule Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in effective materials requirement schedule where the projects GWTP, RNPP, and DCRP have to face most challenges for the lack of estimating and scheduling the project in proper time.

i) Materials Storage According to Safety Standards

It is very challenging in a foreign-aided construction project in Bangladesh to store goods according to the project's safety standard due to lack of enough storage space, proper previous planning about materials storage space in the mobilization period, and also lack of knowledge and training of materials handling and storage. But it is one of the most important aspects that reduce the project cost and construction-related accidents if it is maintained properly. Without proper storage of materials, a natural disaster can lose of many materials and their usefulness.

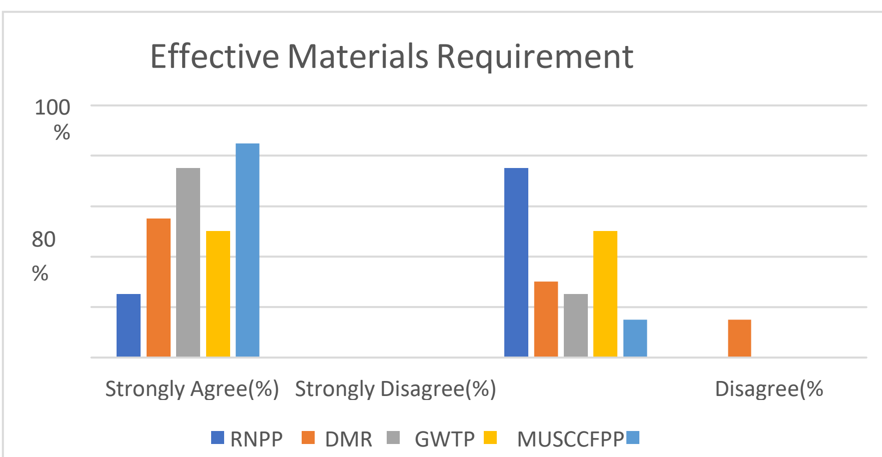

Fig. 11: Safety Standards Materials Storage Challenges

From the questionnaire survey in those five projects, we found that almost all projects have challenges in safety standard materials storage where the project GWTP and DMR have to face most challenges for the project location, lack of enough space, and lack of knowledge about safety among store personnel.

V. Inventory Management Tools Practices in Construction Projects in Bangladesh

Inventory management tools are the techniques by which inventory is measured and regulated according to predetermined norms. In a construction project, 60%-70% cost is the materials cost of the total cost of the project. Inventory Management Tools help to ensure an adequate supply of materials, minimize inventory cost, facilitate purchasing economies, eliminate duplication in order, better utilization of available stocks, provide a check against the loss of materials, facilitate cost accounting activities, enable management in cost comparison, locates & dispose of inactive & obsolete store items, consistent and reliable basis for financial statements. So, it is very important to implement the tools of inventory management. Here, we discuss the inventory control tools which may be implemented in construction projects and show the statistics of the practice of those tools in different construction projects.

a) ABC Analysis (Always Better Control)

ABC Analysis is an inventory management technique that classifies the materials on the basis of annual usage of materials and that determines the value of inventory items based on their importance to the business.

A items represent 10% of the total inventory with 70% of the total annual value.

B items represent 20% of the total inventory with 20% of the total annual value.

C items represent 70% of the total inventory with 10% of the total annual value.

Now I will show the ABC analysis practices in construction projects in Bangladesh through a graph where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

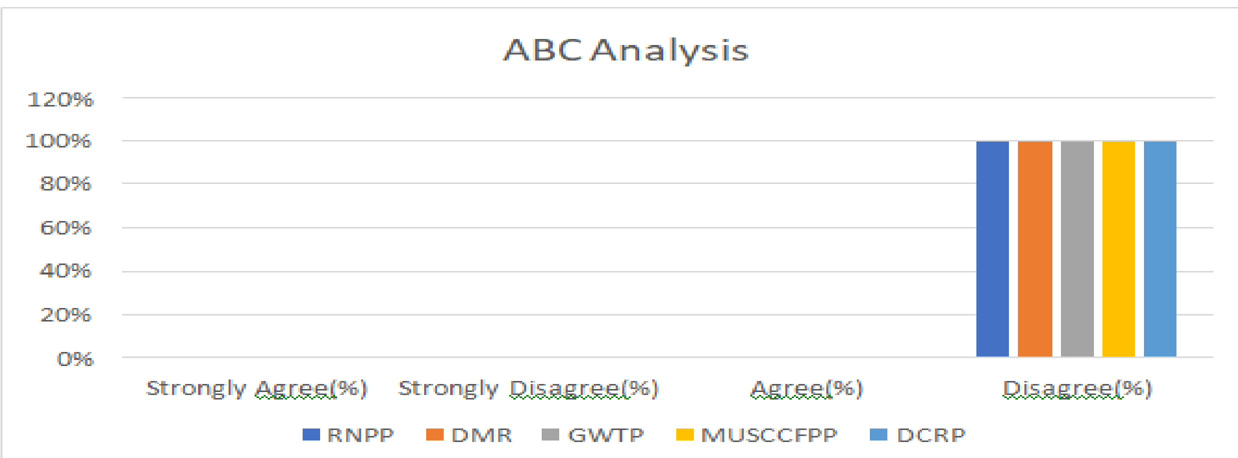

Fig. 12: ABC Analysis Practices

From the questionnaire survey in those five projects, we found that all projects have no practices of this tool. In the case of construction projects most important issue is to finish each milestone according to the schedule and the client's required date. And many times, due to the lack of fewer used materials and low-price materials a milestone handover may be stopped. So, this tool may not be used in inventory management in construction projects.

b) Economic Order Quantity Models (EOQ Model)

Economic Order Quantity (EOQ) is a technique used in inventory management that refers to the optimal amount of inventory a company should purchase in order to meet its demand while minimizing its holding and storage costs.

EOQ Model helps to prevent stock out, reduce holding cost and storage costs, and run the supply chain smoothly in the construction project. So, it may be implemented in construction materials management. To implement the EOQ model, we have to know the holding cost and storage costs, material costs, lot size, and cycle inventory clearly.

i. *Lot Size or Batch Size(Q)*

The quantity that a supply chain stage either produces or orders at a given time.

$$\text{Lot Size} = Q$$

ii. *Cycle Inventory*

Cycle inventory is average inventory that builds up in the supply chain because a supply chain stage either produces or purchases in lots that are larger than those demanded by the customer.

Q = Lot size of an order

D = Demand per unit of time

Cycle Inventory, (CI) = Q/2

Average Flow Time = Q/(2D)

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iii. *Holding Costs/Carrying Cost (H)*

The cost incurred for holding the volume of inventory and measured as entage of The unit cost of an item. Which includes

- Capital Cost
- Obsolescence Cost
- Deterioration Cost
- Taxes on Inventory
- Insurance Cost
- Storage and Handling Cost

Annual Holding Cost = (Q/2) H

Where

Q=Lot size

H=Holding cost per unit

iv. *Ordering Costs (S)*

It is the cost of ordering the item and securing its supply or receiving the item. Which includes

- Buyer Time
- Expense from raising the indent
- Receipt and Inspection of Materials

Annual Ordering Cost = (D/Q) S

Where

D = Annual Demand

S = Fixed Ordering Cost

Q= Lot Size

v. *Material Cost (C)*

Material cost is the cost of the material cost that is used to produce.

Annual Material Cost = CD

Where

D = Annual Demand

C= Material Cost per unit

So, we can identify

Total Annual Cost (TC) = Annual Material Cost+ Annual Ordering Cost+ Annual Holding Cost = CD + (D/Q) S + (Q/2) H

On the basis of the following information, we can calculate the following

- Optimal lot/order size
- Cycle Inventory
- Average Flow Time
- Annual Holding Cost
- Annual Ordering Cost
- Annual Material Cost
- Total Annual Cost
- No. of orders per year

vi. *The EOQ Formula*

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

H

Where,

D = Annual Demand

S = Fixed Ordering Cost H = Holding Cost

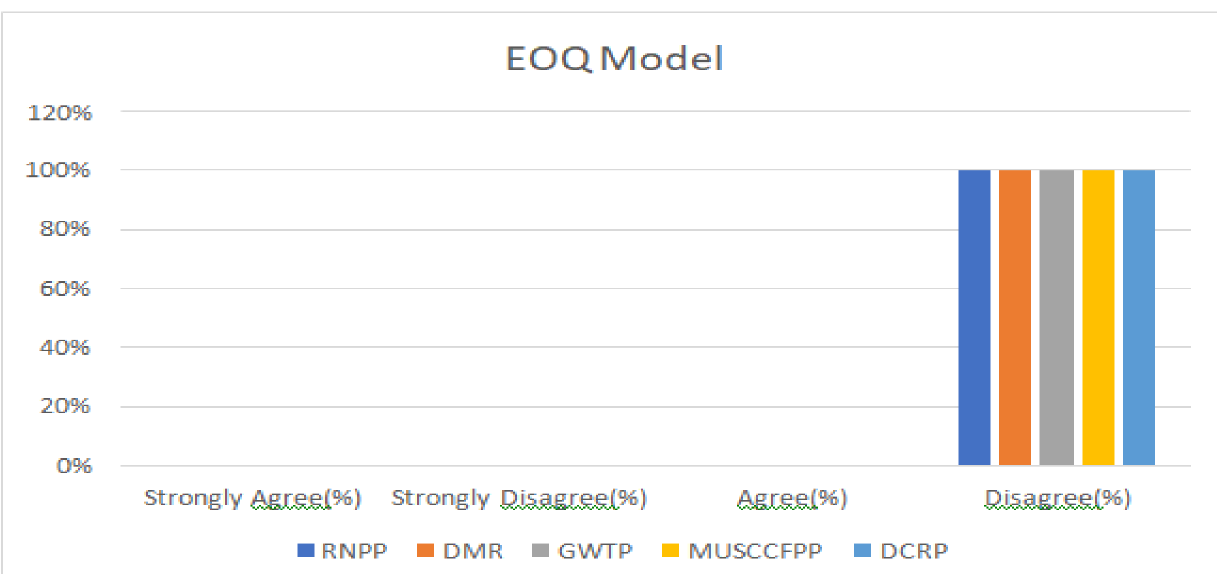

Fig. 13: EOQ Model Practices

From the questionnaire survey in those five projects, we found that all projects have no practices of this tool. The order size of required materials in a construction project depends on project duration, estimation, BOQ, drawing, and schedule. So, this tool may not be used in inventory management in construction projects.

c) HML Analysis (High Medium Low)

HML Analysis is an inventory management technique that classifies the materials on the basis of unit prices.

H represents high-price martial

M represents medium-price martial

L represents low-price martial

Now I will show the HML analysis practices in construction projects in Bangladesh through a graph where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

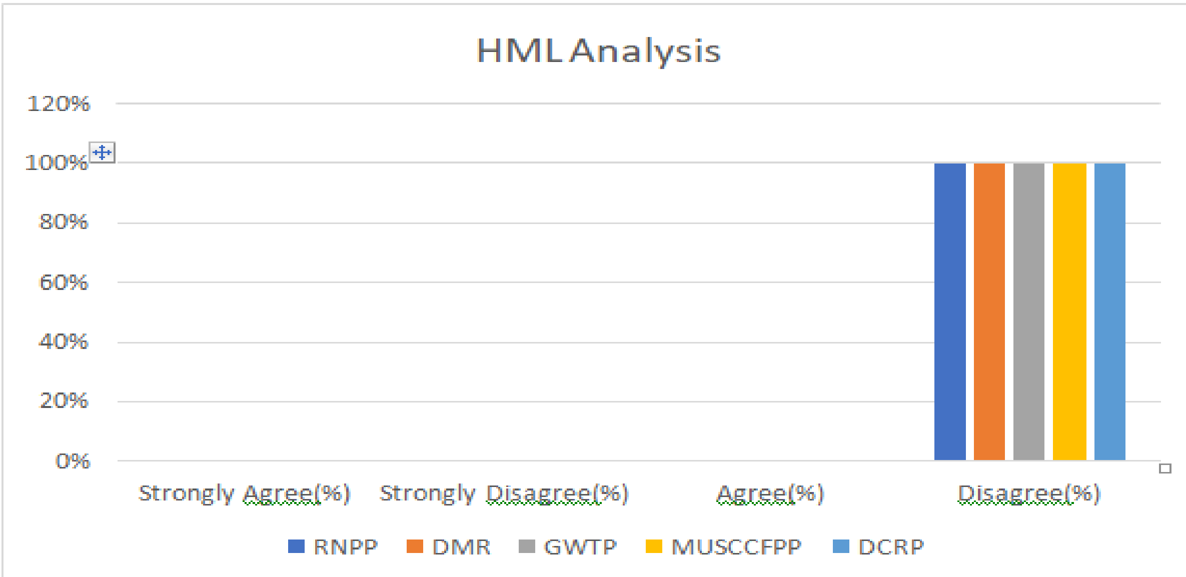

Fig. 14: HML Analysis Practices

From the questionnaire survey in those five projects, we found that all projects have no practices of this tool. In the case of construction projects most important issue is to finish each milestone according to the schedule and the client's required date. And many times, due to the lack of low- price materials a milestone handover may be stopped. So, this tool may not be used in inventory management in construction projects.

d) FSN Analysis (Fast-moving Slow-moving Non-moving)

FSN Analysis is an inventory management technique that classifies the materials on the basis of their frequency of movement from the store.

- *Fast Moving Items:*
  These classified items are stocked up in the store in such a way that they can easily deliver for frequency orders and new items can easily replenish for those items.
- *Slow-moving Items:*
  These classified items are stocked up at some distance from the fast-moving items and do not need to deliver in a certain period of time.
- *Non-moving Items:*
  These classified items are stocked up for disposal over a long period of time.

Now I will show the FSN analysis practices in construction projects in Bangladesh through a graph where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

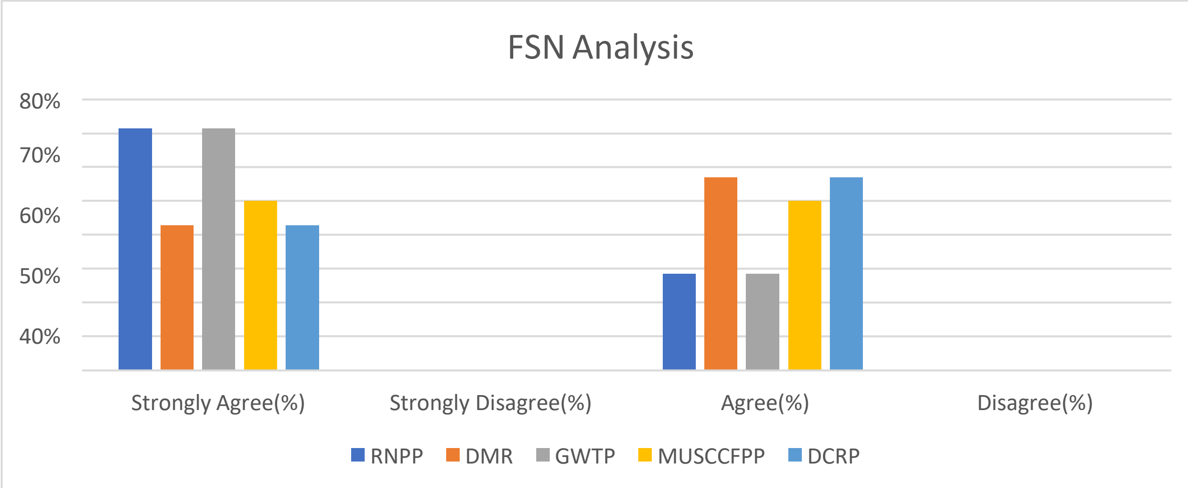

Fig. 15: FSN Analysis Practices

From the questionnaire survey in those five projects, we found that almost all projects have practices of this tool where the project RNPP and GWTP have maximum practices (71%)

e) VED analysis (Vital Essential Desirable)

VED Analysis is an inventory management technique that classifies the materials according to their functional importance in the project.

1. Vital
   - Without which process comes to standstill, non-availability cannot be tolerated
   - Inventory strictly monitored and controlled
2. Essential
   - Non-availability can be tolerated for a certain period if alternative items are available
   - Rigid requirements with reasonably controlled
3. Desirable
   - Non-availability can be tolerated for a long time
   - Stocked in small amounts, purchased based on usage estimates

Now I will show the VED analysis practices in construction projects in Bangladesh through a graph where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

From the questionnaire survey in those five projects, we found that almost all projects have practices of this tool where the project RNPP has maximum practices (50%) and DCRP and MUSCCFPP have comparatively fewer practices (36%) of this tool.

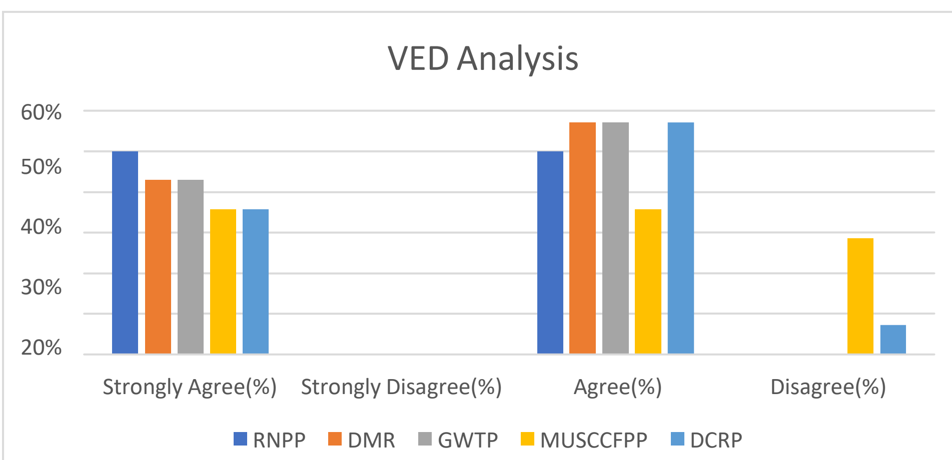

Fig. 16: VED Analysis Practices

f) Just in Time (JIT)

Just in Time is an inventory management technique in which the required materials are received from the previous fixed and contracted supplier only when the project needs those materials. In this case, materials are not stored but when needed supplier delivers them from his own store.

In the case of mega, foreign aid, critical, foreign materials dependent, vast, and specification projects are risky to follow just in time. But in the case of some materials, it may be implemented by analyzing the supplier's ability. But the small construction industry may be implemented this tool. Finally, I want to say that, it is not effective to bring and store the materials long before they need because it increases the holding cost of inventory, and capital is retained.

Now I will show the Just in Time practices in construction projects in Bangladesh through a graph where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

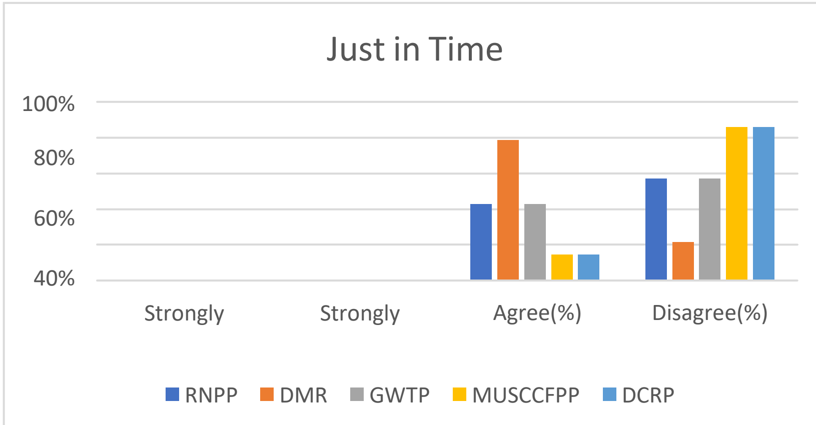

Fig. 17: Just-in-Time Practices

The questionnaire survey and the above graph found that this tool is not followed in the case of all materials, it is followed only in the case of certain materials and it is also depending on the project location. Among the analyzed five projects, the Dhaka Metro Rail project (79%) mostly follows this tool because Dhaka is the capital and crowded city in Bangladesh and here space is not available to store goods. The availability of materials in Dhaka city and the delivery warehouse of suppliers nearest the project also inspired this project to implement this tool. On the other hand, remote projects from Dhaka city like MUSCCFPP, and DCRP comparatively fewer practice this tool.

g) FIFO Analysis

FIFO Analysis is an inventory management technique in which the items that have been received or purchased first and stocked up in the warehouse, must be sold or shipped first from the warehouse. In a construction project, it may be used for the proper valuation of inventory and to protect goods from spoilage. The materials which are not allowed to use when they cross the expiry date and the materials that lose their functionality and quality after crossing the expiry date must implement the FIFO analysis method. All mega projects in Bangladesh use a variety of chemicals, waterproofing materials, and paints that should strictly maintain FIFO analysis and never should order a huge quantity rather than a certain period of demand.

The store personnel should record of receiving date, batch number, and expiry date in the case of this kind of material.

Some common chemicals that are used in construction projects in Bangladesh are:

1. Admixture
2. MasterEmaco
3. Conbextra Gp2
4. Sika Anchorfix
5. MasterRheobuild 623
6. MasterFlow
7. Sika Grout
8. Master Top
9. Master seal
10. Hot Bitumen
11. Mastic 21
12. Bitumen prime coating
13. Technonicol primer
14. Paints
15. Red oxide
16. Wall Putty etc.

Now I will show the FIFO analysis practices in construction projects in Bangladesh through a graph only in the case of construction chemicals where I consider five mega construction projects (RNPP, DMRP, GWTP, DCRP, MUSCCFPP) in Bangladesh.

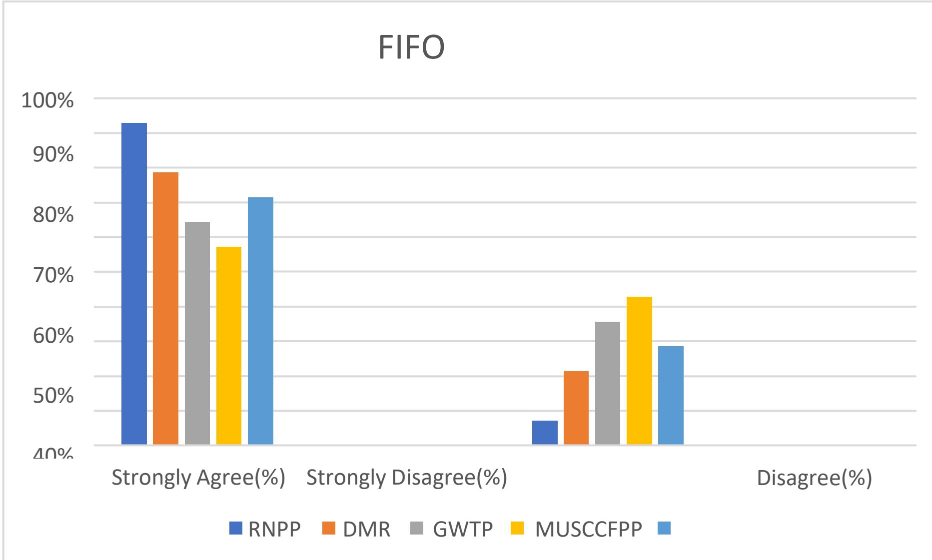

Fig. 18: FIFO Analysis Practices

From the questionnaire survey in those five projects, we found that almost all projects have practices of this tool whereas the project RNPP has maximum practices (93%). All projects follow FIFO Analysis only in the case of construction chemicals.

VI. Conclusion

Maximum mega projects are a new experience in Bangladesh. Different companies in different countries work on these projects and different tools and techniques of their selves exist here. So, most mega projects face different challenging. A successful construction project completion mostly depends on overcoming all inventory management challenges and proper implementation of inventory management tools and techniques. A manufacturing company implements inventory management tools considering annual demand and it is a continuous process but in the case of a project, the demand is fixed as per drawing. So, all tools are not perfect for a construction project. We find from this research that each and every project exist more or less different challenges that have been explained with cause. After surveying five mega projects in Bangladesh, we also observe that some inventory management tools are practiced and some are not. An effective inventory management software like SAP, ERP, and Barcode system may be implemented on the basis of project types.

Abbreviation:

RNPP: Rooppur Nuclear Power Plant

GWTP: Gandharbpur Water Treatment Plant

MUSCCFPP: Matarbari Ultra Super Critical Coal Fired *Power Plant Project DMRP:* Dhaka Metro Rail Project

DCRP: Dohajari-Cox's Bazar Railway Project

FIFO: First in First Out

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

Figures

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

Preparation of Eletronic Figures for Publication

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

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

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Management Research Paper

Techniques for writing a good quality management and business research paper:

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

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

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

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

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

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

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

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

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

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

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

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

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

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

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

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

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

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

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

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

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

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

Informal Guidelines of Research Paper Writing

Key points to remember:

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

Final points:

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

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

The discussion section:

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

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

General style:

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

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

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.

- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

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

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

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

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

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

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

Approach:

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

Introduction:

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

The following approach can create a valuable beginning:

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

Approach:

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

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

Procedures (methods and materials):

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

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

Materials:

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

Methods:

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

Approach:

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

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

What to keep away from:

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

Results:

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

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

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

Content:

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

What to stay away from:

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

Approach:

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

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

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

Figures and tables:

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

Discussion:

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

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

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

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

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

Approach:

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

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

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Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

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Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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