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Envisioning The Future of Transport and Mobility System for Debesmscat using Futures Thinking

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Table of Content

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ABSTRACT

This study concentrated on the existing mobility and transportation situations and status of university commuters. It aims to address the transportation and mobility issues of students and employees at DEBESMSCAT which will look into the current transportation situation, infrastructure, policies, and guidelines, and will propose a plan to improve transportation and mobility. A survey of student commuters in the 2nd district municipality found that there are a variety of transportation modes available, and the mode used varies depending on the respondent's proximity to the DEBESMSCAT main campus. Commuters struggle with the distance from their residence to the school. Moreover, it is found out that the top priority is to maintain existing transportation infrastructure. Policies and guidelines are also important for the mobility of people inside the campus. The Galtung's transcend method and Dator's four future was used in envisioning futuristic scenarios 70 years from now has been applied to think of the plausible scenarios that innovates and creates idea for the present situation the campus has. This futuristic plan is a passageway that would leads to the transportation system and mobility enhancement. Preferred future should be used as a guide to plan the scenarios in contribution to the enhancement of DEBESMSCAT, the researchers recommend to use other futures to further deepen the future.

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CHAPTER ONE
INTRODUCTION

- *Background of the Study*

Today's integration of technologies like the Internet of Things and big data aims to meet the needs of an increasingly resource-demanding society. The use of these technologies on a large scale encourages the development of smart cities. People are more comfortable in smart cities in terms of security, mobility, energy use, and other factors. But to make this change, a significant investment is needed in both socio-economic and technical resources (William Villegas, Xavier Palacios – Pacheco, Sergio Lujan – Mora, 2019). Mobility in transportation is defined as the potential for movement and the ability to get from one place to another using one or more mode of transport to meet daily needs.

Sustainable development is now viewed as a remedy for many environmental problems, including air pollution, ozone layer thinning, global warming, rising ocean levels, and the scarcity of natural resources. Given their enormous environmental effect high level of social responsibility, and essential role in the formation of social behaviors, universities (as one of the most prominent types of public buildings) should be leaders in developing and implementing sustainable practices (Heravi, Aryanpour & Rostami, 2021). Envisioning the transport system and mobility incorporates actions, processes and tasks that promote sustainable transportation modes, and travelers in efficient decisions and raise awareness of DEBESMSCAT people about the environmental effects of travel. Additionally as being stated in the SO 1 of DEBESMSCAT Strategy Map, it ensures prudent use management of resources (e.g., ensure the promotion of safe environment or spaces [LUDIP] green building and generate additional income from non-traditional sources). College campuses, especially the ones with a high numbers of students and staff, can be compared to small cities or neighborhoods, their transport systems and accessibility must be improved to address the increasing needs of their users. This next decade transport will be revolutionized with radical inventions powered by renewable energy, in response to concerns of pollution and congestion to transport system and mobility.

In fact, daily students, teachers, staffs, visitors commute to and from the campus, producing an important impact on the environment and the society. Campus planners must take into account a number of effects produced by the transportation and mobility system, including poor air quality, a lack of parking spots, increasing traffic, and a lack of funding. Since early times people of DEBESMSCAT had sought ways to make travelling faster and more convenient. Ideas that seemed to the realm of science fiction will be made a reality in envisioning the future of transport system and mobility by applying the futures thinking plan.

There are some matters regarding the transportation and mobility inside the campus being observed by the researchers it includes the non-conforming way driver's park, high speed driving inside the campus, high-occupancy vehicle use, as one of means of transportation inside the DEBESMSCAT Campus.

DEBESMSCAT has three (3) parking area for vehicles but due to increasing in numbers of transportation in the campus this results to the congestion and affected the mobility of the students, employees and personnel in the campus, to loitering of vehicles inside the Campus that causes a disturbance to the students, employees and visitors of DEBESMSCAT.

Authorized vehicles in the campus are creating disturbance to the people resulting from its noisy combustion engine and open muffler, reckless drivers who drives in high speed manner not minding the speed limit as stated what needs to be followed inside the campus.

There are also insufficient regulatory signs to be followed, for example the existing one way policy that are not properly observed and obeyed inside the school premises by the visitors and specially the students, staffs and personnel's of DEBESMSCAT Main Campus.

To address the issue of congestion during peak hours, pedestrian and transportation related to infrastructure can be implemented. This will reduce the number of private vehicles. Another solution would be to develop parking areas on the outskirt of the university and students can travel by shuttles or walk from the parking areas to the campus (De Wet, 2018).

DEBESMSCAT, Cabitan, Mandaon, Masbate, Philippines could promote an eco-friendly campus through analysis of the existing policies and guidelines. Development of transport system through the observation of existing transport and mobility inside the campus will contribute in Envisioning SMART transport system and mobility from the current transportation and mobility in DEBESMSCAT. Were already experiencing the beginning of a revolution in transport and these changes are likely to ramp up dramatically between now and 2050.

The researchers conclude that the change will happen unevenly around the world but possibly that the transport system and mobility in DEBESMSCAT could turn its vision into reality by working toward implementing it and catalyzing transformation by envisioning it into SMART transport system and mobility DEBESMSCAT.

Future thinking strategies will be needed by DEBESMSCAT to reach a more futuristic transport system and mobility and a tool to develop a transportation development plan where the existing policies and guidelines will be the basis for creating another

plan and formulate new policies and guidelines to be followed by the student and employee commuters in the campus of DEBESMSCAT Cabitan, Mandaon, Masbate, Philippines.

➢ *Statement of the Problem*

- What are the present transport condition/situation experienced by the students and employee – commuters in DEBESMSCAT in terms of means of transport available, transportation time/duration, and related expenses?
- While in the campus, what means of transportation and mobility do you use/are available to you?
- What are the present transportation and mobility – related infrastructure in the campus? Do you think that there is there a future plan for its improvement?
- Are their existing/proposed transport and mobility – related policies and guidelines implemented by the DEBESMSCAT?
- Using Futures Thinking as basis, what transportation development plan could be proposed for DEBESMSCAT?

➢ *Objectives*

The objective of this study is to propose and design a future transport system and mobility development plan in DEBESMSCAT community based on deep analysis of the prevailing conditions and use of plausible and preferred future scenarios.

➢ *Assumptions*

It is assumed that upon completion of this study, or comprehensive proposal for DEBESMSCATs future transport and mobility systems by 2060 will be produced and would be used as basis in setting the journey of DEBESMSCAT towards implementation of the project.

➢ *Significance of the Study*

The aim of this study is to proposed and design a transport system plan that will contribute to envisioning the future of transport and mobility system by applying future thinking. This study will be undertaken to address, manage, utilize and enhance the transport system and mobility within the campus of DEBESMSCAT Cabitan, Mandaon, Masbate, Philippines.

Benefiting the study are various sectors as follows:

- **DEBESMSCAT** This study will contribute to the improvement of the campus transportation system and mobility. This will encourage DEBESMSCAT to develop or envision transportation modes and system that will help the campus.
- **Community.** This research can help people in the communities to be aware of the new insights and the future of transportation and improvements in the mobility. This will help the communities to experience the future of SMART transport system and mobility.
- **Drivers.** This study will enlighten the drivers of rules and regulations that needs to be follow as a responsible drivers and good individual. This can be a tool to create new ways to the drivers and be informed of the future of transportation system and mobility.
- **Commuters.** This study will serve as new idea to commuters who are seeking information and knowledge about the future of transportation system and mobility. This can help them to be responsible of the rules and regulations being implemented.
- **Policy Makers.** This can be used as basis for policy makers to develop new policies and formulate additional guidelines in relation to the contribution of enhancement of the transport system and mobility.
- **Researchers.** This study can be used as a references by the future researchers that will be conducting the same study or any related studies.

➢ *Scope and Limitations*

The research was conducted at the DEBESMSCAT – Main Campus Cabitan, Mandaon, Masbate, Philippines. The employees and students who were officially enrolled at DEBESMSCAT – Main Campus excluding 4th year students and graduate programs students, who reside in the province of Masbate are chosen as respondents; non – commuter students and employees are not classified as respondents. The Dator's four futures was used to describe scenarios and create a preferred future. Deeping the future was not yet considered in this preliminary study on transport and mobility systems.

➢ *Theoretical Framework*

The Dator's Four Futures is composed of four scenarios that explain how James Dator's Four Future helps future thinkers turns into innovation. It includes growth, collapse, discipline and transformation. This framework by James Dator, one of the fathers of the future studies, is founded on two fundamental truths about our relationship to the future.

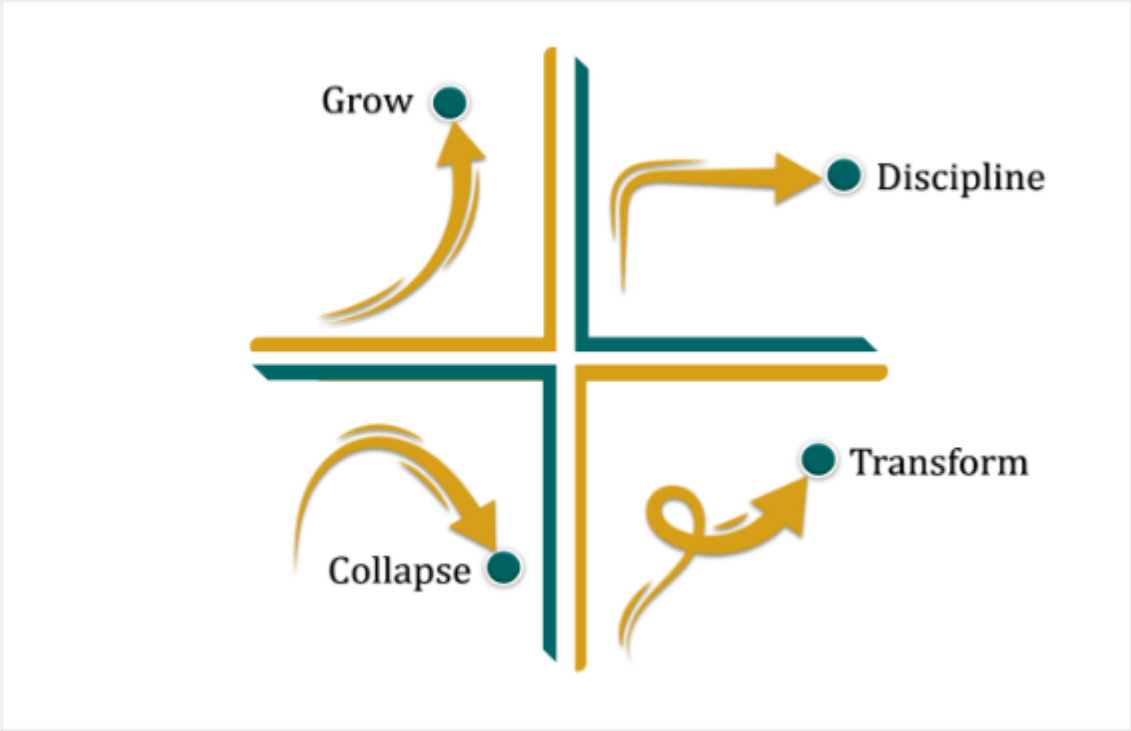

Fig 1 Paradigm of Theoretical Framework
English-Lueck, J.A. & Avery M., (2020)

Dator's model observes that all of narrative (stories, scenarios) on social change issues can be classified into four recurring groups of images, stories, or policies regarding of that particular change. This framework will assist us to better understand it. Growth is described as continued economic growth, widening prosperity, and ongoing technological advance. A Collapse scenario would be a catastrophe that is the result of not in favor or financial disaster that topples life as we know. Discipline is the future most people mean when they describe the actions and behaviors they see as being necessary for reducing the internal and external forces. Transformation is a utopia that some say is possible, but no one can fully articulate right now. However, ideally it would address individual, social, economic, and environmental well-being.

- *Conceptual Framework*

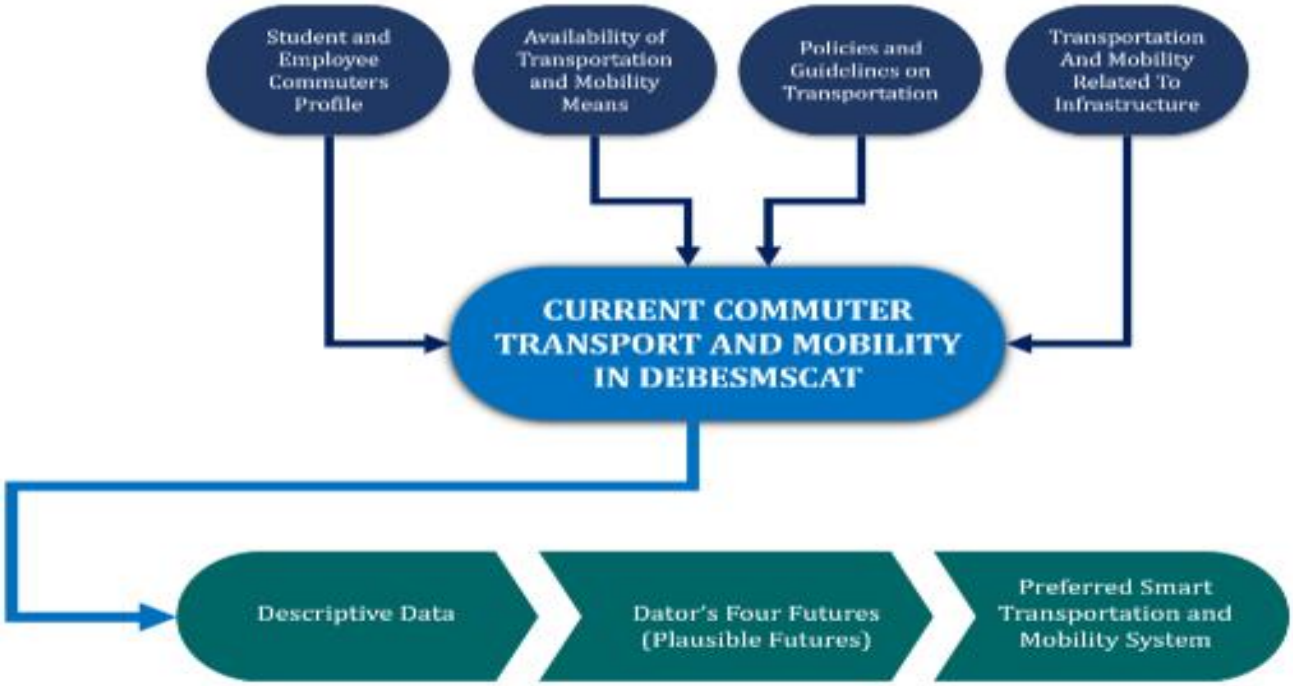

Fig 2 Paradigm of Conceptual Framework

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The conceptual framework includes the students and employee commuters profile, the availability of transportation and mobility means, policies and guidelines on transportation, and transportation mobility related infrastructure that describes the current commuter transportation situation in DEBESMSCAT. The descriptive data complemented the analysis of the current commuter transportation situation that served as input in creating the 4 plausible future scenarios. Upon using DATOR'S FOUR FUTURE is another tool to visualize and outline the growth scenario, the collapse or potential things that will hindrance the plan, the limitations or Disciplines that would be taken into consideration through the current conditions of passengers, and the future's thinker plan that would bring the plan to Transformation. Galtung's transcend model to make preferred future as a guide to plan in transportation and mobility system enhancement of DEBESMSCAT – a strategy to envision the Future of transport and mobility system for DEBESMSCAT. The researchers will offer a survey questionnaire, as well as information on the available transportation options, existing policies, and rules aiming to enhance commuters' current circumstances in DEBESMSCAT. Finally, the preferred future was created and proposed after the analysis of the plausible futures' transform scenario and the influence of sustain, collapse and grow scenarios.

➢ *Definition of Terms*

To better understand the study, the following terms are defined according to its use in this study.

- **Autonomous.** Refers to an AI – system that interprets specific input and executes a set of predetermined instructions without being restricted to doing so, even while the system's behavior is constrained by and aimed at achieving the objective it was given, as well as any pertinent design decisions made by its creator.
- **Collapse**. Refers to the scenarios where the potential outcome or output might decline or have a negative impact.
- **Dator's 4 Future**. Refers to Jim Dator's scenarios that include a number of future – oriented forecasts.
- **Discipline**. Refers to the consideration and maintenance of the scenarios
- **Envisioning.** Refers to a scenario-building method that encourages group discussion of plausible futures.
- **Futures Thinking**. A creative and exploratory process that makes use divergent thought, seek out numerous potential solutions, and accept ambiguity.
- **Growth**. Refers to the current status of the scenarios and the needs of growth at the moment.
- **Mobility**. Characterized as the possibility of movement and capacity to travel utilizing one or more means of transportation to satisfy everyday demands.
- **Plausible Futures.** Refers to the scenarios that are possible given the range of uncertainty.
- **Preferred Futures.** Outlines the specific changes you prefer to happen and supports in developing a plan of action for those changes.
- **Sustainable.** The definition of sustainable in its most basic form is "possible to be sustained.
- **Transportation Demand Management.** A set of methods for expanding traveler options that seeks to enhance the efficiency of the urban transportation system using a variety of approaches.
- **Transformation**. Refers to the radical change in a scenario in which it adopts new innovation and creative ideas.
- **Transport Infrastructure**. Refers to the structure that holds the transport system together.
- **Transport System**. Refers to the set of relationships between nodes, networks, and demand.
- **Visualizing.** Refers to the practice of imagining the goals you have for the future.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

Presented below is the review of related literature of the study of the proposal. This serves has basis in gathering supporting ideas and statements to support this research undertakings.

- *Profile of Student and Employee Commuters*

Targeting sustainability should always start with transportation and specially to begin from the university's society such as students, academicians, and staff (Sundram, Atika & Akmal, 2021). This is true of the fact that universities as the center of excellence in most countries could easily be the potential for triggering transport sustainability practices across the globe. Sustainable transport is about providing the mobility needs of the population. It emphasizes the important mobility dimensions which are the ease, convenience, affordability, and accessibility of traveling to one's destination with minimal impacts on the environment and others (Brough, Wilkie, Ma, Isaac & Gal, 2016).

University campuses have unique transportation requirements with a high concentration of trips throughout several peak periods; hence transportation plays a vital role in campus life for any university community (including students, faculty, staff, and visitors). Universities around the globe are progressively adopting strategies to promote sustainable transportation at their campuses. University communities typically possess many characteristics that make the use of alternate transportation modes convenient and a necessity (Daggett and Gutkowski, 2003).

Unlimited Access is an approach to inducing travel demand for public transport through a university student and staff 'discount', but it creates a lock-in effect for the public transport operations in general because of the Mohring effect (Brown, Hess & Shoup, 2001) with the aim of assessing the effectiveness and the efficiency of different policies and policy mixes, in 2010 we interviewed a sample of students and employees of the University of Trieste (Rotaris and Danielis, 2014). For example, comparing university staff with students in Los Angeles (a car dominant city), students drive alone 15% less on average in terms of commuting distance; their mode choices are responsive to their level of study (undergraduates are more likely to use non-motorized transport); and the availability of a transit pass (Zhou 2016).

The modal share of the car is higher in campuses located at quite some distance from the city centre. In Lisbon (Portugal) for example between 55% and 86% of members of staff (19% and 52% among students) drive to the campus depending on its location (Vale, Pereira & Viana, 2018). Disparities also appear within university communities; students, due to their age and limited financial means, are less likely to have a driver's license or a car, and therefore use automobiles less than employees. At the University of Cantabria (Spain) 50% of the students commute by cars about 75% of the employees (dell'Olio, Codera, Ibeas, Barreda, Alonso & Moura, 2019). Among staff, lecturers and researchers use cars less than members of the administration, primarily because they live in more urban areas (Miralles-Guasch and Domene, 2010).

Students are more likely to use public transport, but also to cycle, because of the low cost and their physical fitness (Shannon, Giles-Corti, Pikora, Bulsara & Shilton, 2006). A few papers noted differences between faculties. Students attending different faculties are known to have different attitudes and personalities, which can affect their mobility patterns (Cattaneo, Cattaneo, Malighetti, Morlotti & Paleari, 2018). For example, among civil engineering students, attending classes on environmental issues increases awareness of environmental problems and influences attitudes to transportation (Kim & Schmöcker, 2016). Several studies have for example shown the importance of parking regulation in the case of campus. Under-priced parking is seen as subsidizing students and staff who drive to campus, while those who walk, bike or ride transit to campus rarely receive any subsidy (Brown et al., 2001).

- *Availability of Transportation and Mobility Means*

In transport terms, this relativity means that the levels of accessibility and mobility of others living in the same area need to be considered to identify transport disadvantage, particularly when the analysis is concerned with the differential levels of area accessibility and area mobility although the outcome measures reflect the performance of transport/land use systems, it, however, cannot be assumed that a lower level of mobility/accessibility for certain groups is due to a non-existence of transport/land use systems.

Promoting alternative means of transport is complicated by the lack of dedicated infrastructure, the lack of recognition of active mobility and the longer duration of journeys by public transport (Miralles-Guasch and Domene, 2010). Therefore, practical elements pertain to the enablement and facilitation of mobility, involving costs, efficiency, expediency, reliability, safety and simplicity of travel alternatives in public space. Related to non-motorized travel, in particular the distances between origin and destination, the presence of coherent routes, safe paths and crossings, as well as the absence of barriers, define practicability (Brownson, Hoehner, Day, Forsyth & Sallis, 2019; Timms and Tight, 2010).

An increase in industrialization and urbanization over time, the demand for transportation has increased proportionately as well. Although the rate of urbanization in Southeast Asia is predicted to decline within the next few decades, the Philippines is experiencing otherwise (United Nations, 2018). Due to increased urbanization and population in its urban cities, inadequacy of transport infrastructures has left the people to develop inexpensive and innovative transportation alternatives (Cervero, 2000). A general increase in registered motor vehicles between 2014 and 2018 in the Philippines is observed (Land Transportation Office, 2018). An increase in number of motor vehicles may lead to worsening traffic prompting commuters to find other means to quickly get to their destination congestion (Fillone, Montalbo, Christopher & Tiglao, 2007).

In the Philippines, only Metro Manila has formal public transport (the Light Rail Transit and Metro Rail Transit), while other urban areas are catered by privately operated informal transportation, such as the Jeepneys (Asian Development Bank, 2012). Other informal transportation that are uniquely found in the Philippines include Tricycle (auto rickshaw), Pedicab or Trisikad (cycle rickshaw), and "Habal-Habal" (for-hire motorcycle). Although unregulated by the government, they are still allowed to operate since they can access locations that other transportation modes are unable or allowed to. Despite diverse options, commuters still tend to own private vehicles (Dissanayake, Kurauchi, Morikawa & Ohashi, 2012).

This suggests the need of extending the analysis to included process-based investigation (e.g., existing transport and/or land use arrangements). The presence and distribution of land use, e.g. identified by its proximity, density and diversity, determine the accessibility of activities with regard to distances, affecting travel efforts, in particular travel time and costs (Van Wee, 2002). These assessments can be used to inform and develop a comprehensive Mobility Management Plan, which should guide the planning priorities within and beyond the university precinct (Gurrutxag, Iturrate, Oses & Garcia, 2017).

A modal choice is defined as the decision to use a particular means of transport to complete a journey. It is often the result of a very compound choice process that can take place consciously or unconsciously and which may be constrained by objective and subjective determinants (De Witte, Hollevoet, Dobruszkes, Hubert & Macharis , 2013).

- *Infrastructure Related to Transportation and Mobility*

Universities have been playing a central role in fostering technological progress in firms (Garcia, Araujo, Mascarini, Gomes, Santos & Costa, 2015). However, it is also known that knowledge spillover is bounded in space, thus imposing a limit to collaborative efforts between universities and firms (Jaffe, Trajtenberg & Henderson, 1993). This implies that pervasive knowledge building requires not only more investments in higher education, but also more investments in the provisioning of adequate road network and efficient transportation systems in order to connect places and boost learning and knowledge diffusion (Feldman and Kogler, 2010). Firms and universities tend to be co-localized (Audretsch and Feldman, 1996). Spatial agglomeration may stimulate the maintenance of frequent contacts between academic researchers and firms' research and development staff (Garcia, Araujo & Mascarini, 2013). Innovative activity tends to be more concentrated than industrial activity (Carlino and Kerr, 2015).

Sustainable infrastructure according to (Ayomi, 2018) is the key to development will involve in social and environmental conditions of the local surroundings. Assessment of the availability of such transport infrastructure is one of the solutions adapted from social and environmental impacts. By conducting a correlation test, the presence of transportation infrastructure and the social conditions of the environment can be identified. (Jackiva Yatskiv, Budilovich & Gromule, 2017) says that availability of infrastructure, ease of information, reduced time and cost are imperative factors in providing an attractive public transport.

Conversely, sustainability and accessibility can easily conflict each other- in case of transportation infrastructure, sustainability appreciates the shared spaces but accessibility desires to remove these obstacles (Tyler, 2017).

Transit network defines the availability of public transportation infrastructure is the area. Transit network covers the empirical value of provision of public transport. It also calculates the mobility with mean of numbers of trips and person-miles covered (Hernandez, 2017). Likewise, (Papantaniou et al., 1917) states that the action plan considers the fact that a University Campus is embedded into the overarching mobility context that see other end-users of the mobility services sharing with the University's end user's infrastructure and services.

Additionally, as being stated by Dowd, Franz & Waseok (2018) system availability for aging transportation infrastructure decreases in the absence of maintenance and modernization activities. This degradation is compounded when coupled with the growing backlog of needs and limited resources, making prioritization of these activities as complex problem. (Qiang Li et al., 2011) mentioned that performance measures are used to communicate the operation of the transportation infrastructure, to build and enhance credibility and accountability, to guide investment, and to support budget and program proposals.

Based from the JICA study on formulation of Spatial Planning they mentioned that "Optimizing utilization of existing transport infrastructure through efficient traffic control and information system", it will mainly utilized the performance of mobility and transport system. Moreover, sustainability of transportation, environmental conditions of an area, public health and economic condition of residents can be raised by shifting from private transport to the public transportation (Elias and Shiftan, 2012).

According also to Luigi (2014) that using the data collected at the various stages of the methodology, the mobility alternatives in this research consider the management of the parking spaces, a bike-sharing system and a shuttle bus to specific destinations from a stadium car park located on the limits of the campus, thereby making the most such a big but often empty city infrastructure.

- *Existing Policies and Guidelines Affecting the Transportation and Mobility*

Universities are an essential source of knowledge and may boost innovative activities of firms. Some authors argue that radical innovations come from outside the firms. The interaction among agents of different areas - such as firms, universities and governments – is essential to allow the sharing of existing knowledge and the absorption of new information (Etzkowitz and Leyedesdorff, 2003). Universities contribute to the formation of new and skilled professionals (Lundvall, Johnson, Andersen & Dalum, 2002) and by doing basic and applied research, thus benefiting firms and the society (Nelson, 1990). Furthermore, universities can play an important role as agents of social development (Arocena & Sutz, 2005), especially in laggard countries or regions at where the productive and innovative activities are weak and not based on high-technology industries compared to the leading economies.

According to Vegas (2011) in policymaking and academics, there is growing interest in the sustainability of transportation and its implications. Concerns concerning the use of present resources are addressed, and sustainability aims to preserve a certain level of resources for future generations. The policymakers will benefit from the analysis and identification of the factors that are acceptable and unacceptable to the commuter profile within the campus by identifying the varied travel behaviors in a campus (Eriksson, 2018) likewise in other study the projections of mobility demand and information of how individuals decide how to travel are the foundations for policy rules on sustainable urban mobility management Cieśla, Sobota & Jacyna, 2020).

The coordination of parking policies and traffic management shows how parking is increasingly affecting through-traffic activities. Additionally, it was stated that policy decisions are made on an as-needed basis, which is accountable for the inefficient use of the existing resources (Janak P., et. al. 2020). Smart parking system will be the solution to the unavailability of resources to the mentioned problem above, this system can minimize the time allotted for parking and spaces consume by vehicles.

In addition, according to Rotaris & Danielis (2014) the ability of these policies to induce a modal shift varies according to the type of user considered: students, faculty and administrative staff. According to the author, the best course of action is to fully subsidize the one-way ticket regardless of the user type being taken in to consideration. If an effective policy is in place, it will reduce traffic congestion and improve mobility inside the campus. These will relate to the analysis of current policies and guidelines within the DEBESMSCAT community in terms of transportation and mobility.

- *Transportation Development Plan to Enhance Mobility*

In order to anticipate potential transport system futures, a vision building process has been developed. The process consists of three consecutive steps, where appropriate futures techniques are used to involve transport sector experts and formulate one or several images of the future transport system. Suitable time frame ranges from 50 to 100 years into the future. The three steps of the vision building process are: 1) environmental scanning, 2) futures table and visions and 3) describing visions. Uncertainty in predicting those impacts remains high though, especially given the intrinsic complexity of the road transport system.

It is unclear how Connected and Automated Vehicles (CAVs), mixed with conventional legacy vehicles, will behave in real traffic. Their promising impacts in energy/fuel efficiency could be partially outweighed by higher travelling speeds where the recent rapid technological development of self-driving cars led to the current situation in which tests with driver-less cars are performed all over the world. With increasing autonomous driving assistance systems in car production, the shift towards a fully autonomous driving experience has already begun (Hörl, Ciari, & Axhausen, 2016). We applied scenario planning, which is increasingly being used to deal with opportunities and risks of complex long-term issues, such as future mobility, instead of straight-line trend analysis or improved travel demand forecast models. Not only are the data to support these latter approaches incomplete and evolving, but also the accuracy of long-term forecasts has long been suspect.

Predictions usually deteriorate with time because of unforeseen effects (Flyvbjerg, 2009). And, according Börjeson (2006) provide a simple typology of the many uses for which scenarios have been developed over the years. The technique we use here would be classified as an external explorative scenario. External means that it focuses on external factors, rather than what can happen if a particular actor takes a certain action. Explorative means that it seeks to understand what can happen in the future, rather than what will happen or how a certain target can be reached.

The increasing digitalization and automation will lead to a significant change in the transport system and mobility. This is especially true for highly automated driving (level 4 high automation), i.e., vehicles that perform all aspects of the dynamic driving task only in specific areas and under specific conditions and, in particular, fully automated driving (level 5 full automation), vehicles that perform the dynamic driving task under all roadway and environmental conditions. However, it is still completely unclear in what form and to what extent this will happen. Numerous drivers and developments, such as climate change, technological and demographic developments or urbanization, are working in parallel, but are also interpenetrating and

thus increasing complexity. At the same time, however, companies, public administrations and politicians need as concrete a framework as possible on how to use increasingly automated services for the mobility of people and goods. This framework for action is particularly important if automated vehicles (AVs) should support the goals of sustainable spatial and transport development.

In this regard, scenarios as representations of possible futures, including their development paths, could help to better imagine possible futures. Scenarios are classified as the central and most widespread method of future research. With the presentation of developments that are thought from the present into the future (forecasting), complex future situations are described as ideal types which, however, do not necessarily have to occur in this form. Scenarios are therefore not prognoses, i.e., they do not describe a certain future, but represent coherent and plausible visions of the future or alternative possibilities ("this is how it could be"). It is largely uncertain whether and which of these possibilities will certainly occur.

Universities have a remarkable capacity for raising public knowledge of all facts of community sustainability. They must first accept and practice sustainable ideas on their own campuses if they are to be effective. One of the industries that has the biggest impact on how the sustainable university campuses is transportation (Dehghanmongabadi & Hoşkara, 2018) thus mobility and access to transportation are significant on college students in the campus.

According to Carol Schweiger (2018) technology, demographics and other altering realities are pushing the transportation industry inexorably toward a more on-demand and demand-responsive future. In this statement it is relatable since transportation in accordance to mobility means are now more enhanced and evolving than in the past due to the new emerging technologies and various ideas using futures thinking are created.

Jim Dator's four futures research seeks to "assist in informing perceptions, options and decisions about the future." (Amara, 1991) It help us to articulate and work towards a desired future and to understand alternatives or preferences for the future as well as plausible development. (Bell, 1993). Growth scenarios are the present situations or conditions that DEBESMSCAT are experiencing in terms of transport and mobility; Collapse scenarios DEBESMSCAT abruptly stop moving in the direction it must be. The structures and methods of action collapse, what could be the possible situations, issues and factors affect the transportation and mobility of DEBESMSCAT. Discipline are scenarios or new forms of restriction and control are imposed in order to keep the current trajectory or situation from collapsing and Transformation are scenarios that the researchers transcend the existing order and discover entirely new systems and ways of being to envision the future of DEBESMSCAT transport system and mobility for the community of the University. Technology for automated driving is developing. However, nothing is known in the literature concerning the release date of autonomous cars, the growth of their market share, and the impact of this new transportation technology on transportation demand and planning (Milakis, 2017). Reducing transportation- and car-related stressors on the environment and society is a necessary aspect of building sustainable urban futures. In discussions concerning the shift to sustainable urban futures, new transportation technology like autonomous vehicles are becoming more prominent. But there are already a lot of unknowns about how autonomous vehicles might affect urban mobility (Acheampong, 2021) with this related literature, it is widely known that for the next many years' autonomous vehicles will emerge and be used by humans. Plausibility aids in the organization of the research's scenarios (Dator's Four Futures), the discussion of potential outcomes, and the creation of a university-wide transportation system and mobility that generates and promotes improved service and standardized transportation. The researcher gathered the data from the survey questionnaire and during the unstructured interview, the researchers provided an overview of the issues and factors that may affect or enhance the effectiveness of transport system and mobility within the Campus. Since Dator's four futures paradigm is on how we interact in the future, the researchers thought of variety of plausible innovation in the future with a great level of confidence in generating a positive impact on the transportation and mobility. HSR has been in operation for over 50 years in many countries. Within Asia itself, during the past two decades several corridors have been developed in the PRC and countries like India, Viet Nam, and Thailand, and others are also planning and constructing HSRs. (Yin, Bertolini & Duan, 2015)

According to Yaqoob, Khan, Kazmi, Imran, Guizani & Hong, (2019) autonomous vehicles is an intelligent vehicles are in high demand as we move forward with a focus on safety and making daily life more convenient. These vehicles support features like sensing the environment, connecting to the internet, obeying traffic guidelines, navigating by themselves, making quick decisions, ensuring pedestrian and passenger safety, parking, etc. Such machines are called autonomous vehicles. They are currently regarded as the topmost level in developing intelligent vehicles. A smart parking system that simultaneously saves parking space is an idea that is expected to provide solutions for parking providers to these problems. In addition to saving land, this system is also able to reduce the possibility of illegal parking and reduction of green open land in densely populated cities. In addition, this system is also equipped with several sensors that are used to ensure the safety of each driver who will park his car. In making this smart parking system, a prototype is needed which is expected to be developed in the future. (Nirwan et.al, 2016) Sidewalks need to be envisioned as a distinct public space, and improvements can be made with that in mind.

The beginnings can be small – with each new project and numerous seemingly minor opportunities for local improvements. According to Ehrenfeucht & Loukaitou-Sideris (2010) sidewalks can accommodate more activities than walking, and more interests than those of abutting property owners. Although planning techniques have at times exacerbated inequality, undermined mechanisms of social integration and unjustly denied access to public spaces, planners have to opportunity to provide

comfortable, well-designed spaces that accommodate formal and informal activities, and allow diverse residents to live more of their lives between buildings. The increasing power of computer technologies, the evolution of software engineering and the advent of the intelligent transport systems has prompted traffic simulation to become one of the most used approaches for traffic analysis in s- port of the design and evaluation of traffic systems. The ability of traffic simulation to emulate the time variability of traffic phenomena makes it a unique tool for capturing the complexity of traffic systems

In recent years, traffic simulation – and namely microscopic traffic simulation – has moved from the academic to the professional world. (Barceló, 2010) A wide variety of traffic simulation software is currently available on the market and it is utilized by thousands of users, consultants, researchers and public agencies developed a completely integrated method for traffic monitoring by combining high-definition intelligent cameras with wireless connectivity to improve the visibility of roadside actions, further steps can be taken to examine, improve, and apply the CVROSS this technique cannot be used in other areas where there is double parking and busy roadside activities. (Ho, Tsang, Wu, Wong & Choy, 2010) E-Bikes are classified according to the power that their electric motor can deliver and the ability of their control systems, which in turn influence when and how the power from the motor is applied (Muetze and Tan, 2007)

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CHAPTER THREE
MATERIALS AND METHODS

This chapter presents the design, instrument, respondents, procedures and tools that used as part of the methodology applied in this research endeavor.

- *Research Design and Method*

The researchers used descriptive research design in this study. The descriptive survey used as a tool in analyzing and collecting data from the current 1st year to 3rd students and employee - commuter transport and mobility conditions in DEBESMSCAT – Main Campus only. Additionally, the researcher used DATOR'S Four Future as one of the methods consisting the growth scenario, collapse scenario, discipline and transformation to create plausible futures that could be used as basis in creating preferred future. Galtung's transcend model was used in determining the preferred future scenarios. The Preferred Futures on envisioning DEBESMSCAT transport system and mobility within the campus. By 2060.

- *Sample and Sampling Techniques*

The researchers used random sampling techniques in this study to determine the number of respondents. The survey monkey online sample size calculator was used for the sample size computation. Enrollment data from the registrar revealed total of 5,366 first year to third year students in DEBESMSCAT. This includes the 391 employees at the Main Campus. Setting the confidence level of 95% and a margin of error 5%, the researchers got a sample size of 359 respondents.

- *Respondents*

The respondents were the current officially enrolled students and employees of DEBESMSCAT – Main Campus. The students and employees of DEBESMSCAT – Main Campus that are residing at the 21 municipalities of Masbate province and who commutes regularly were considered as respondents; however. Students enrolled in Cawayan campus and the Graduate school programs were excluded in the study.

- *Instrumentation*

The research instrument that used to gathered data for the study is survey questionnaire served as the main instrument in gathering data for this study. The questionnaire is divided into 9 sections. Section 1 consists of question 1 and 2 is for the profile of the respondents, section 2 is for modes of transportation, section 3 is for travelling expenses, section 4 is for valid drivers' license of the vehicle owner, section 5 is for challenges and struggles in commuting, section 6 is for distance travel, section 7 is for time duration of travel, section 8 is for factors affecting the environment and mobility within the campus and lastly, section 9 is for target scenarios.

- *Data Gathering Procedure*

A set of questions and items has been formulated to form a survey questionnaire, the researcher conducted a face validity test in which survey questionnaire would be distributed to the 15 persons including instructor and non-respondents to check its validity and relevance to the study. During the face validity test the researcher gathered the information and takes up notes that are relevant and could enhanced the questionnaire for the study. After the face validity test was conducted an item analysis has been done to review and check if there is a need of revision of the questionnaire based on the results and findings. As per the results and findings of the face validity test a revision has been made in the questionnaire, the list of items that has less than 5% of response, a set of questions that found as not relevant to the study are omitted and through checking of the construction of the questionnaire based on the suggestion of the instructor. After the approved revised survey questionnaire, the researchers printed a copies of the questionnaire to be distributed to the respondents (employees and students), it was distributed to the different offices and department in DEBESMSCAT – Main Campus for the employee commuters and to the students. The retrieval of the survey questionnaire was conducted after the respondents answer the questionnaire, afterwards the questionnaire has been collected it was checked for any invalid questionnaire that needs to leave out during the actual counting and tallying of the results, afterwards the researchers starts to tally the results and analyze the findings and data gathered from the 359 respondents.

- *Statistical Tool*

The data gathered by the researchers from the respondents who answered the survey are tallied. The overall result of the question is analyzed to determine the result. This study used the percentage distribution to get the percentage of the items to compare each of the answered, ranking to determine the relationship between set of items in which responses are in higher or lower ranking, weighted mean is used to determine the weighted average of each items to reflect the significant of each data and thus more descriptive and enhanced the accuracy of each item, likert scale a popular statistical used in research study, it is a rating scale in which used to assess opinions based on the responses – it allows the researcher to easily operationalize perceptions or answers in the items.

- *Ethical Consideration*

The researcher upheld respect to the privacy of the respondents during the conduct of the study. Proper information about the purpose and description of the study were indicated at the survey questionnaire. The researchers asked for voluntarily consent of the respondents to answer the survey questionnaire provided by the researchers. Assurance was also made by the researcher that the collected will be solely used in the study.

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CHAPTER FOUR
PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the analysis, interpretation and implications of the data gathered from 359 respondents in transportation and mobility of DEBESMSCAT.

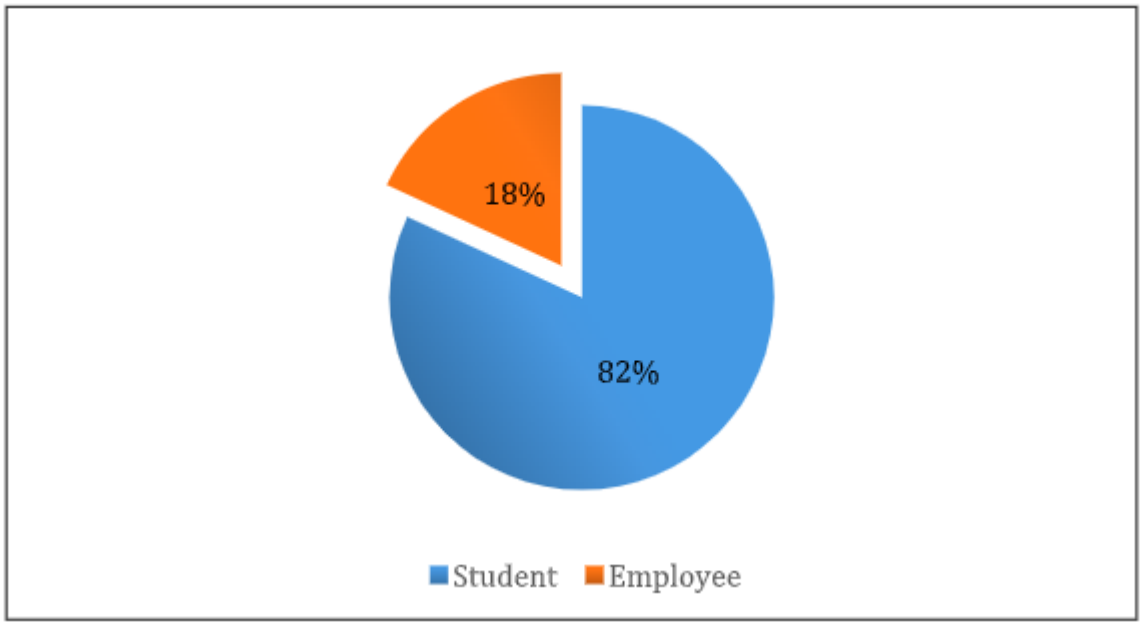

Fig 3 Profile of the Respondents

As shown in Figure 3, it can be observed that 82% or 294 of the respondents are students 18% or 65 are employees of DEBESMSCAT – Main Campus. It implies that the students has the more number of responses and commuters rather than employees since Universities or campuses are compose mostly of student's population.

Table 1 shows the different municipality where the respondents resides. According to Hillman (2016) students frequently prefer to stay close to their places of employment and residence while attending college. The three (3) highest number of respondents are from 2nd district municipality which 78 or 22% of them are from Aroroy, 81 or 23% are from Mandaon and 57 or 16% are from Milagros. This implies that most of the students of DEBESMSCAT – Main Campus are from 2nd district municipalities. The 1st district municipalities includes Batuan, Claveria, Monreal, San Fernando, San Jacinto and San Pascual with a total of 26 respondents or 8% of the total population had the least number of respondents since the municipalities are located in the coastal areas and are far from DEBESMSCAT. 3rd district municipalities includes Cataingan, Cawayan, Dimasalang, Esperanza, Palanas, Pio V. Corpuz, Placer and Uson with a total of 62 respondents or 17% of the total population. Placer and San Pascual receive zero (0) response, Since Placer and San Pascual is a coastal municipality in the island of Masbate and the closest cities were Masbate City, Cebu, Samar, Negros Occidental, Albay and Camarines Sur located in western, eastern Visayas and Bicol region, it is difficult to find respondents came from this municipalities. It implies that there are universities and colleges to choose from that are nearer than DEBESMSCAT.

Table 1 Municipality Address of the Respondents

No.	Municipality	District	Frequency Count	Percentage
1	Mandaon	2nd District	81	23%
2	Aroroy		78	22%
3	Milagros		57	16%
4	Masbate		25	7%
5	Baleno		15	4%
6	Mobo		11	3%
7	Balud		4	1%
8	Uson	3rd District	17	5%
9	Palanas		17	5%
10	Cawayan		13	4%
11	Cataingan		7	2%
12	Dimasalang		4	1%
13	Esperanza		3	1%

14	Pio V. Corpus		1	0.27
15	Placer		0	0%
16	Claveria	1st District	7	2%
17	San Jacinto		6	2%
18	San Fernando		5	1%
19	Monreal		4	1%
20	Batuan		4	1%
21	San Pascual		0	0%

Table 2 Transportation Modes Used from Municipality to DEBESMSCAT

No.		Frequency Count	Percentage	Ranking
1	Motorcycle (Private)	159	30%	**1st**
2	Van	109	21%	**2nd**
3	Motorcycle (Habal – habal)	76	14%	**3rd**
4	Tricycle (Pampasahero)	71	13%	**4th**
5	Bus	68	13%	**5th**
6	Tricycle (Private)	28	5%	**6th**
7	Others, please specify	19	4%	**7th**

Table 2 shows the mode of transportation used by the students and employee commuters from their municipalities to DEBESMSCAT. Motorcycle (private) obtained a 30% or 159 out of the 359 total responses and ranked as the 1st. According to Zolnik (2012), commuters are more sensitive to negative transport externalities prefer private vehicles to public transport or active travel. It implies that most of the respondents prefer to ride with their own personal vehicle rather than use public transport due to the amount of time they would spent on travel and the inconvenience that may occur during travel time. Van with 21% or 109 of the responses. It implies that rather than private vehicle the 2nd most preferable used by the commuters students and employees is a public transport since the amount of time travel by van is shorten than any other public transport available. The tricycle (pampasahero) ranks in the middle with 13% or 71 out of the 359 total responses since most of the respondents reside at Aroroy, Mandaon and Milagros a 2nd district municipalities. It implies that some of the respondents use a public transport with a short distance travel to commute from their residence to DEBESMSCAT. Others, please specify ranks 7th with 6% or 19 out of 359 total responses, municipality from coastal areas are mostly the one who answered this item, it includes the passenger boat, fast craft as a mode of transport this results implies that respondents varies its transportation modes in municipalities area.

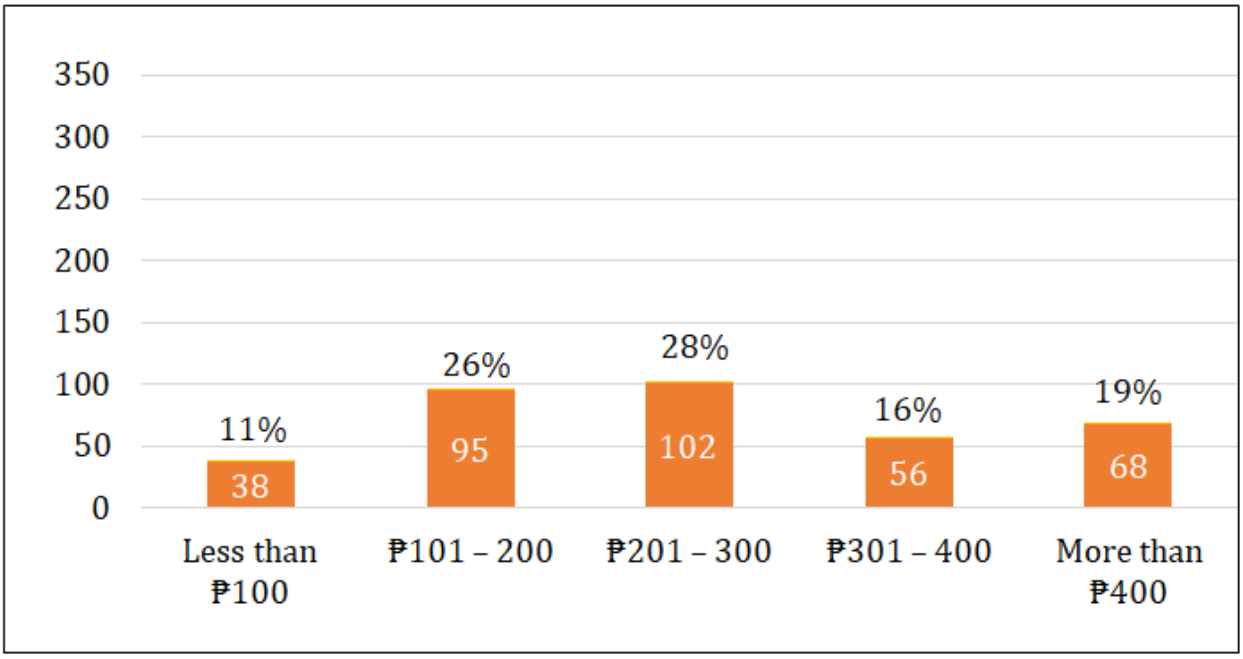

Fig 4 Expenses in Traveling to DEBESMSCAT – Main Campus

As shown in Figure 4 the commuters expenses in travelling to DEBESMSCAT. As you can see most of the commuters spent up to ₱201-300 with 28% or 102 responses. The researchers found out upon the responses that the least amount of spent in travel is less than ₱100 with 11% or 38 responses. It implies that most students and employees commuters spent fare rates to DEBESMSCAT is costing higher than before. During the unstructured interview some of the respondents said that "gasoline price is now expensive" and usually some are prefer to transport in public.

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Figure 5 shows a total of 192 out of the 359 total respondents owned a private vehicle. There are 16% or 57 respondents have a valid driver license while 38% or 135 out of 359 total respondents haven't. Disparities also exist within university communities, as they are younger and have less money, students are less likely to have a driver's or a car and use car less frequently than workers. At the University of Cantabria in Spain, 50% of students and 75% of employees commute by automobile (dell'Olio, Codera, Ibeas, Barreda, Alonso & Moura, 2019). It implies that the mostly of the respondents have privately owned a vehicle but doesn't have a driver license.

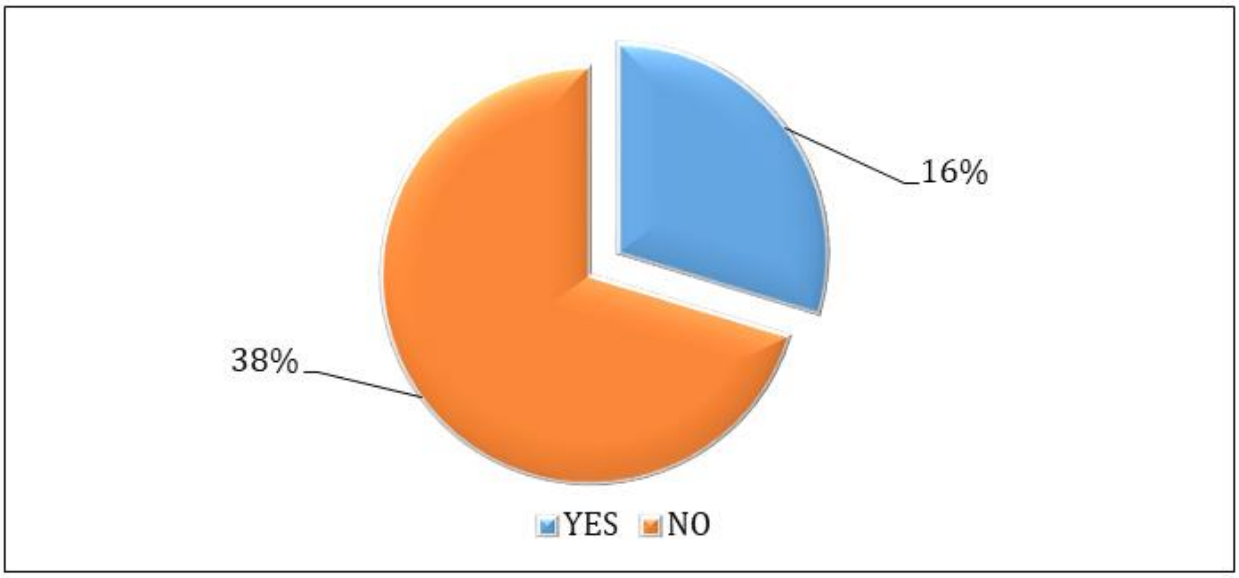

Fig 5 Percentage Distribution of Vehicles Owner with Valid Driver's License

Table 3 shows the frequency count, percentage and ranking of the struggles encountered by commuters. It can be observed that the top three (3) utmost struggles of the commuters are the accessibility of travelling from your home with 46% or 165 out of 359 respondents, fare rates on the public transport are expensive 45% or 161 out of the 359 total respondents and number of transfer times before you arrive to your destination with 30% or 107 total responses. According to Wang & Lui (2015) that distance and travel time are the most significant factors of using public transportation. It implies that travelling from a distant place is a struggle to the respondents. Then I own a vehicle and maintaining it is expensive item show 13% or 48 which ranks 6th.

Table 3 Struggles Encountered by Commuters

No.	Statements	Frequency Count	Percentage	Ranking
1	Accessibility of travelling from your home to DEBESMSCAT	165	25%	1st
2	Fare rates on the public transport are expensive	161	25%	2nd
3	Number of transfer times before you arrive to your destination	107	16%	3rd
4	I own a vehicle but the fuel is expensive	100	15%	4th
5	Experiencing car sickness	75	12%	5th
6	I own a vehicle and maintaining it is expensive	48	7%	6th

Figure 6 presents the data and results of the distance in kilometer (km) from a residence to DEBESMSCAT – Main Campus. Less than 50 km obtained 48% or 171 out of the 359 total respondents. It implies that the respondents are near in the school since mostly of the students are from 2nd district. More than 120 km with 20% or 75 out of the 359 total respondents. It implies that there are respondents who travel a long distance to DEBESMSCAT – Main Campus.

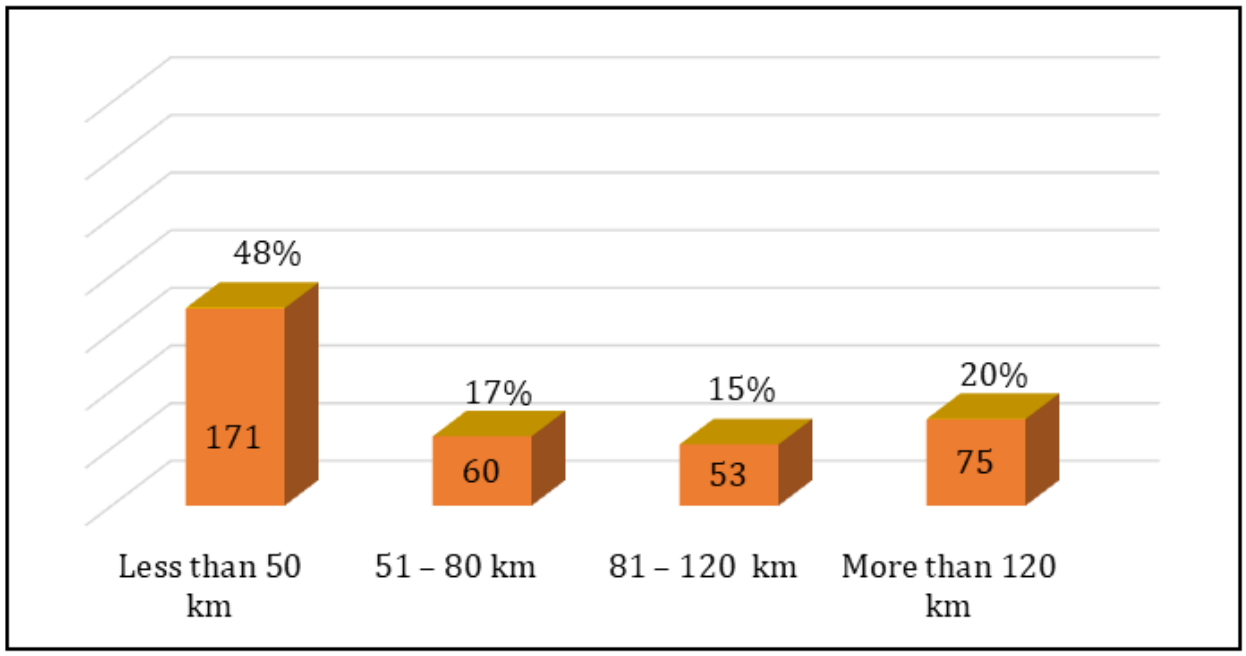

Fig 6 The Distance from a Residence to DEBESMSCAT

Table 4 Number of Hours Travelled from Home to DEBESMSCAT

No.	Statements	Weighted Mean	Adjectival Rating
1	Less than 1 hour	3.92	**Very Often**
2	1 – 2 hours	3.68	**Very Often**
3	2 – 3 hours	2.76	**Sometimes**
4	More than 3 hours	2.67	**Sometimes**
Overall weighted Mean		3.26	**Sometimes**

Table 4 presents the number of hours travel from home to DEBESMSCAT. Less than 1 hour obtained the highest number of response with a weighted mean of 3.92 which is verbally interpreted as very often. It implies that the respondents travel time is less time consuming when traveling to school from residence. 1 – 2 hours obtained a weighted mean of 3.68 which also verbally interpreted as very often. For 2 – 3 hours with a weighted mean of 2.76 and more than 3 hours with a weighted mean of 2.67 have the same verbal interpretation as sometimes, respondents from the 3rd district municipality are the ones that travel more than 3 hours which considerably a long distance time travel.

Table 5 Factors Affecting the Environment and Mobility within the Campus

No.	Statements	Weighted Mean	Adjectival Rating
1	Policy and Guidelines not being followed thoroughly	3.89	**Agree**
2	Limited infrastructure related to transportation within the Campus	3.64	**Agree**
3	Not enough designated parking areas within the campus	3.61	**Agree**
4	Reckless drivers	3.52	**Agree**
5	Vehicles that exhaust emissions, fumes and smokes	3.5	**Agree**
6	Increasing traffic congestion resulting to decreasing mobility	3.29	**Neutral**
7	Loud vehicular noise	3.23	**Neutral**
8	No visible traffic signs	2.89	**Neutral**
9	Limited traffic signage	2.41	**Disagree**

Table 5 presents the data of factors affecting the environment and mobility within the campus. Policy and guidelines not being followed thoroughly are 1st with a weighted mean of 3.89. Improvements in the worldwide environmental efficiency have not been sufficient to deal with the effects of transport growth, despite the introduction of numerous instruments into the transport system, they have not been able to achieve their goal. Improving the effectiveness of the system of policy tools is the ultimate environmental problem facing those responsible for transportation policy (Vieira, Moura & Viegas, 2007). Next limited

infrastructure related to transportation within the Campus with a weighted mean of 3.64, not enough designated parking areas within the campus with a weighted mean of 3.61 and reckless drivers weighted mean of 3.52 which verbally interpreted also as agree. According to Buyvol (2021), fleets of transportation rise as urbanization quickens. The lack of time for road infrastructure to expand at the same rate results in issues with organization and road safety. Vehicles that exhaust emissions, fumes and smokes, increasing traffic congestion resulting to decreasing mobility, noise pollution has increased an alarming level that needs to be managed and prevent further harm since technology, industrialization and transportation has advanced quickly (Rahman Farooqi, 2020), in which loud vehicular noise with a weighted mean of 3.23 and no visible traffic signs with a weighted mean of 2.89 which verbally interpreted as neutral this results to qualification as the factors that may affect the environment and mobility within the campus. Limited traffic signage receives a weighted mean of 2.41 which verbally interpreted as disagree. It implies that there's a dissent effect to the mobility within the college campus.

Sticker policy is known as a policy and regulation of the school to raise the security and safety of the people inside the campus it includes that if a vehicle don't have sticker the school guard as per the rules and regulations stated in the manual the vehicle is not allowed to enter in the premises of the campus, but based on the observation of the researchers it is not being followed thoroughly and as for the conduct of this study it can be modified for the enhancement of the mobility inside the campus.

The Table 6 presents the ranking of futuristic scenarios. Prioritizing maintenance of existing transportation infrastructure with a score of 961 which rank 1st out of the four futuristic scenarios. According to Shi, Xiang, Xiao & Xing (2021), the economy of a country depends on the nation's transportation infrastructure, such as its roads and bridges. However, a significant portion of the transportation infrastructure is fundamentally weak and underperforming and has to be fixed and rebuilt. A variety of different sorts and levels of actions with intricate consequences to maintain aging transportation infrastructure. Without maintenance and modernization efforts, the availability of the old transportation infrastructure degrades (Dowd, Franz & Waseok, 2018). Changing existing policies and add new guidelines with a score of 909 ranks 2nd. It implies that it is good to enhance the existing policies for a new ways and ideas that needed to be created in improvement of the transportation and mobility conditions, then for the 3rd rank encourage development in activity centers and around transit situation with a score of 907 and for the last coordinate land use and transportation decision – making garnered an 814 score which rank 4th. According to Faubert (1990), planning for transportation is the process of resolving societal issues while aiming to meet public demand for transportation. Making decisions is what this process ultimately leads to. In the development of the interactions between land use and transportation. It is evident that decisions about transportation have an impact on land-use patterns and vice versa (Kelly, 1994).

Table 6 Ranking of Futuristic Scenarios

No.	Statements	Raw Score	Ranking
1	Prioritize maintenance of existing transportation infrastructure	961	**1st**
2	Plan for changing existing policies and add new guidelines	909	**2nd**
3	Encourage development in activity centers and around transit situation	907	**3rd**
4	Coordinate land use and transportation decision – making	814	**4th**

Table 7 Dator's Four Futures

Sustain	• Many commuting students are from the 2nd District • Private vehicle as prominent used transport • Average fare amount spent on traveling • Accessibility to the school from home • Commuters travel less than 50 km from their municipality to DEBESMSCAT • A hour and two (2) duration of travel time from a municipality to DEBESMSCAT by the commuters • Prioritizing maintenance of existing transportation and infrastructure • Planning of changing existing policies and adding new guidelines
Collapse	• Decrease in enrolment • Increase in air pollution • Increase in gas price • Increase in mobility • Increase in fare rates of public transport • Changes in travel mode preferences by the commuters • Increase in traffic congestion • Poor road construction

	• Limited infrastructure related to transportation and mobility • Lack of budget in rehabilitation of infrastructure related to transport and mobility • Changes in commuter behaviour due to time and travel distance consumption • Unavailability of extended amount of land – use • Lack of good and high quality of technological resources • Infrastructure and economic interdependency • Urbanization
Grow	• Increase enrolment • Increase commuters • Increase in vehicles • Allowing authorized public transport vehicles to enter to DEBESMCAT • Decrease in gas prices • Construction of parking areas • Implementation of road traffic signage
	• Adding more transportation infrastructure to facilitates vehicles • Increase in infrastructure related to mobility and transportation • Enhancement of the existing infrastructure related to transportation and mobility • Communication and monitoring to the management
Transform	• Rotary Smart Parking System • Bullet train • Autonomous car vehicles • Traffic simulation software • Intelligent road surveillance system • Luminous side walk/pavements • Faster – R – CNN

The researcher used a table to shows the four scenarios by Jim Dator, the current status of DEBESMSCAT as sustain, the negative effects and scenarios that could affect the growth of the current status as collapse, grow as the scenarios that could help to enhance and improve the current status and for the ideal and futuristic scenarios to envision the future of DEBESMSCAT as transform. DEBESMSCAT possess a remarkable capacity for raising public knowledge of all facets of community sustainability. They must first incorporate and serve as models for sustainable practices on their own campuses if they are to succeed. It is challenging for the researchers and policy planners for long-range transportation development plan- to plan for a transportation travel patterns that are likely to change in ways that we can at this time. DEBESMSCAT transportation and mobility system is able to provide communities with the fundamental needs of safety, well-being, comfort, health, economic growth and social development to varied degrees depending on the variety of its modes.

As a result many of student's commuters are from the 2nd district traveling to and from DEBESMSCAT campus, an increased in the use of private vehicle as a mode of transport are seen. Prioritizing the maintenance of the existing transportation as a scenario in contribution to the development of the transport system of DEBESMSCAT. The mentioned scenarios from the table in the row of sustain is the current status of DEBESMSCAT based on the results of the survey conducted by the researchers. Transportation systems are designed to operate under defined conditions with criteria such as capacity, frequency, or timeliness. Yet, disruptions caused are rather frequent and well-mitigated. There is a level of tolerance to disruption built into transportation infrastructures and their operations. The emergence of the increasing number of commuters and private vehicles affects the environment and mobility within the campus such as deterioration of transport infrastructure, lack of support and budget on the construction of the infrastructure and this are scenarios that are needed to prevent or minimize in order to grow and transform the current status of DEBESMSCAT campus in transportation and mobility. Fortunately, awareness about their negative impacts has greatly increased along with special attempts by university planners to supply sustainable transportation options. Rebuilding the road network, implementation and construction of infrastructure related to transport systems as a contribution in the enhancement of DEBESMSCAT transportation and mobility system. Planners will best serve their many urban publics by providing better infrastructure and adaptable spaces throughout the campus and by realizes that by controlling less, students, employees and visitors alike would benefits from the development.

The advancements in automation and opportunities offered by cutting-edge technology serve as the base for intelligent vehicles that are emerging will enable innovation of ideas to envision the current status of DEBESMSCAT by 2070. Promoting sustainable modes of transportation for university campuses has many environmental, social, and economic benefits, but the educational benefits of this effort are most profound since internally they have a duty to educate and foster the next generation of decision makers and externally they have a duty to spread the most progressive knowledge into general usage. In technology

industry are accelerating the speed of automotive technology innovation as they develop new concepts of electric, connected, autonomous, and shared mobility. The technological era is developing rapidly in line with the needs of the problems that arise. The problems that arise can be overcome with technology, both in the fields of agricultural, education, and medicine.

- *Preferred Futures of Transport and Mobility System of DEBESMSCAT*

To plan and deliver higher-quality, more coordinated, more sustainable, and better utilized campus transportation services, it is vital to have an authoritative transportation management organization for DEBESMSCAT that can identify appropriate strategies based on current conditions and user expectations. More commuters of DEBESMSCAT will switch to active means of transportation if policies are put in place to discourage the use of personal vehicles and to support those who already use them. The most recent iteration of the current standards must be taken into account and applied in order to improve the quality of services associated to achieve modes of transportation. Accordingly development of preferred future for transport and mobility system for DEBESMSCAT aimed to provide high-quality and sustainable mobility and transport to, through and within an area as a recommendations. As a result of increased university attendance, the number of commuters to and from university campuses has likewise increased, the majority of these commuters use private automobiles as their mode of transport. According to Zhan, Yan, Zhu and Wang (2016) the dependency on private automobiles is directly related to the lack of appropriate infrastructures and strategies for shared other modes of transportation.

Consideration of concerns related to the transportation sector is a first step in moving towards achieving sustainability on university campuses, accordingly development of preferred future for transport and mobility system for DEBESMSCAT aimed to provide high-quality and sustainable mobility and transport to, through and within an area as a recommendations, there is an indispensable need for inclusion of Transportation Demand Management (TDM) strategies in comprehensive transportation system plans for university campuses. TDM encourages strategies for better management to promote more effective and environmentally-conscious attitudes about transportation. It is defined as the art of changing transportation behavior. Since the use of private vehicles is a prominent case in DEBESMSCAT, in which several factors affects the environment and situation within the campus such as increase in congestion and air pollution due to the emission of gas from the vehicles. Stimulating a strategic planning on transport and mobility of DEBESMSCAT to minimize and support owner who use already the use of private vehicle. Systematized registration of vehicles ownership used inside the campus as one of the scenario for DEBESMSCAT enhancement of the current status related to the use of private vehicles, a computer – based system offers less effort and time friendly using QR code sticker to detect and records the time and date of the vehicles arrival and departure, the identification of the owner is included in the registration to ensure the safety and security within the campus.

Considering the behavioral influence of the commuters in the improvement of policies and guidelines related to mobility and transport system within DEBESMSCAT campus, the researchers encourages another alternative strategies in the use of mode in transportation within the campus, the need of rebuilding our deteriorating infrastructure for DEBESMSCAT as DEBESMSCAT proceed with the objectives of developing a greener, more effective and futuristic transportation systems the promotion of eco-friendly commuting to and from DEBESMSCAT could be a help to the enhancement of situation to facilitate students and employees of DEBESMSCAT.

A parking management and utilization program where issues related to parking facilities can be divided into two different categories: supply and management. Management approaches play a crucial role in the solution of the parking problem and they need not only supply solutions, but also support and provide more strategies which move toward a more efficient use of existing parking capacity, also essential to a parking supply program. Implementation of additional parking space to accommodate and facilitates the modes use in transportation.

The researchers want to underline that the adoption of Transport and mobility system in DEBESMSCAT should turn plan into action, which will allow DEBESMSCAT to get started right away on delivering transportation innovations from 2070, like there will be widespread adoption of accurate real-time information, smart infrastructure, and automated vehicles available. Public Transportation Strategy (U-Pass Program) is one of the strategic planning for the transport and enhancement of DEBESMCAT. Public transportation strategies like the U-Pass Program are one of the most popular of the TDM strategies for university campuses. The U-Pass Program's main goal is to encourage all participants to use public transportation modes (buses, trains, or light rail) and/or active transportation modes (bicycles, walking, etc.) rather than commuting by private cars to reduce the pollution and congestion that could hindrance in the mobility within the campus, solely for DEBESMSCAT from the municipality travel by the commuters. According to American University Officials, the top five reasons to apply the U-Pass Program are: declines in parking demand and traffic; improved access to housing and the university campus by all members; decreased costs of travel and student education; increased transportation justice, and enhanced usage levels of sustainable, active modes of transportation. These developments will accelerate and increase the efficiency of both human and commercial transportation consistent across all modes.

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CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presented the summary of the study, conclusions and recommendations given by the considering the result of the study.

- *Summary*

The study was conducted in DEBESMSCAT, Cabitan, Mandaon, Masbate, Philippines with 359 total number of chosen respondents who came from 21 municipalities in Masbate province.

This study is to propose and design a future transport system and mobility development plan in DEBESMSCAT community based on the deep analysis of the prevailing conditions and use of plausible and preferred future scenarios. Specifically, this research study was conducted with the aims to answer the following statement of the problem; What are the present transport condition/situation experienced by the students and employee – commuters in DEBESMSCAT in terms of means of transport available, transportation time/duration, and related expenses?, While in the campus, what means of transportation and mobility do you use/are available to you?, What are the present transportation and mobility – related infrastructure in the campus? Do you think that there is there a future plan for its improvement?, Are their existing/proposed transport and mobility – related policies and guidelines implemented by the DEBESMSCAT? And using Futures Thinking as basis, what transportation development plan could be proposed for DEBESMSCAT?

The study employed the descriptive research design survey to be a tool in collecting data from the 1st year to 3rd year students and employees' commuters on transport and mobility conditions in DEBESMSCAT. Random sampling techniques was used in gathering data from the commuters from 21 municipalities and frequency count, percentage distribution, ranking and weighted mean was used as a tool to analyze and determine the result of the survey tallied. Additionally, DATOR's Four Future was used as one of the methods in visualizing plausible futures and Galtung's transcend model in determining the preferred futures.

There are many students commuters from the 2nd municipality with a total of 82% of the total respondents. Motorcycle (private) ranked as 1st of the highest and common mode of transportation of the students and employees with an expense or fare rate of 201 – 300 pesos. This study revealed that a total of 192 responses, owned a private vehicle but only 57 or 16% does have a valid driver's license and 135 or 16% doesn't. Accessibility of travelling to the public from home, fare rates and number of transfer times before arriving to the destination are listed as the top three (3) in terms of struggles encountered by commuters. According to the results the commuters travel from home to DEBESMSCAT a distance of less than 50 km while there are respondents who travel more than 120 km which is considered a long distance travel to DEBESMSCAT. Moreover, it is indicated in this research study that based on the data by number of hours travel from home to DEBESMSCAT by the commuters less than 1 hour received the highest number of response with a weighted mean of 3.92 which is verbally interpreted as very often and implies that the respondents travel time is less time consuming when traveling to school from residence. It is also indicated that in terms of factors affecting the environment and mobility within the campus, policy and guidelines not being followed thoroughly ranks 1st with a weighted mean of 3.89 which is verbally interpreted as agree. In the futuristic scenarios that the commuters need to rank among their top priorities it revealed that prioritize maintenance of existing transportation infrastructure rated as rank 1.

- *Conclusion*

Based on the findings of the study the researchers came up with the conclusion that there are more numbers of student commuters than employees hence various modes of transportation are used to travel from their residence to DEBESMSCAT Main Campus Motorcycle (Private) are the most used transportation mode. Mostly of the respondents are from the 2nd District Municipality including Aroroy, Milagros and Mandaon. Distance travel, amount of time spent and accessibility from their residence to DEBESMSCAT Main Campus has an impact to the choice and behaviors of the commuters in terms of transportation modes and mobility. Policies and guidelines must be followed thoroughly to minimize the effects on the mobility within the campus, additional parking areas and spaces should be implemented to ensure that the congestion inside the campus will be prevented. Variety of situations that affects the mobility and environment within the campus has been observed.

Plausible and preferred futures are necessary to determine the scenarios that could results to the enhancement of the current status of the DEBESMSCAT Main Campus and envision futuristic scenarios in terms of transportation and mobility based on the results and findings of the study.

➢ *Recommendations*

Based on the foregoing findings and conclusion, the following recommendations are hereby suggested:

- The study focuses only on the transport and mobility of DEBESMSCAT Main Campus it is hereby recommended by the researchers that other universities or colleges in the province of Masbate must be considered to extend the scope of the study.
- Preferred Future should be used to determine scenarios that will guide in planning for the improvement of the transport and mobility in DEBESMSCAT.
- The researcher used plausible and preferred futures as a tool and methods in determining and envisioning scenarios on transportation and mobility of DEBESMSCAT, thus other future methods are highly recommended to be used to further deepen the future.

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