

An-Najah National University

Faculty of Graduate Studies

**Purchasing Intention and Adoption of
Electric Vehicles and their Impact on
Sustainability in the West Bank**

By

Manar Ramadan

Supervisor

Dr. Mohammed Othman

**This Thesis is submitted in Partial Fulfillment of the Requirements for
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By

Manar H. Ramadan

This Thesis was Defended Successfully on 20/1/2021 and approved by:

Defense Committee Members:

Signature

Dr. Mohammed Othman / Supervisor

Dr. Majeed Mansour / External Examiner

Dr. Yahya Saleh / Internal Examiner



الإهداء

اللهم لك الحمد كما اعنتني وهديتني ووفقتني لأتم هذا العمل

لروح والدي الطيب.. والدتي الجميلة التي لا تكف عن الدعاء لأحلامي لتنمو وتكبر وتصبح
واقعا..

زوجي الذي تحمل معي عناء الوقت.. لكل من ترك أثرا طيبا في حياتي ولم يسعفني الوقت لأقل
له شكرا

وجزيل شكري أمتناني للدكتور الرائع محمد عثمان... لكل ما فعله وما بذله من أجل مساعدتي

منار رمضان

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الاقرار

أنا الموقعة أدناه، مقدّمة الرسالة التي تحمل العنوان:

**Purchasing Intention and Adoption of Electric Vehicles and their
Impact on Sustainability in the West Bank**

أقر بأن ما اشتملت عليه هذه الأطروحة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد. وأن هذه الرسالة كاملة، أو أي جزء منها لم يقدم من قبل لنيل أي درجة أو لقب علمي أو بحثي لدى أي مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: Manar Hasan Ramadan

اسم الطالبة:

Signature: Manar Ramadan

التوقيع:

Date: 20/1/2021

التاريخ:

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Abbreviations

Abbreviation	Description
EV	Electric Vehicles
BEV	Battery Electric Vehicle
PHEV	Plug-in Hybrid Electric Vehicle
HEV	Hybrid Electric Vehicle
ICE	Internal Combustion Engine
ICEV	Internal Combustion Engine Vehicle
TtCO₂e	Thousands ton CO ₂ eq
TPB	Theory of Planed Behavior
WB	West Bank
PCBS	Palestinian Central Bureau of Statistics
CSE	Center for Sustainable Energy

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Abstract

The electric vehicles (EV) market grew rapidly in the previous decade. Based on the extended theory of planned behavior (TPB), the purpose of this study is to identify the factors affecting the EV intention of purchase and adoption in the West Bank, Palestine, and to investigate the EV economic, environmental, and social sustainability purchase behaviour aspects. Mixed research approach was adopted by conducting unstructured interviews and survey. A survey was conducted among potential consumers in the West Bank. In total, 384 survey responses were obtained from EV owners and non-EV owners. This study used Partial Least Squares Structural Equation Modeling (PLS-SEM) tool for empirical analysis. The results showed that environmental concerns, subjective norms, cognitive status, incentive policies, and product perception all have significant positive effects on consumers' intentions to purchase EVs in the West Bank. Moreover, the attitudes mediate the relationship between environmental concerns and consumers' intentions to purchase EVs. However, perceived behaviors control has no significant impact on purchasing intention. The path coefficients test revealed that EV purchase behavior had a positive influence on the economic, environmental, and social sustainability aspects. These results can guide policymakers in

improving transportation policies, and open the door for further research in consumer behaviour towards this emerging technology.

Key Words: Electric Vehicle, Purchase intention, Theory of planned behavior, Sustainability.

Chapter One

Introduction

1.1 Chapter overview

This chapter provides an introduction of the study and displays the local and global background of the study, problem statement, research objectives, the organizing of the thesis, and finally, the summary of the study.

1.2 General Background

An Electric Vehicle (EV) is general term used to describe any vehicle that uses an electric motor with two basic types. Depending on the electrification level of the vehicle, there are two types of EVs. The first type includes all-electric vehicles (AEVs) run only on electricity with zero-emissions tailpipe, including Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs), with ranges of 80 to 100 miles, while a few luxury models nowadays have ranges of 200–300 miles. The second type is plug-in hybrid electric vehicles (PHEVs) that run on electricity for shorter ranges (6 to 40 miles), PHEVs can be powered by gasoline, grid electricity, or both. (Axsen & Kurani, 2013; Chan et al., 2009; Larminie & Lowry, 2012; Nykvist et al., 2019). Worldwide, deployment of EV has been growing rapidly over the past ten years, as it is increased by 63% compared to the previous year (IEA, 2019), as shown in Figure 1.1.

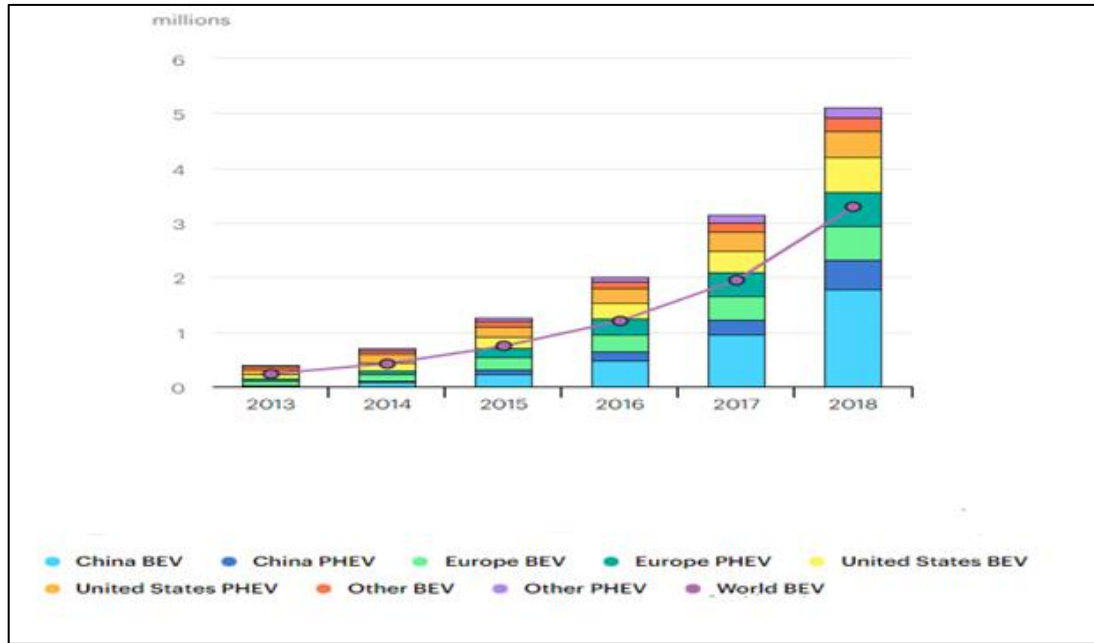


Figure 1. 1: Electric car deployment in selected countries, 2013-2018. (IEA, 2019)

The critical need to greenhouse gas (GHG) emissions reduction is one of the most significant issues leading to transition towards a higher share of electric vehicles (EV), as significant increase in car ownership is amongst the most serious causes of energy consumption worldwide (Timilsina & Shrestha, 2009). This study data covers the West Bank area; excluding parts of Jerusalem. Palestine imports all of its petroleum needs and electricity from Israel because of its control over energy, for instance, the total imports of energy in Palestine reached in 2018, approximately 43,941 TJ from Oil Products (PCBS, 2020). This energy sector leads to a steady increase in the total amount of GHG emissions from Palestine, and according to Qureitem et al. (2019), the transport sector is responsible for about 56.2% of GHG emissions inventory as shown in Figure 1.2, which is an encouraging element for the adoption of low-emission vehicles.

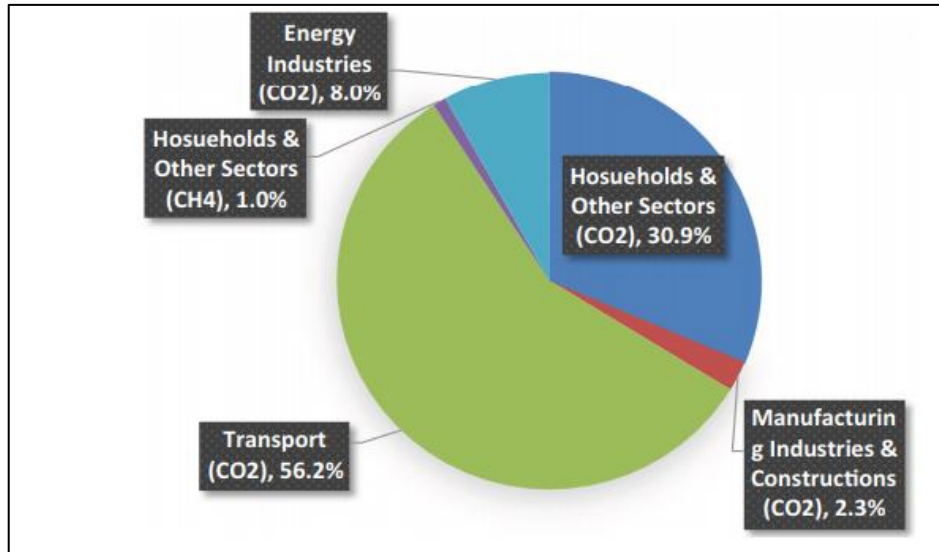


Figure 1. 2: Categories of GHG emissions inventory in 2016. (Qureitem et al., 2019)

As for Palestine, it made its way through the Electric Vehicles' market in 2017, by placing Nissan LEAF, which is a 100% Electric Vehicle, in the market and providing its users with home charging stations only. This was followed by placing Peugeot Partner Tepee Electric in the market in 2018, along with providing its users with several public-charging stations across the West Bank cities, which motivated many car dealers as Jaguar, Land Rover, BMW, and others, to announce their intention to import other luxury models of EVs to the Palestinian Market by 2019. Where the number of electric vehicles is still small compared to neighboring countries such as Jordan with more than 18,000 electric vehicles (EVs) are found on the streets of Jordan in 2018 (Friedrich-Ebert-Stiftung, 2019).

1.3 Problem statement

Road transport is responsible for the major share of global GHG emissions, which account for about 23% of the total energy-related CO₂ emissions

(Santos, 2017), while the transport sector produces approximately about 56% of the greenhouse gas emissions in Palestine (Qureitem et al., 2020). For this purpose, emissions from this sector need to be reduced to improve air quality and reduce the negative effect of these pollutants on health and climate. Many countries have introduced regulations on the vehicle's fuel consumption rates to control energy consumption and GHG emissions. For example, they introduced electric vehicles (EVs) as one of the most promising green technologies and most effective solutions to reduce energy consumption and GHG emission.

This study aims at providing a further contribution to the understanding of the EV adoption by studying the influencing factors of EVs purchase intention. The factors of consumers' purchase adoption are studied from consumers' perspectives, demographics, and the geographical nurture. This study analyzes consumers' perceptions based on the Extended TPB (extended theory of planned behavior), in a developing country context. TPB is one of the important theories in social psychology that is used to explain the determinants of decision-making process (Wang et al., 2016). Several countries excluding the US, China, Germany, the UK, are relatively new to the adoption of EVs (Kumar &Alok, 2020). There is a need for more in-depth research about EV adoption across various organizational functions and based on a diversity of cultures (Rezvani et al., 2015). Moreover, environmental concern moderates purchase intention and actual adoption (Kumar & Alok, 2020; Kim et al., 2018), but few studies examine the effect of environmental concern on EV adoption. On

the other hand, most research studies focus either on intention or behavior rather than studying the actual adoption behavior of EVs consumers (Singh et al., 2020). Therefore, this study focuses on the differences and conversions between the consumers' purchase intention and the actual purchase behavior through examining another moderator of the product variety variable, which was extracted from local dealerships interviews and antecedents needs to be studied for the moderation effect (Kumar & Alok, 2020). Moreover, this study examines the moderation effect of environmental concerns and product variety between the adoption intention and the actual behavior among EV consumers.

1.4 Research questions and hypotheses

Following the background of the research, with an understanding of the research gaps, the following research questions are intended to be answered in this study:

1. What are the factors influencing, and mediating, the EV intention in the West Bank?
2. What is the impact of EV purchase intention on the sustainable purchasing behavior in West Bank?
3. What is the sustainable managerial framework that can be adopted to promote the adoption of the electric vehicles in the West Bank?

Based on the previous research questions, the following hypotheses have been formulated:

- H1. Consumer environmental concern has a significant and positive effect on effect on consumers' intentions to purchase EVs in the West Bank.
- H2. Subjective norms have a significant positive effect on EV purchase intentions in the West Bank.
- H3. Perceived behavior control has a significant positive effect on effect on consumers' intentions to purchase EVs in the West Bank.
- H4. Cognitive status has a significant positive effect on effect on effect on consumers' intentions to purchase EVs in the West Bank.
- H5. Product perception has a significant positive effect on EV purchase intentions in the West Bank.
- H6. Incentive policies have a significant positive effect on EV purchase intentions in the West Bank.
- H7. Consumers' attitudes have a positive effect and mediate between environmental concerns and EV purchase intentions in the West Bank.
- H8. EV intention has a significant positive impact on economic purchase behavior in the West Bank.
- H9. EV intention has significant positive impact on environmental purchase behavior in the West Bank.

H10. EV intention has a significant positive impact on social purchase behavior in the West Bank.

1.5 Research objectives

This study aims at achieving the following research objectives:

1. Identifying the factors affecting the EV adoption rate in the West Bank.
2. Investigating the relationships between EV intention and sustainable purchasing behavior in the West Bank.
3. Developing a managerial framework for EV adoption in the West Bank.

1.6 Thesis organization

The current thesis is structured as follows: The first chapter includes firstly an introduction of the study, which contains profiles of the study background, research problem, research questions and hypotheses, and the objectives of this study. The second chapter presents the review of literature on EV researches by providing a clear understanding of research frameworks and that is by mentioning the works related to each influential factor addressed in the study. The third chapter clarifies the study methodology used to obtain the research objectives and questions. It includes hypotheses development and research model, research approach and methodology flow chart, population and sampling design, data collection method, and the methodology of analysis. The fourth chapter presents the data analyses and the research results, and then discusses the

details of research findings, by linking them to past works. Moreover, it develops policy implications. Finally, the fifth chapter consists of the results, recommendations and future studies, as well as the limitations of the research.

1.7 Chapter summary

This chapter introduces the study by showing and identifying the key terms of research. Then it tackles the problem statement, followed by providing the research questions and objectives. Finally, the thesis organization is also displayed.

Chapter Two

Literature Review

2.1 Chapter overview

This chapter aims to present a comprehensive view of previous studies that included the challenges and opportunities of electric vehicles adoption around the world in addition to the methods that were used in analyzing the impact on sustainability dimensions.

2.2 Energy sector in the West Bank

Many countries around the world are increasingly moving toward the adoption of sustainable transportation strategies such as the green vehicle technologies. Palestine is one of the countries that faces many threats because of climate change, which results in environmental and socioeconomic system losses in agriculture production and other productive activities, consequently threatening the health and safety of Palestinian citizens (PCBS, 2019a).

The major source of air pollution in Palestine comes from energy consumption (Abu-Madi & Abu Rayyan, 2013). The energy sector situation in Palestine suffers from non-availability of natural resources, unstable political conditions, financial crisis and high density population. Furthermore, Palestine depends on other countries for 100% of its fossil fuel imports and for 87% of its electricity imports (Juaidi et al., 2016).

Results show that the contribution of households' energy consumption in the West Bank to global CO₂ emission is about 0.016%, while the contribution of total energy consumption by all sectors is about 0.041%. The results also show that Palestinians' consumption of energy, such as electricity, wood, diesel, and gasoline, contribute to the total emissions with about 32%, 26%, 20%, 18%, respectively. Final consumption of energy in 2018 was 65,912.99 Tera joule (TJ), which caused approximately 4,527.7 TtCO₂e GHG Emissions (PCBS, 2019b).

Since Palestinians have neither an airport nor a seaport, the total registered vehicles in West Bank in 2018 are 254,497 with about 31,731 newly registered vehicles, about 84 % of those vehicles being private cars, 5.8% as trucks and commercial vehicles, 3.6% as taxis and public buses, and other vehicles representing 6.6% (PCBS, 2018b). This increase in the number of vehicles causes an increase in energy consumption with consumption about 29,898.56 Tera joule (TJ) in 2018 (PCBS, 2018a), and as the transportation activity is major producer of greenhouse gas (GHGs) emissions, it is essential to consider mitigating actions to reduce GHGs emissions to reduce the impacts of this sector on climate change. The actions could involve encouraging those who use automobiles to start using public transportation more. Another action could be raising awareness in regards of the adoption of environmentally-friendly vehicles to achieve sustainable transportation in Palestine (Dwaikat & Abu-Eisheh, 2017; Qureitem et al., 2019).

2.3 Consumer's intention and behavior toward EVs

Researchers worldwide designed many qualitative and quantitative methods for measuring the behavior toward EVs; the quantitative method designed for EV adoption used widely is the survey-based methodology, followed by simulation, optimization techniques, and secondary data analysis (Kumar & Alok, 2020). The use of different samples and theories resulted in finding a wide range of factors which affect the consumer's intention and behavior toward EVs. From consumers' perspectives, many studies pointed out psychological aspects, such as intention and behavior, as determinants of EV adoption (Schuitema et al., 2013; He & Zhan, 2018). The results of these studies verify that the Theory of Planned Behavior (TPB) model is a suitable theory to predict environmental-friendly behavioral intentions.

2.4 Theory of Planned Behavior (TPB)

TPB model has been recently used to explore environmental-friendly behavior (Wang et al., 2016). The TPB explains that a behavioral intention is a direct psychological determinant of actual behavior. This theory proposed by Ajzen as an extension and improvement to the Theory of Reasoned Action (TRA), the TRA suggests that attitude and subjective norms are the driving factors affecting behavioral intentions (Fishbein & Ajzen, 1975). The TPB proposed an extension of the theory by including perceptions of behavioral control as an additional predictor of intentions and behavior (Ajzen, 1985). Through this theory, attitude, subjective

norms, and perceived behavioral control can directly influence behavioral intentions and indirectly affect behaviors through behavioral intentions.

The TPB framework is outlined in Figure 2.1.

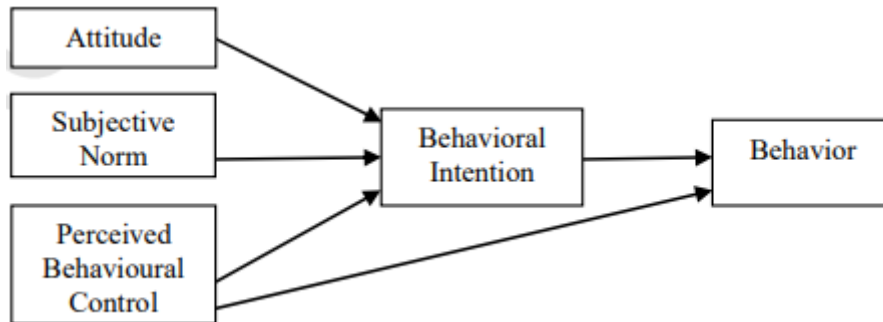


Figure 2. 1: Theory of Planned Behavior [TPB]. (Ajzen, 1991)

The theory has been widely used to predict consumer intention and behavior in various sectors, such as green hotels and restaurants (Olya et al., 2019; Chen & Tung, 2014; Kim & Han, 2010). Recycle waste also has been studied by Chen and Tung (2010) when they used the TPB model to explore consumers' behavioral intention towards recycling. Klöckner et al. (2013) used the TPB model and found that the most psychological determinants, such as attitudes and norms, have a significant effect on the intention of adopting green cars. A large number of subsequent studies also came in the same field within various geographical regions. The results of these studies verify that the TPB model is a suitable theory to predict environmentally-friendly behavioral intentions. Next subsections display the elements of the TPB.

2.4.1 Attitude

Attitude is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior (Ajzen, 1991), and the individual's overall evaluation of participating in a specific behavior (Huang & Ge, 2019; Kim & Han, 2010). In context, it is defined as the positive or negative evaluation of the adoption behavior (Wang et al., 2016) and when consumers have more positive attitude, they have stronger intention to perform a certain behavior (Beck & Ajzen, 1991).

2.4.2 Subjective norm

Subjective norm refers to the perceived social pressure to perform or not to perform the behavior and the influence of important people around the person in his or her decision (Ajzen, 1991), although some studies failed to prove and confirm the significant positive impact of subjective norms on consumers' purchase intention (López -Mosquera et al., 2014; Tan et al., 2017; Huang & Ge, 2019). Many previous studies prove significant positive impact of subjective norms on consumers' behavior intention (Han et al., 2010; Castanier et al., 2013; Wang et al., 2016; Shi et al., 2017) and also some of these studies confirm that promoting EV sharing requires external encouragements over than inner perceptions (Zhang et al., 2018).

2.4.3 Perceived behavioral control

The performance of social behavior depends on the degree of control a person has over internal and external factors that may interfere with the

execution of an intended action (Ajzen, 1985). In other words, the degree of ease or difficulty perceived by the consumer to perform an action in a person's perception (Zhang et al., 2018). So, the perceived behavior control is an important antecedent to purchase intention and it is a strong predictor of pro-environmental consumer behavioral intention as suggested from previous studies (Tan et al., 2017; Huang & Ge, 2019).

Summed up, the outline for the basic TPB theory having more favorable attitudes, greater pressures from important others, and greater behavioral control towards behavioral consequence will result in the strong intention to perform the behavior (Ajzen, 1985). Many efforts later were done by adding additional variables to improve the TPB model, such as moral responsibility (Beck & Ajzen, 1991; Kaiser & Scheuthle, 2003; Wang et al., 2016) to improve the TPB model to predict the behavioral intention towards Electric Vehicle (EV). The recent study by Huang and Ge (2019) also extended TPB model by adding cognitive status, product perception and incentive policy (monetary and non-monetary) variables, using a questionnaire survey among potential EV consumers in Beijing city in China in order to build a purchase intention mechanism model.

2.4.4 Cognitive status

Consumers' cognitive status is an important personal factor which refers to consumers' knowledge about EVs and EVs related policy (Huang & Ge, 2019). Lane and Potter (2007) mentioned that a lack of sufficient consumers' cognitive status in some areas such as environment, energy,

and low carbon vehicle policies will affect their purchase intention and behavior towards low carbon vehicles. And they mention that UK's private car buyers collect information from a wide range of sources including (manufacturer brochures, the internet, car magazines, sales staff, consumer guides, family and friends, TV programs and radio and newspaper advertising). Coad et al.'s (2009) also did a study on how information provision policies may be effective in encouraging certain Swiss consumers to adopt green cars, focusing on how consumer motivation can be tapped in order to encourage the adoption of cleaner technologies. In the same context, Zhang et al. (2013) found that when government policies are better understood, consumers are more likely to purchase EVs as awareness by the government. In contrast, the lack of knowledge about EVs can be a drawback that prevents their success in the market, and government promotions in low carbon and green growth rarely stimulate potential customers' purchase intentions of clean cars (Kang & Park, 2011). Wang et al. (2017) showed it was not proven that Chinese consumers' cognitive status has a significant positive impact on consumers' purchase intention towards energy-efficient appliances among China's urban residents. Thus, the lack of consumer's confidence in EVs results more from biased belief (because of anxieties) than from lack of information (Lim et al., 2015).

2.4.5 Product perception

As each product is defined by its underlying attributes (Beggs et al., 1981), the product perception refers to consumers' subjective evaluation of EVs'

product attributes (Huang & Ge, 2019). In other words, EVs success depends critically on their uptake by mass-market consumer drivers. Vehicle performance and symbolic value can be important factors in car purchase decisions as some people do not only drive their car because they need to go somewhere, but also because they love driving (Steg, 2005). Many studies also suggest that the potential adoption of EVs will depend on their instrumental attributes, such as performance, driving range, battery, and recharging time. These factors are likely to influence the adoption of EVs (e.g., Beggs et al., 1981; Chéron & Zins, 1997; Schuitema et al., 2013; Huang & Ge, 2019). In this context, Skippon and Garwood (2011) had found some of UK consumers might start to consider electric vehicles as second cars if they had a range of 100 miles and as main cars if they had a range of 150 miles, and most would recharge at home overnight. Huang and Ge (2019) also confirm that product perceptions, such as safety, cruising range, charging time, battery life, and charging infrastructure have a significant positive impact on EV purchase intention.

2.4.6 Incentive policies

Government policies and regulations are the main driving force for achieving impressive progress in new energy vehicle adoption (Zhang & Bai, 2017). Another study mentioned that governments have the responsibility of converting the barriers to improve the EV market share which can facilitate the country's reduction of vehicles' pollutant emissions (Kumar & Alok, 2020). This incentive policy can be pointed towards

purchase; such as tax fees which decrease the fixed cost of EV-use or in use, another example would be providing free parking lots, and other incentives that decrease the marginal cost of EV-use (Langbroek et al., 2016).

Many countries in Europe have made incentive policy packages, e.g. Norway and Netherlands have high market share of electric vehicles, mainly due to supportive and incentive policies (Sierzechula et al., 2014). The British government gives a discount on electric vehicles that emit 50 g/km or less of CO₂ with maximum grant for cars £3,000 (GOV.UK, 2019). In the United States, both the federal and state governments have taken direct approach of financial incentives as tax credits or tax exemptions and other incentives, California residents get up to \$7,000 for the purchase or lease of a new, eligible zero-emission or plug-in hybrid light-duty vehicle (CSE, 2018).

China world's largest automotive market since 2009 has also achieved impressive progress in new energy vehicle adoption by many incentive policies. The Chinese central government and the local governments pays a subsidy of up to nearly \$9430 to any consumer who purchases EVs, and the consumer also gets exempted from some taxes like road tolling (Zhang & Bai ,2017; Wang et al., 2017a). Zhang and Bai (2017) studied 175 incentives policies promulgated in the ten years from 2006 to 2016 and analyzed those policies around three lines; conserve energy, transform and upgrade the automotive industry, and improve air quality by reducing

vehicle pollutant emissions. This contribution confirmed that Beijing takes the lead in terms of both EV adoption and policymaking. These comprehensive policies cover direct subsidies such as providing preferential access, facilitating infrastructure, incentivizing R&D, and increasing public familiarity. Huang and Ge (2019) also study the effect of Beijing incentive policies by dividing EV consumption incentive policy measures into 1. Monetary incentive policy measures such as EV purchase subsidies, tax exemption, parking fee reduction, and increased EV purchase loan amounts. 2. Non-monetary incentive policy measures that aim to provide convenience to consumers as the abolishment of traffic restrictions on EVs, the results show that monetary incentive policy measures have a significant positive effect on consumers' purchase intention.

2.4.7 Environmental concern

Environmental concern refers to an individual's awareness toward environmental issues and willingness to solve related environmental problems (Schuitema et al., 2013; Wang & Zhao, 2017). Many previous studies confirm that early adopters of EVs are more environmentally-conscious, and that people with higher awareness toward environmental issues have a greater preference for EVs (Jensen et al., 2013; Aksen et al., 2016). The environmental concern is studied as an antecedent, mediator and moderator. However, most studies considered it merely as an antecedent variable (Kumar & Alok, 2020).

Ajzen et al. (1991) mentioned in their research that environmental concerns do not have direct impact on specific environmental behavior but rather it is by some different variables. Some studies revealed that environmental concern directly affects EV adoption (Jensen et al., 2013; Mohamed et al., 2018; Schuitema et al., 2013), while other studies have shown to have indirect effects of environmental concern via other mediating constructs. The previously mentioned work was concluded by Wang et al. (2016), when they predicted the customers' intention to adopt HEVs using an extended model of the theory of planned behavior (TPB), and confirmed that consumers' environmental concern affects the adoption intention indirectly and is significantly positively related to the attitude toward HEVs, subjective norm, perceived behavioral control and personal moral norm.

Increasing green vehicles adoption reduces vehicle pollutant emissions, and sustains the automotive industry (Zhang & Bai, 2017). Few studies cover all three sustainability dimensions simultaneously as consequence variables (Kumar & Alok, 2020), with little emphasis on the comprehensiveness of the three pillars of sustainability (environment, society, and economy) in the assessment of EV, and there are is no clear image about the potential benefits of electric vehicle technologies (Onat et al., 2019).

2.4.8 Economic impact

Some economic measures were considered regarding EV adoption such as revenue, profit, net present value analysis and market share (Kumar &

Alok, 2020). Zhao et al. (2016) considered the net present revenues by testing the relation of life cycle ownership cost, Vehicle to Grid (V2G) service data and regional parameters in economic benefit, and they found out that providing vehicle-to-grid regulation services (electric power resources from vehicle) for electrified trucks could produce substantial extra revenue between \$20,000 and \$50,000 compared to conventional trucks. This V2G system enables EVs to store electricity generated from renewable energy sources (e.g. solar energy) and discharge with output that fluctuates depending on some criteria like time or weather (Lund & Kempton, 2008). Rietmann and Lieven (2019) studied the influences of policy instruments on EV market share in 20 countries; they concluded that there is a direct link between governmental incentives and EV market share. Onat et al. (2019) also developed an assessment model with fourteen sustainability indicators representing the three pillars of sustainability which include some economic indicators such as Operating Surplus, Gross Domestic Product (GDP), and Life Cycle Cost (LCC). They compared the life cycle ownership costs considering four vehicle types in Qatar (internal combustion vehicles (ICV), Hybrid Electric Vehicles (HEVs), Plug-in Hybrid Electric Vehicles (PHEV), and Battery Electric Vehicles (BEV)). They also incorporated various cost elements such as vehicle's purchase price, fuel cost, maintenance cost, insurance cost, and salvage value. The results highlighted that adoption of electric vehicle alternatives does not favor macro-economic indicators and they have slightly less for a life-cycle

cost and concluded the operating surplus and GDP would be reduced if BEVs are adopted.

In contrast, tax revenue loss studied as barriers of EV adoption by Jenn et al. (2015). When they examined how different vehicles change the annual fee and assess the effects of adoption of alternative vehicles on revenues using several projections of alternative vehicles adoption, the results confirmed that the massive adoption of electric vehicles in the USA would reduce the revenue from the transportation sector.

2.4.9 Environmental impact

BEVs and PHEV in electricity mode do not have tailpipe emissions (Onat et al., 2019), but the way electric energy is generated is an important factor to assess the sustainability of an EV and each way of generating electric energy had its own environmental impact. For example, electricity generation by renewable energy source such as hydro, solar or wind, have near zero GHG emissions. Taking into account the availability of these renewable energy sources, there cannot be an accurate prediction for any given time period (Lund & Kempton, 2008). While electricity generation based on a fossil source, such as fuel oil or coal, have the highest GHG emissions. Hofmann et al. (2016) mentioned that for some countries like China where electricity generation is a powered by 80% coal, the actual GHG emissions did not change because The CO₂ emissions reduction in the petroleum sector is substituted by the increase in CO₂ emissions in electricity generation. So, it is important to emphasize that to get actual

benefits of EV adoption, the countries that generate electricity using fossil fuel sources need to decarbonize their electricity generation source and adopt more environmentally-friendly renewable energy source (Hofmann et al., 2016; Kumar & Alok, 2020). Choi and Song (2018) analyzed well-to-wheel GHG emission of BEV in countries dependent on the import of fuels through maritime transportation, such as Japan, South Korea, and Taiwan. Results of this study showed that the processes of importing fuels through maritime transportation commonly increases the life cycle GHG emissions about 40% higher than countries that can produce sizable amounts of fuels or import additionally required fuels through land transportation like USA. The result also showed up that driving a BEV produces approximately 90–110 g CO₂ eq/km less GHG emissions than an ICEV.

Recently, Onat et al. (2019) confirmed in conjunction with previous literature results that for 10% market penetration of battery electric vehicles, Plug-in hybrid electric vehicles, and hybrid electric vehicles in Qatar, the global warming potential can be reduced by 8%, taking into consideration battery electric vehicles performed worse than internal combustion vehicles and all other alternative vehicles in the water withdrawal.

2.4.10 Social impact

Many categories and opportunities are considered as the social impact of EV such as safety, total tax, employment, and human health impact. Karaaslan et al. (2018) studied driver behavior characteristics and findings

that EVs have 30% more pedestrian traffic safety risk as compared to conventional vehicles under high ambient sound level and at the low ambient sound level. It is also shown that EVs have 10% higher safety risk for pedestrians because EV vehicles have relatively silent engines compared to those of internal combustion engine vehicles. However, HEV emits nearly the same level of noise as ICVs at speeds higher than 20 km/h (Hong et al., 2013; Singh et al., 2014). Onat et al. (2019) considered the social impact indicators regarding human health and social impact category. The results showed that the adoption of 10% electric vehicles would achieve 8%, 4% and 5% reduction of human health impact by BEVs, PHEVs and HEVs respectively. Recently, Pautasso et al. (2019) also established eight different EV diffusion scenarios in order to estimate the total amount of pollutants as well as related costs, and assumed that improved environmental and health conditions caused by the increase in the number of electric vehicles can be associated to a better quality of life (social impact).

2.5 Hypotheses developments and research model

Combined with the previous empirical research results, the research model was built based on the theory of planned behaviour. This model can be used to analyze the influencing factors on EV purchase intention and actual adoption behaviors.

- **Antecedent variables**

The antecedent factors that start the network of the EV purchase intention proceed as barriers or motivators for EV consumer's intention.

Few studies have confirmed that early adopters of EV are more environmentally-conscious (Axsen et al., 2016). The environmental concern is studied in terms of antecedents, dependent variables, mediation, and moderation; however, most studies considered it as an antecedent variable for the mediation effect analysis (Kumar & Alok, 2020). This research considers consumer environmental concern is antecedent variable for the mediation effect of attitudes and dependent variables. Therefore, the first hypothesis of antecedent variable is as follows:

H1. Consumer environmental concern has a significant and positive effect on effect on consumers' intentions to purchase EVs in the West Bank.

According to TPB, the behavioral intention is positively affected by perceived attitudes, subjective norms, and perceived behavioral control (Beck & Ajzen, 1991). Subjective norms refer to the expectations of purchasing EVs from family, friends, and, and reliable people, while the perceived behavioral control implies how easy it is to take such action (Ajzen, 1991). Previous studies illustrated that the stronger subjective norms and perceived behavioral control are the stronger the purchase intention (Wang & Dong, 2016). Therefore, the following two hypotheses were formulated:

H2. Subjective norms have a significant positive effect on EV purchase intentions in the West Bank.

H3. Perceived behavior control has a significant positive effect on effect on consumers' intentions to purchase EVs in the West Bank.

As extension of cognitive status in the TPB model, cognitive status includes consumers' cognition of EV and cognition of relevant incentive policy measures (Huan & Ge, 2019). Previous studies supposed that consumers who have more knowledge about environmentally-friendly cars are more willing to buy EVs (Huan & Ge, 2019; Coad et al., 2009). Therefore, the fourth hypothesis was formulated

H4. Cognitive status has a significant positive effect on effect on effect on consumers' intentions to purchase EVs in the West Bank.

Product perception, in this case, refers to consumers' subjective psychological evaluation of specific product attributes of EVs. Previous studies mentioned the importance of evaluation of EVs' features as performance attribute to acceptance EVs (Zhang et al., 2013; Kumar & Geb, 2019). Therefore, the following hypothesis was formulated:

H5. Product perception has a significant positive effect on EV purchase intentions in the West Bank.

Government regulations often support dealerships to facilitate EV sales (Melton et al., 2017). Previous studies mentioned the importance of analysis of subsidies, tax exemptions along with convenience policies, and

charging infrastructure improvement to provides a clear signal to government and policymakers as how to improve the consumer's intention towards EV (Kumar & Alok, 2020). In general, this incentive policy measures aim to lower the EVs purchasing and operating costs (Huang & Ge, 2019). Therefore, the following hypothesis was formulated

H6. Incentive policies have a significant positive effect on EV purchase intentions in the West Bank.

- **Mediator variables**

A mediator variable causes mediating effect by intervenes between two other related constructs, and it reveals the true relationship between an independent and a dependent construct (Hair et al., 2016). Attitudes and preferences for EVs must be considered in developing market share (Egbue & Long, 2012). Previous studies showed that attitude towards adoption mediated between environmental concern and intention to adopt (Jing et al., 2019; Wang et al., 2019). The study supposes that attitude mediating the relationship between environmental concerns and EV purchase intention Therefore, the following hypothesis was formulated:

H7. Consumers' attitudes have a positive effect and mediate between environmental concerns and EV purchase intentions in the West Bank.

- **Consequence variables**

The consequences variables measure the effect of the intention on specific fields, our research analyzed the effect of EV intention on economic, environment, and social purchase behavior, with below hypotheses:

H8. EV intention has a significant positive impact on economic purchase behavior in the West Bank.

H9. EV intention has significant positive impact on environmental purchase behavior in the West Bank.

H10: EV intention has a significant positive impact on social purchase behavior in the West Bank.

A research model including all the above factors and hypotheses is proposed and is shown in Figure 2.2.

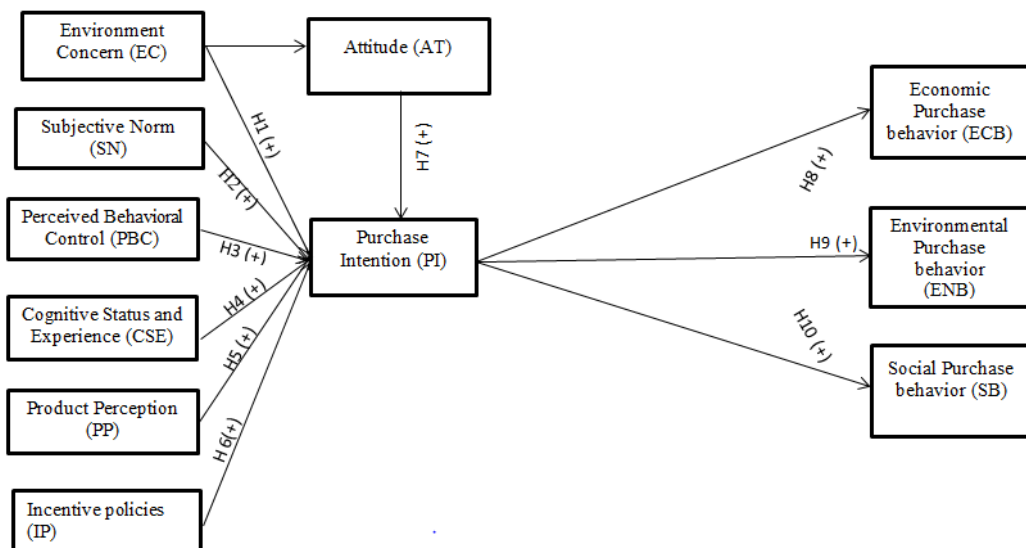


Figure 2. 2: Research framework of the study.

The sequence of model displayed from left to right, with independent (predictor) constructs on the left and dependent (outcome) variables on the right-hand side.

Constructs act only as independent variables, which are generally referred to as exogenous latent variables and are on the very left side of the structural model. In our model, environmental concerns, subjective norm, perceived behavior control, cognitive status, product perception, and incentive policies acted as exogenous latent variables and these constructs only have arrows that point out of them and never have arrows pointing into them (Hair et al., 2016).

Endogenous latent variables: are on the right side of the structural model and have an arrow pointing into them. In our model environment, social and economic purchase behaviour (Consequence) acted as endogenous latent variables. Constructs that operate as both independent and dependent variables in a model also are considered endogenous variables i.e., attitude and intention. Figure 2.3 illustrates the contents of a simple path model.

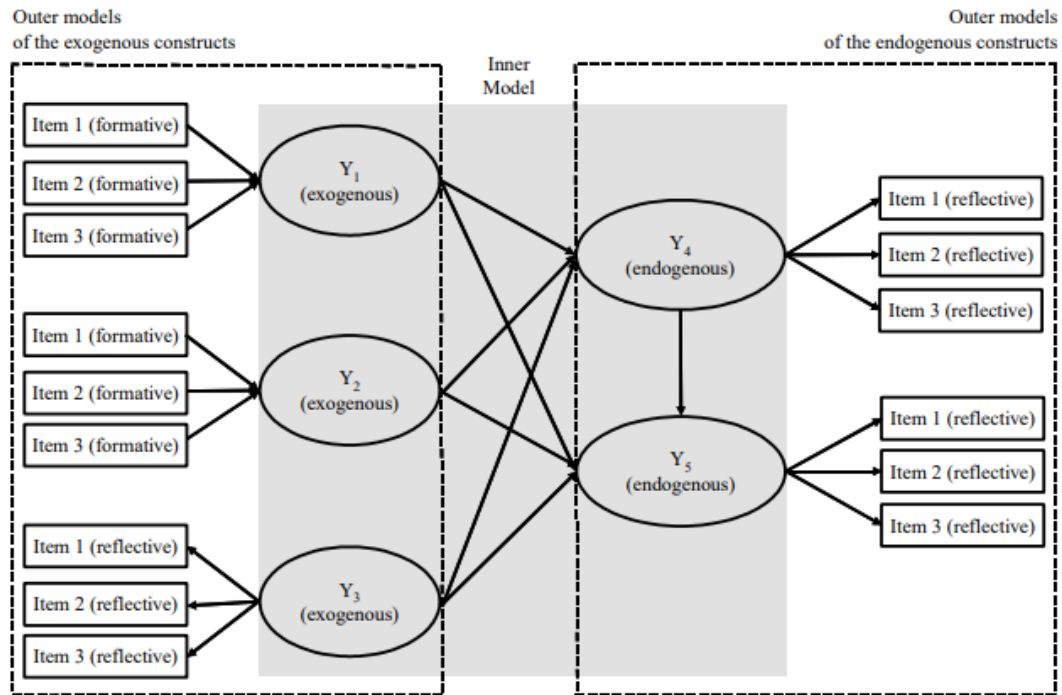


Figure 2. 3 A simple path model (Hair et al., 2014).

2.6 Chapter summary

Previous studies showed direction and correlation in the results as the studies varied and studied different environments, geographical and population situation, in which an encouraging factor for studying the Palestinian situation in EV is adopting. A review of these studies showed that they were concerned with the consumer behavior towards electric vehicles, which in its analysis basically depended on a theory of planned behavior.

Chapter Three

Research Methodology

3.1 Chapter overview

This chapter explains the methodological approach of this research, including the study approach, population and sample size, data collection and analysis techniques.

3.2 Research approach and methodology flow chart

Since the entry of electric vehicles into the West Bank market is still new, the exploratory study was conducted through unstructured interviews with a number of specialists in the private sector e.g. EV agencies, and governmental sectors, mainly the ministry of transportation, which contributed to distinguishing four sets of factors that influence the EV intention and Purchase behavior. This study is designed also using quantitative approaches survey- based methods to investigate the consumer's intention to purchase electric vehicles. The qualitative method was also used to conduct some unstructured aiming to discover the main factors that may affect the attitude toward EVs, and to determine the main factors from the literature that can be locally affected more than others. Thus, we can define our approach as a mixed-method research, given its integration of quantitative and qualitative methods in the same research study, This research approach increases the understanding of the situations by addressing the research questions avoiding qualitative open-ended response problem and quantitative closed-ended responses, such as

questionnaires (Creswell, 2014). The research methodology flowchart of research is presented in Figure 3.1. The methodology starts by defining the problem and scope of the study, provides a deep literature review of the study, filling the gap and identifying the need of the study, this leads to formulate the research questions and hypotheses. The second phase is to start collecting qualitative and quantitative data. By the next phase, a suitable sample is chosen. Unstructured interviews were conducted with representatives from some EVs local agencies and EVs experts from the Ministry of Transportation (MOT). In addition, questionnaires are distributed EV owners and non-owners in West Bank. Follows with distribution of questionnaires to the sample represented the EV owners and non-owners in the West Bank. After collecting the data from the previous phase, it was analyzed to test the hypotheses by dividing the research framework into two stages; the first stage represents intention factor related to all respondent category, and the second stage is related to the intuition-purchase behavior directed to EV owners only. The final step is to set policy implications for EVs local dealers and government to encourage the consumer's intention to purchase EVs in the West Bank, and finally presenting recommendations and future work-related studies.

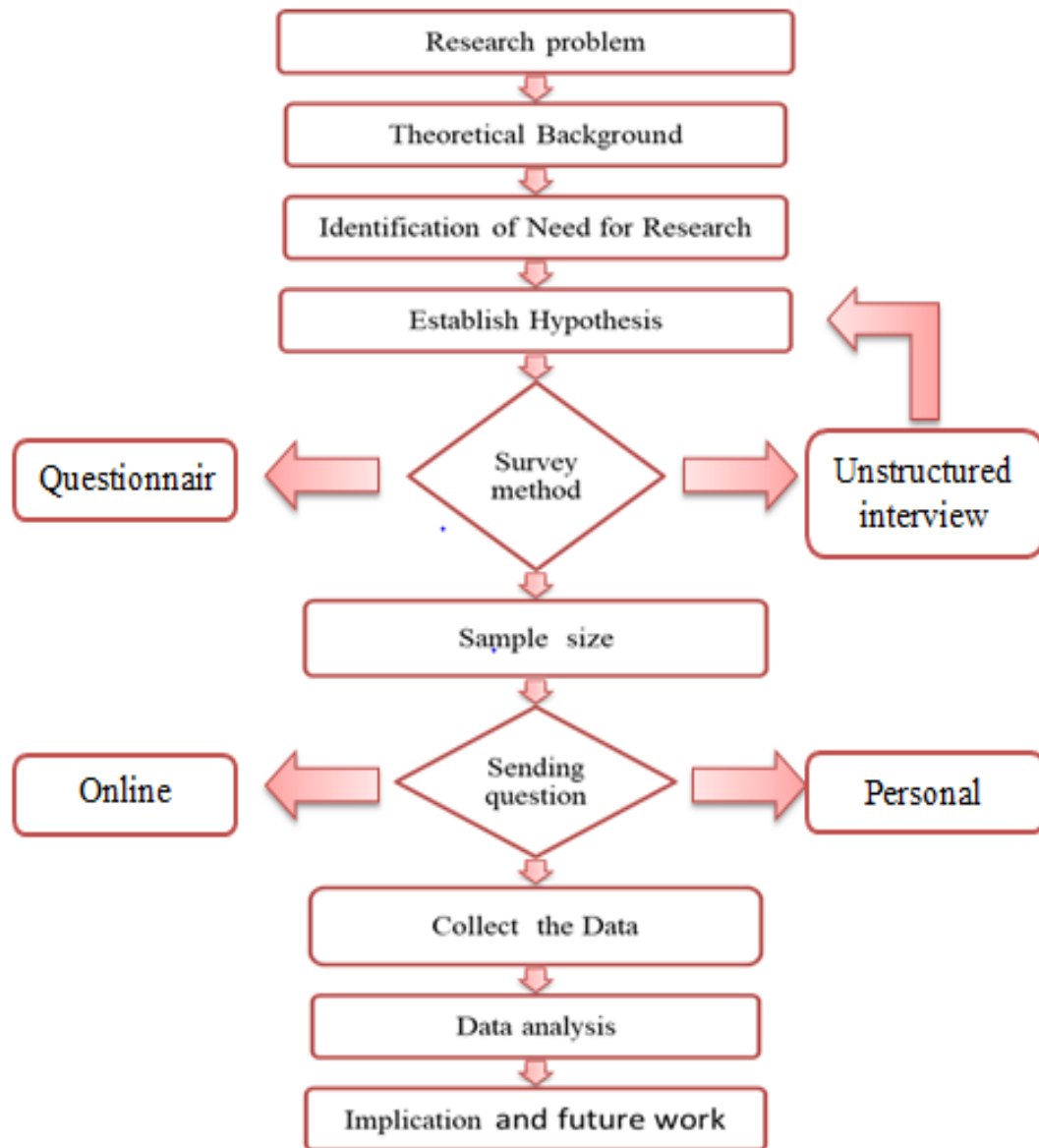


Figure 3. 1: Research methodology flow chart.

3.3 Data collection

As mixed approach combined the data from interviews and questionnaires, were used to generate the primary information that was analyzed later to determine the factors that influence the EVs purchase intention, barriers, and impact of actual EV adoption.

3.3.1 Unstructured interviews

There are several kinds of interviews: face-to-face interviews, group interviews, and mixed approach. This research is conducted by face-to-face interviews; e.g. unstructured interviews. Unstructured interviews are “open-ended or narrative interviews, participants are given considerable control over the course of the interview, and there is no specific set of predetermined questions” (Corbin & Morse, 2013). This type of interview provides large amount of information for analysis as the interviewer can ask the participant to search for the new topic (Opie, 2019). In addition, the researcher cannot perform an unstructured interview without gaining detailed knowledge (Corbin & Morse, 2013). The results of these interviews direct us towards a number of variables, motivators or barriers, surrounding electric vehicles in the West Bank market, and the potential problems faced by suppliers as well as customers by interviewing several specialists at the private and governmental levels.

3.3.2 Questionnaire design

The questionnaire used in this study is a five-point Likert scale of 1 (Strongly disagree) to 5 (Strongly agree) directed for two main consumers segments; drivers who do not have electric vehicles to investigate their intention to adopt EVs, and two additional sections for the segments of the EVs costumers (first EVs adopters).

The research in which participants do not have experience of EVs may have increased substantial uncertainties (Kumar& Alok, 2020), so this questionnaire is divided into four sections to cover most aspects around the EV purchase intention and the actual adoption.

- The first section of questionnaire considered socio-demographical variables, including gender, age, education, income, nature of housing, pace of residence and car ownership.
- The second section includes antecedent and mediating variables: environmental concern (EC), attitude (AT), subjective norm (SN), perceived behavioral control (PBC), were reviewed with reference to Adnan et al. (2017), Huang and Ge (2019), Han et al. (2017), and Klöckner et al. (2013). The measurement of extension of the TPB variables cognitive status (CS), product perception and incentive policies reviewed with reference to the scales of Huang and Ge (2019), Bunce and Burgess (2014), She et al. (2017), Wang et al. (2017), and Hidrue et al. (2011).
- All participants responded to the personal information and socio-demographic variables section and for the second intention section. Only the participants adopting EV they attend to answer third and fourth sections.
- The third section contains the EV intention effects on sustainability purchase behavior items. This section is adapted from Zhao et al.

(2016), Özdemir and Hartmann (2012). Nienhueser and Qiu (2016), Ramoni and Zhang (2013), Carley et al. (2013), Mousa and Othman (2020), Poullikkas (2015), and Murphy (2012).

3.3.2.1 Research population and sample size

The study is conducted in the West Bank and the population of the study consists of three categories based on whether or not the participant owns a vehicle:

- Firstly, it contains all individuals who have driver's licenses, this category includes people who are likely to buy an electric vehicle so that their first or next choice is adopting an electric vehicle. According to MOT there were about 481,200 drivers who have valid driving licenses issued until 2020.
- Secondly, it includes all those who own conventional non-electric vehicles and they are a strong potential opportunity to change their current vehicles to electric vehicles. According to MOT, there were 269,550 drivers.
- Thirdly, it includes only those who own electric vehicles in the West Bank, where the first EV was sold in 2017. The EV classifications are still inaccurate in the MOT but in general the number of electric vehicles registered and classified according to MOT is 85 vehicles.

Given that the situations with large populations contains all individuals who have driver's licenses, so the Cochran formula is adopted to calculate an ideal sample size (Cochran, 1977):

$$\boxed{n_0 = \frac{Z^2 pq}{e^2}} \quad (1)$$

Where:

“ e ” is “the desired level of precision (i.e. the margin of error)”

“ p ” is “the (estimated) proportion of the population which has the attribute in question $p=0.5$ (maximum variability)”

$$q = 1 - p = (0.5)$$

Assuming a 95% confidence level and $\pm 5\%$ precision, the sample size is illustrated as follows:

$$n_0 = \frac{Z^2 pq}{e^2} = \frac{1.96^2 (0.5)(0.5)}{0.05^2} = 384$$

And as, $\frac{n_0}{N} = \frac{384}{488,200} < .05$, where n_0 = the sample size and N = total population, the results from the sample size equations show that more than 384 responses need to complete the survey.

If vehicle type is EV or conventional one, the Stratified Random Sampling Formula was used to calculate the proportion of each stratum:

$$n_c = (N_c / N) \times n$$

Where:

n_c = Sample size for conventional vehicle owners' stratum.

N_c = Population size for conventional vehicle owners' stratum.

N = Population size.

n = Sample size.

As the EV owners are small populations we need almost the entire population in order to achieve maximum accuracy, so the sample of survey should contain at least 63 of EV pioneer owners, 212 conventional vehicle owners and 109 owning no vehicle.

3.4 Methodology of analysis

Data of the survey is analyzed by Partial Least Squares Structural Equation Modeling (PLS-SEM) software, which suited to exploratory studies, and allows a researcher to employ multiple items for variables (Fornell & Larcker, 1981; Hair et al., 2016). Smart PLS tool works efficiently with small sample sizes. So, complexity of a structural model does not affect the sample size requirements (Hair et al., 2016).

The research methodology presents the techniques used in analyzing the data that are collected from the questionnaires by assessing structural model (inner model) and the measurement models (outer models). In order to analyze the study model, researchers classified the study into two main models:

Intention model: this model assesses all factors that may affect the intention of EV purchase by analyzing the collected data from the three population layers: 1. Drivers who did not have any car 2. Conventional vehicle drivers and 3. EV drivers.

Intention – sustainable Purchase behavior: in this stage the researchers assess all factors that may affect the intention – **Purchase behavior** impact purchase intention on sustainability behavior by analyzing the collected data from only the EV owner's respondents.

3.4.1 Assessment of measurement models

As this study conducts a reflective and formative measurement model, the model assesses their internal reliability and validity; including: the composite reliability, convergent validity, and discriminant validity.

The reliability is “the extent to which results are consistent over time and an accurate representation of the total population under study” (Golafshani, 2003) and the reliability test is conducted on the survey data to measure the reliability and consistency of the outer models (factors). Composite reliability is measured similar to Cronbach's alpha, which must be between 0 and 1 (Hair et al., 2016),

Validity is “the extent to which a construct's indicators jointly measure what they are supposed to measure” (Hair et al., 2016), to evaluate the validity of research data, discriminant validity test is used which includes the Fornell-Larcker criterion and cross-loadings.

3.4.2 The structural model assessment

We conduct several tests depending on constructs and their path relationships in the structural model as follows.

- Coefficient of determination (level of the R^2 values): this coefficient measures the model's predictive power by calculating the squared correlation between an endogenous construct's actual and predicted values. Also, this coefficient represents the amount of variance in the endogenous constructs explained by all of its linked exogenous constructs, and the acceptable level of R^2 value depends on the research context (Hair et al., 2014).
- Effect size (f^2): allows us assessing every exogenous construct's contribution to specific endogenous latent variables and can determine the change in the R^2 value when a specified exogenous construct is removed from the model so it evaluates whether the omitted construct has an impact on the endogenous constructs or not (Hair et al., 2016).
- Predictive relevance (Q^2): is an indicator of the models out-of-sample predictive power, the results of Q^2 values should be larger than zero which indicates that the exogenous constructs have predictive relevance for the endogenous construct (Hair et al., 2016).
- Model fit test: Goodness-Of-Fit index (GoF) is not recommended to use in exploratory studies according to Hair et al. (2016) as it cannot reliably distinguish between valid and invalid models.

- Hypotheses test: testing hypothesis relationships had been done by using the path coefficients test, in order to estimate the path relationships for the variables in the structural model based on the two-tailed t-test, in PLS use the bootstrapping technique test the hypothesis by drawing a large number of subsamples from the original data (Hair et al., 2016).
- Multi-group analysis: we use multi-group analysis to assess if there is significance effect of EV experience or test drive on product perception variable. This type of analysis is one of moderator analysis and tests whether parameters differ significantly between two groups (Hair et al., 2016).

3.5 Chapter summary

This chapter presents the methodology used, population and sample size calculated, the data collection procedures for both qualitative and quantitative approach, Also, the validity and reliability of the measurements model tests are presented. Finally, this chapter presents also structural model and statistical techniques used in the study.

Chapter Four

Data Analysis and Results

4.1 Chapter overview

This chapter presents the results of data obtained through Structural Equation Modeling (PLS-SEM). The analysis is divided into two main sections; first section covers the intention of all respondents to purchase an EV, and the second section describes the intention-purchase behavior relationship. For both sections, the result of the primary analysis of survey responses and screening of the data represented is presented. After that, assessment of the study model quality obtained through PLS-SEM is presented by reporting the evaluation of the measurement model and the structural model. The last section discusses the results of the analysis and presents practical implications.

4.2 Interviews analysis

Unstructured interviews provide large amount of information for analysis as the interviewer asks participants to go further into the new topic (Opie, 2019, p176). We conducted unstructured face-to-face interviews with several specialists at the private and governmental levels in September, 2019. Interviewees from the private sector who are selling vehicles directly to customers showed their need for more government support, especially regarding to charging stations, as well as import incentive of these vehicles.

Among the important points are the lack of sufficient information about these vehicles, in addition to the many misconceptions and anxiety the consumers have about the performance and safety of these types of vehicles. Additionally, indicated that customers who show greater environmental concern are the ones had more intention towards the EV adoption.

On the other hand, the government interviews were held with a specialist in vehicle transportation, who has demonstrated the need for a framework to direct the policy makers towards supporting the adoption of electric vehicles in the West Bank. Besides, there is a critical need for studies to show the effect of adopting EVs on Palestinian society. The results of these interviews direct us towards a number of variables for electric vehicles intention and adoption in the West Bank.

4.3 Analysis of survey response

4.3.1 Response rates

The survey was conducted between May and July 2020, and the questionnaire was set up using Google drive. 414 Survey requests were sent by email and as a hard copy, and a total of 384 valid responses were ultimately obtained, where the response rate was 92.8% for all questionnaires regarding intention factors.

The descriptive statistics for the demographic variables are presented in Table (4.1), which shows that there were 63% of male respondents and 37% of female respondents. About 41% of the respondents were under the age of 30 and 59% of respondents aged 30 and over. There were 25% of respondents who did not have a bachelor's degree or above, and 75% of the respondents who had a bachelor's degree or above. According to the income respondents with monthly disposable income of less than 2000 JD (Jordanian Dinars) which is a low-income group; participants with annual income of 2000 JD (Jordanian Dinars) and above were classified as the high-income group. There were 81% of respondents in the low-income group and 19% of respondents in the high-income group. A majority of the respondents with 67% have less than one car, and there were 33% of respondents who have two or more vehicles. There were 43% of respondents living in an apartment building and 57% living in a detached house. According to the respondents themselves, in terms of vehicle ownership status, 88% of drivers have no vehicles or are having conventional vehicles, where only 12% of respondents have electric vehicles. Also, there were 26% who had previously driven an EV and 74 % who have never driven an EV before. Finally, regarding the distance travelled by the respondents daily; about 57% of the respondents have been traveling short distance (0-50KM) daily, where 43% of respondents have been traveling more than 50KM daily.

Also, noted that most of the respondents that are located in Ramallah, Nablus and Jerusalem representing 49%, 10%, 10% of the sample respectively, and the lowest level for Qalqilya, Salfit, Bethlehem, Tulkarm, Jericho, Jordan Valley, Jenin, and Tubas.

Table 4. 1: Respondent profile

Respondents' characteristics	Item	Frequency (n = 384)	Percentage (%)
Gender	Male	240	63%
	Female	144	37%
Age	18 – 29	156	41%
	30 - 44	197	51%
	45 – 59	29	7%
	60+	2	1%
Education	High school and below	25	7%
	Junior college	33	9%
	Bachelors	228	59%
	Master	95	24%
	Ph. D. and above	3	1%
Monthly Disposable Income of Household (JD)	Less than 800 JD	150	39%
	800 – 2000 JD	161	42%
	2000- 4000 JD	48	13%
	More than 4000JD	25	6%
Respondents' Site	Ramallah	191	49%
	Nablus	41	10%
	Jerusalem	40	10%
	Jenin	19	5%
	Bethlehem	17	5%
	Qalqilya	11	3%
	Salfit	22	6%
	Tubas	2	1%
	Hebron	14	4%
	Jericho and the Jordan Valley	12	3%
	Tulkarm	15	4%
Number of Cars Owned by Household	0	66	17%
	1	193	50%
	2	93	24%
	More than 2	32	9 %
Residence Style	A House	218	57%
	An apartment building	166	43%
Average Daily Travel (KM)	Short distances (0-50 Km trip)	219	57%
	Medium distance (50-100 Km trip)	132	34%
	Longer distance (over 100 Km Trip)	33	9%

Vehicle Ownership Status	EV	48	12%
	Conventional vehicle	212	55%
	No vehicle	124	33%
Respondents EV Experience	No experience	284	74%
	EV experience	100	26%

4.3.2 EV respondent response rates

The MOT has 85 licensed EVs registered until May 2020, these EVs owned by only about 63 consumers, with 60 survey requests were sent and only 48 replies were obtained, for a response rate of 80%.

The demographic variables statistics for EV respondent are illustrated in Table 4.2. There were 83% male respondents and 17% female respondents, with 71% of them aged 30 and over and 29% under the age of 30. The participants who did not have a bachelor's degree or above are 29%, while 71% of the respondents had a bachelor's degree or above. There were only 17% respondents in the low-income group (below 2000 JD) and 83% of them in the high-income group (over 2000 JD). About 58% of the respondents have two or more vehicles and there were 42% have only one vehicle. There were 58% of respondents living in an apartment building and 42% living in a detached house. Also, there were 75 % who have previously driven an EV and 25% who have never driven an EV before deciding the EV purchase.

It is also obvious that most of the respondents are located in Ramallah with 75% of the sample, and the lowest level for Jericho, Jordan Valley, Nablus, Jenin and Bethlehem. Finally, 54% of the respondents owned a private

vehicle, and the rest were driving vehicles for the commercial sector and government sector.

Table 4. 2: Participants Profile

Participant' characteristics	Item	Frequency (n = 48)	Percentage%
Gender	Male	40	83%
	Female	8	17%
Age	18 – 29	14	29%
	30 - 44	24	50%
	45 – 59	10	21%
Education	High school and below	12	25%
	Junior college	2	4%
	Bachelors	32	67%
	Master	2	4%
Monthly disposable income of household (JD)	Less than 800 JD	0	0%
	800 – 2000 JD	8	17%
	2000- 4000 JD	16	33%
	More than 4000JD	24	50%
Respondents' location	Ramallah	36	75%
	Nablus	4	8.5%
	Jenin	4	8.5%
	Bethlehem	2	4%
	Jericho and the Jordan Valley	2	4%
Number of vehicles owned	1	20	42%
	2	20	42%
	More than 2	8	16%
Residence style	A House	20	42%
	An apartment building	28	58%
Average daily travel (km)	Short distances (0-50 Km trip)	12	25%
		22	46%
	Medium distance (50-100 Km trip)	14	29%
	Longer distance (over 100 Km Trip)		
Respondents EV experience	No experience	12	25%
	EV experience	36	75%
Sector	Private vehicle	26	54%
	Commercial sector	10	21%
	Government sector	12	25%

4.4 Questionnaire's analysis

The Partial Least Squares (PLS) approach by using the Smart-PLS version 3.3.2 software was used to analyze the quantitative data collected from the questionnaires. The PLS-SEM Path models are made up of two elements: (1) **structural model**, and (2) the **measurement model** (Hair et al., 2016). In this study, both approaches of measurement theory were used to measure unobservable variables; the first approach is referred to as (1) **reflective measurement** and the other as (2) **formative measurement**.

In the reflective measurement model approach, the construct causes the measurement. Also, the direction of the arrows is from the construct (latent variable) to the indicator as indicated in Figure 4.1.

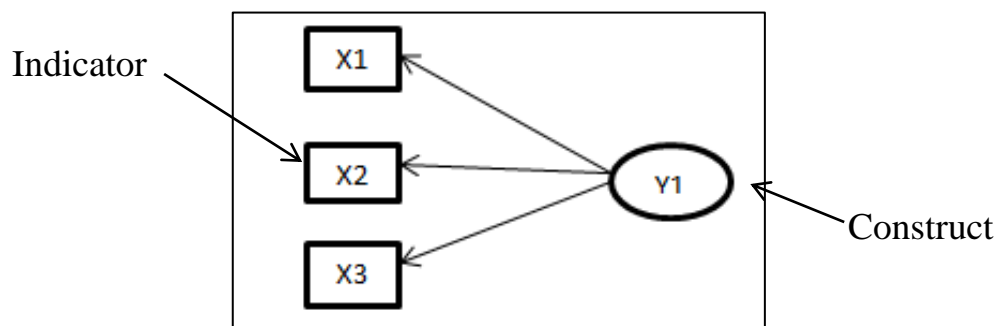


Figure 4. 1: Reflective measurement model. Source (Hair et al., 2016, p50).

The formative measurement model approach is also used in term of product perception variable. Through this approach, the indicators do not necessarily need to be conceptually united and they are not interchangeable. Thus, each indicator of a formative construct captures a specific aspect of the construct's domain (Hair et al., 2016). The direction

of the arrows is from the indicators to the construct variable as indicated in Figure 4.2.

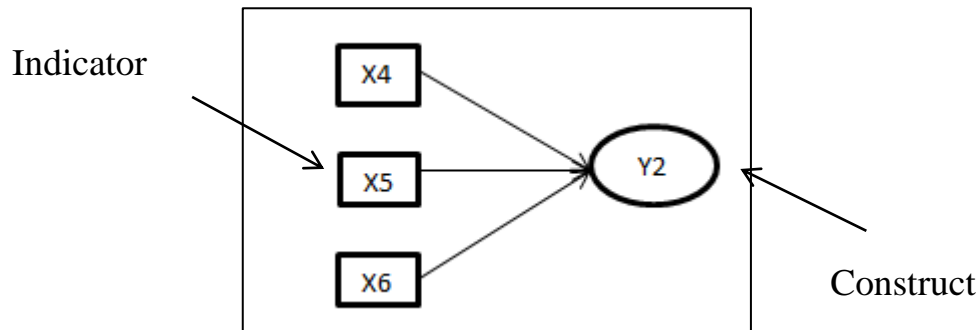


Figure 4. 2: Formative measurement model. (Hair et al., 2016, p50)

Based on the collected data from two main respondent categories (1) EV owners and (2) non EV owners. This study assessed firstly the intention hypotheses depending on the intention contracts only with data from all respondents (**intention model**), and secondly, the (**intention-purchase behavior**) hypotheses depending on EV respondent data only.

4.5 Intention model

In assessing the intention model which includes all variables that affect the intention to purchase electric vehicle directly or by mediating variable, a reflective model was used for dimensions of Attitude (AT), Subject Norm (SN), Perceived Behavioral Control (PBC), Cognitive Status (CS), Purchase Intention (PI), Incentive Policies (IP), and Environmental Concern (EC). The intention model included twenty-one reflective measurement items (indicators) for eight latent variables, including four independent variables (EC, SN, PBC, and IP), one dependent variables (PI) and one mediating variables (AT).

The formative model was used only for product perception (PP) independent dimension as every indicator for this construct presents a feature of electric vehicle product.

4.5.1 Assessment of intention measurement models

The purpose of these criteria is to assess the validity and reliability of the construct of the measured variables. This process consists of two aspects: convergent and discriminant validity.

4.5.1.1 Convergent validity

Convergent validity can be defined as “the extent to which a measure correlates positively with alternative measures of the same construct” (Hair et al., 2016). In other words, the degree to which two measures of constructs that theoretically should be related. This assessment type of measurement model examines the outer loadings of the indicators to determine the average variance extracted (AVE) from each construct. To evaluate the reflective measurement models, the items of the outer loadings value should exceed 0.708 (Hair et al., 2017) and are allowed to be above 0.6 in exploratory studies (Hair et al., 2016). Composite reliability (CR) is used to estimate internal consistency that should also exceed 0.7, and average variance extracted (AVE) should also exceed 0.5 which indicates that more than half of the indicator variance is included in the construct score (Hair et al., 2017).

After eliminating (CS1) and (PBC2) since their factor loadings were less than 0.5, the composite reliability (CR) is greater than 0.7 and the AVE values are greater than 0.5 as shown in Table 4. 3.

Table 4. 4: Measurement model of reflective constructs for intention model

Reflective constructs	Indicators	Factor loadings	CR	AVE	Cronbach's alpha (α)
Attitude (AT)	AT1	0.899	0.927	0.810	0.882
	AT2	0.915			
	AT3	0.886			
Subject Norm (SN)	SN1	0.867	0.856	0.665	0.749
	SN2	0.804			
	SN3	0.772			
Perceived Behavioral Control (PBC)	PBC1	0.709	0.850	0.657	0.765
	PBC2	0.773			
	PBC2	0.933			
Cognitive Status (CS)	CS1	0.799	0.791	0.655	0.743
	CS2	0.819			
Incentive Policies (IP)	IP1	0.833	0.926	0.808	0.880
	IP2	0.932			
	IP3	0.928			
Purchase Intention (PI)	PI1	0.694	0.842	0.641	0.720
	PI2	0.884			
	PI3	0.813			
Environmental Concern (EC)	EC1	0.700	0.884	0.720	0.806
	EC2	0.929			
	EC3	0.897			

Cronbach's alpha assumes that all indicators have equal factor loading with sensitivity to the number of items (Hair et al., 2016). We apply composite reliability to measure reliability which takes into consideration the various outer loadings of the indicator variables.

4.5.1.2 Discriminant validity

Discriminant validity determines the degree a construct correlates with other constructs. The first criteria for evaluating discriminant validity are to examine the cross loadings of the indicators, an indicators correlation with other constructs in the model and the loadings always should exceed the cross-loadings (other constructs loading) as shown in Table 4.4.

Table 4. 5: Discriminant validity of intention measurement model – Cross Loadings.

	AT	CS	EC	IP	PBC	PI	SN
AT1	0.899	0.400	0.309	0.403	0.296	0.650	0.453
AT2	0.915	0.393	0.317	0.435	0.296	0.648	0.430
AT3	0.886	0.373	0.346	0.465	0.311	0.609	0.491
CS1	0.364	0.799	0.436	0.228	0.163	0.444	0.309
CS2	0.336	0.819	0.201	0.272	0.214	0.465	0.274
EC1	0.142	0.255	0.700	0.204	0.168	0.279	0.150
EC2	0.395	0.396	0.929	0.345	0.155	0.435	0.289
EC3	0.318	0.319	0.897	0.302	0.147	0.322	0.173
IP1	0.333	0.292	0.276	0.833	0.272	0.433	0.364
IP2	0.461	0.247	0.301	0.932	0.324	0.491	0.356
IP3	0.493	0.297	0.348	0.928	0.341	0.526	0.379
PBC1	0.116	0.080	0.150	0.197	0.709	0.127	0.185
PBC2	0.189	0.196	0.109	0.219	0.773	0.186	0.191
PBC3	0.385	0.239	0.174	0.367	0.933	0.387	0.408
PI1	0.369	0.300	0.310	0.427	0.295	0.694	0.307
PI2	0.708	0.449	0.357	0.478	0.323	0.884	0.438
PI3	0.569	0.573	0.338	0.402	0.203	0.813	0.440
SN1	0.481	0.265	0.228	0.433	0.349	0.475	0.867
SN2	0.378	0.314	0.223	0.283	0.272	0.381	0.804
SN3	0.371	0.315	0.158	0.255	0.261	0.355	0.772

The second criterion to measure the discernment validity is based on Fornell and Larcker's, (1981), showing the off-diagonal values are less than values on all diagonals. PLS compares the square root of each construct's AVE with its correlations with all other constructs (Hair et al.,

2016). The results in Table 4.5 show that the discriminant validity of the measurement tools is accepted.

Table 4. 6: Discriminant Validity Measures- Fornell-Larcker Criterion

Latent Variable	AT	PBC	CS	EC	IP	PI	SN
Attitude (AT)	0.900						
Perceived Behavioral Control (PBC)	0.335	0.810					
Cognitive Status (CS)	0.432	0.234	0.809				
Environmental Concern (EC)	0.360	0.179	0.390	0.848			
Incentive Policies (IP)	0.482	0.349	0.309	0.345	0.899		
Purchase Intention (PI)	0.707	0.337	0.562	0.417	0.540	0.801	
Subject Norm (SN)	0.508	0.365	0.36	0.252	0.407	0.500	0.816

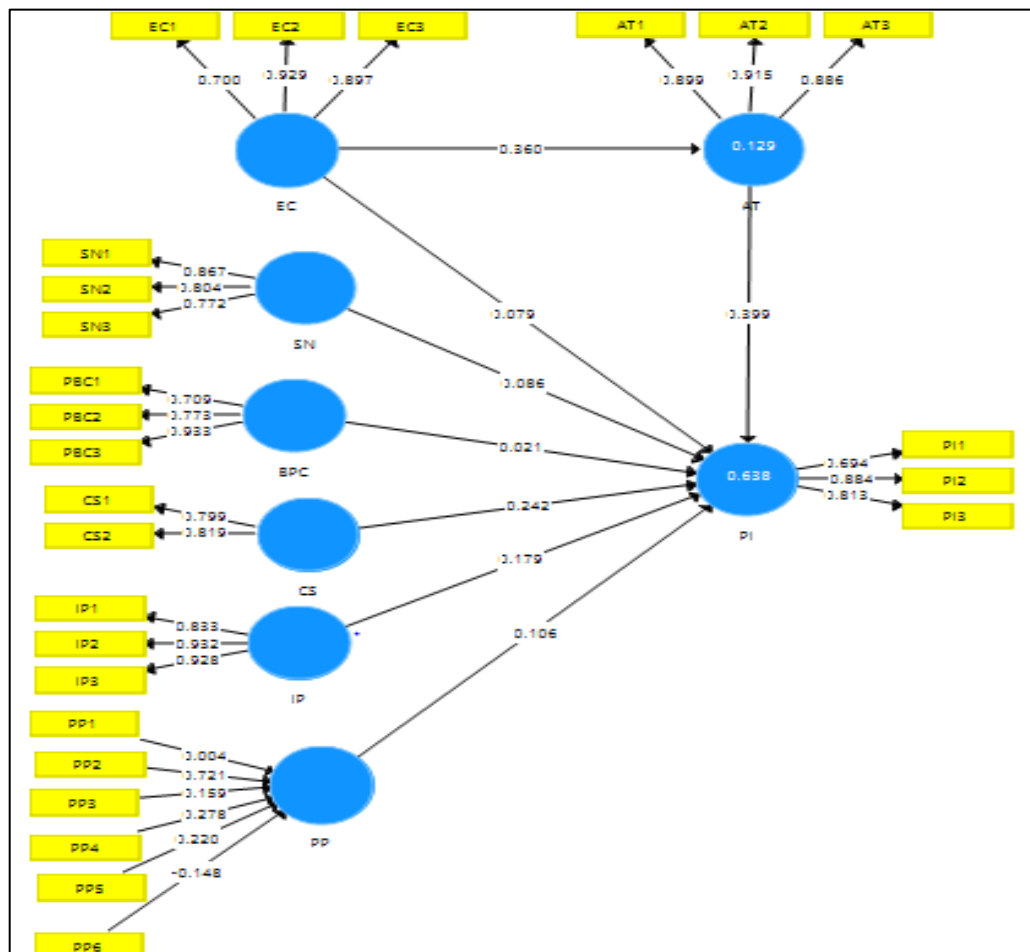
4.5.1.3 Formative construct assessment

Formative indicators “have no individual measurement error terms” (Hair et al., 2016) and the evaluation of formative measurement models contains, firstly, convergent validity to make sure that the entire domain of the construct has been covered by the formative indicators. The second test of formative indicator is predictor constructs tolerance Variance inflation factor (VIF). “Each predictor construct’s tolerance (VIF) value should be higher than 0.20 and lower than five” (Hair et al., 2016). All VIF values of formative product perception construct are clearly below the threshold of five (as shown in Table 4.6.). So, collinearity among the predictor constructs is not a critical issue in the structural model.

Table 4. 7: Intention model formative construct assessment

Formative construct	Formative indicator	Weight	t-value	p-value	VIF
Product Perception (PP)	PP1	0.338	2.691	0.007	1.261
	PP2	0.917	17.634	0.000	1.340
	PP3	0.629	6.090	0.000	1.525
	PP4	0.660	7.294	0.000	1.509
	PP5	0.499	4.988	0.000	1.556
	PP6	0.371	2.880	0.000	1.672

Figure 4.3 displays the model of EV purchase intention study with all the results from the assessment of the measurement model.

**Figure 4. 3: The measurement model of EV purchase intention**

4.5.2 Assessment of intention structural models

After confirming the construct measures of intention model are valid, we examined the model's predictive capabilities and the relationships between the constructs, and we conducted three tests to assess the structural model in PLS-SEM: the coefficient of determination, effect size, and the predictive relevance.

4.5.2.1 Coefficient of Determination (R^2 Value)

Coefficient of determination (R^2 value) measures the model's predictive power by “calculating the squared correlation between a specific endogenous construct's actual and predicted values”. (Hair et al., 2014).

According to Chin (1998), the R^2 values that are above 0.67 are considered high, while values ranging from 0.33 to 0.67 are moderate, whereas values between 0.19 and 0.33 are considered weak. Additionally, “ R^2 values of 0.20 are considered high in disciplines such as consumer behavior” (Hair et al., 2016).

Table 4.7 shows acceptable medium level R^2 for intention endogenous variable with R^2 values of 0.63.

Table 4. 8: R-Square of the Endogenous Latent Variables

Construct	R^2	Result
Purchase Intention (PI)	0.631	Moderate

4.5.2.2 Effect size (f^2)

In addition to R^2 analyses, f^2 analyses allow us assessing every exogenous construct's contribution to specific endogenous latent variables. Regarding Cohen, (1988), f^2 values of 0.02, 0.15, and 0.35 represents an exogenous construct's small, medium, or large effect, respectively. And can be calculated using the following formula:

$$f^2 = (R^2_{\text{included}} - R^2_{\text{excluded}}) / (1 - R^2_{\text{included}})$$

Our model result shows that medium effect size of attitude with 0.245, low effect size with 0.116, 0.060 and 0.026 of cognitive status, incentive policy, and product perception, respectively. Furthermore, there is no effect of subjective norm, perceived behavior control and subjective norm as there effects size less than the minimum value of 0.020.

4.5.2.3 The Predictive relevance (Q^2 value)

This measure is an indicator of the model's out-of-sample predictive power. This test was done using 'Blindfolding'; which is an iterative process repeats until each data point has been omitted and the model re estimated. The results of Q^2 values "should be larger than zero indicating that the exogenous constructs have predictive relevance for the endogenous construct under consideration" (Hair et al., 2016). And that the result of the intention model study predictive relevance is 0.389, which supports the assumption that the model has a sufficient predictive quality.

4.5.2.4 Model fit test

Goodness-Of-Fit index (GoF) is not recommended to be used in exploratory studies according to Hair et al. (2016) as it cannot reliably distinguish between valid and invalid models, and since its applicability is limited to certain model setups, we assessed the standardized root mean square residual (SRMR) - the intention model fit SRMR result was 0.067 and the value was less than 0.08, which is generally considered a good fit. However, according to Hair et al. (2016), SRMR minimizes the discrepancy, whereas this is not the case in PLS-SEM.

4.5.2.5 Hypotheses testing

The testing of the hypothesized relationships was done using the path coefficients test, and that is in order to estimate the path relationships for the variables in the structural model based on the two-tailed t-test. As proposed by Hair et al. (2016), the outcomes of bootstrapping running are presented in Table 4.8 and Figure 4.4 concluding the numerical data related to the beta, Std. Error, t-values and P-values.

Table 4. 9: Results of the structural equation model and hypothesis testing

Path	Hyp.	(β)	Std. Error	T- value	P-value	Decision
EC -> PI	H1	0.079	0.036	2.169	0.031	Supported*
SN -> PI	H2	0.086	0.041	2.134	0.033	Supported*
PBC -> PI	H3	0.021	0.036	0.576	0.565	Not Supported
CS -> PI	H4	0.242	0.040	6.009	0.000	Supported***
IP -> PI	H5	0.179	0.043	4.132	0.000	Supported***
PP -> PI	H6	0.106	0.038	2.767	0.006	Supported**

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

Results output by PLS-SEM reveal that the results of H1, H2, H4, H5 and H6 are consistent with the hypotheses, which indicates that environmental concerns, subjective norm, cognitive status, product perception and incentive policy measures influence consumers' purchase intention. It is worth noting that H3 is rejected here. Thus, result of the intention model showed that perceived behavior control does not affect consumers' purchase intentions toward EVs in the West Bank, where the hypothesized relationships below were tested:

H1: Environmental concerns have a significant positive effect on EV purchase intention significant ($\beta = 0.031$, $t = 2.169$, $P\text{-value} = 0.031$) and hence the hypothesis was supported.

H2: Subjective norms have a significant positive effect on EV purchase intention ($\beta = 0.086$, $t = 2.134$, $P\text{-value} = 0.033$) and hence the hypothesis was supported

H3: Perceived behavior control has no effect on EV purchase intention ($\beta = 0.021$, $t = .576$, $P\text{-value} = 0.565$) and hence the hypothesis was not supported.

H4: Cognitive status has a highly significant positive effect on EV purchase intention ($\beta = 0.242$, $t = 6.009$, $P\text{-value} = 0.00$) and hence the hypothesis was supported.

H5: Incentive policies have a highly significant positive effect on EV purchase intention ($\beta = 0.179$, $t = 4.132$, P-value = 0.00) and hence the hypothesis was supported.

H6: product perception have a significant positive effect on EV purchase intention ($\beta = 0.106$, $t = 2.767$, P-value = 0.06) and hence the hypothesis was supported.

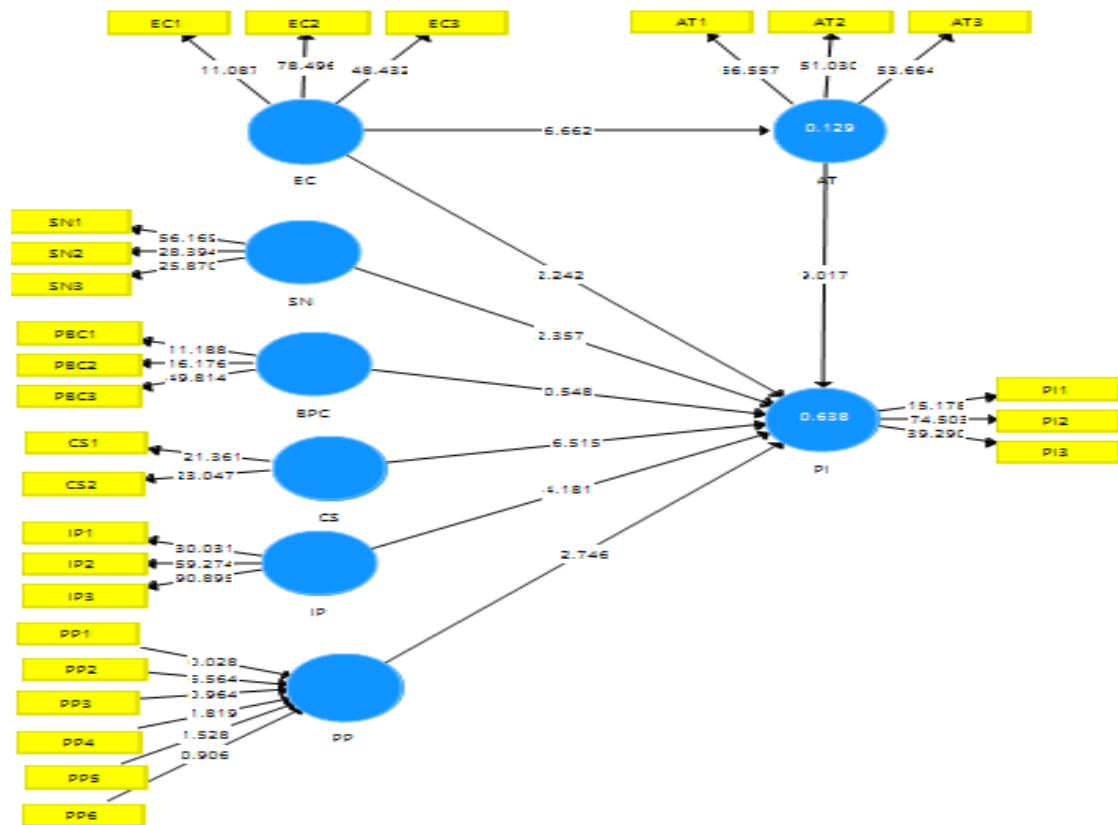


Figure 4.4: PLS Bootstrapping (t-values) for the intuition study model

4.5.2.6 Mediator variable

A mediator variable refers to the variable intervening between two other related constructs (Hair et al., 2016). We assume attitude in our study as the mediator variable. Therefore, a change in the exogenous construct

(environmental concerns) results in a change of the mediator variable (attitude), which, in turn, changes the endogenous construct (purchase intention).

The mediation analysis procedure according to Preacher and Hayes (2008) has been used with a two-tailed testing and significance level of 0.05 the P-values for total indirect path by two steps. First, we have assessed the significant relationship between environmental concerns and purchase intention via the mediator (intention)-total effect as shown in Table 4.9, and the result of p-value had supported the hypothesis of significant relationship between environmental concerns and purchase intention via the mediator.

Table 4. 10: The mediating role of attitude between EC and PI in intention model

Paths	Std. Beta	Std. Err	t-value	P-value	Decision
Direct Relation					
EC -> PI	0.143	0.027	5.332	0.000	Supported***
Indirect Relation					
EC -> AT	0.360	0.057	6.317	0.000	Supported***
AT -> PI	0.399	0.047	8.435	0.000	Supported***
EC -> PI	0.223	0.042	5.318	0.000	Supported***

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

Next, as described in Table 4.10, we have tested bootstrap confidence interval, and as zero is not located between upper and lower level the attitude mediates the relationship between environmental concerns and purchasing intention where the hypothesized relationships were tested:

H7: Result revealed that attitude has mediation effect between environmental concern and purchase intention and hence the hypothesis was supported.

Table 4. 11: Mediator analysis by bootstrap confidence interval

Path a	Path b	Indirect Effect	SE	t-value	95% LL	95% UL	Decision
0.360	0.399	0.144	0.042	5.318	0.061	0.226	Mediation

4.5.2.7 Multi-Group analysis between cognitive status and purchase intention

A multi-group-SEM was used to explore the influence path of consumers' purchase intention of an EV (path H6). And regarding consumers experience (e.g. test drive), the effect is significant in the no experience group ($\beta=0.117$, $p < 0.05$).

4.6 Intention–Purchase behavior model

The second part of the model contains the actual purchase behavior, which represents the data from actual EV owners ($n=48$). For assessing this model, a reflective model was used to assess three latent variables: economic purchase behavior (ECB), environment purchase behavior (ENB), and social purchase behavior (SB).

4.6.1 Assessment of Intention–Purchase behavior measurement models

4.6.1.1 Convergent Validity

The combined reliability (CR) intention–purchase behavior measurement models reached a standard greater than 0.7, and the extracted average variance values (AVE) were all greater than 0.5 as shown in **Error! Reference source not found.11**.

Table 4. 12: Measurement model of reflective constructs for intention-purchase behavior model

Reflective Constructs	Indicators	Factor Loadings	CR	AVE	Cronbach's Alpha (α)
Purchase intention (PI)	PI1	0.853	0.916	0..825	0.861
	PI2	0.952			
	PI3	0.849			
Social purchase behavior (SB).	SB1	0.941	0.934	0.785	0.894
	SB2	0.887			
	SB3	0.897			
Environment purchase behavior (ENB)	ENB1	0.711	0.810	0.587	0.766
	ENB2	0.748			
	ENB3	0.835			

4.6.1.2 Discriminant validity

The cross loadings of the indicators were examined. Correlation with other constructs in the model and the loadings always exceed the cross-loadings (other constructs loading)). Table 4.12 indicates that the discriminant validity regarding cross-loading of the measurement tools is accepted.

Table 4. 13: Discriminant validity for intention- purchase behavior model– cross loadings

		ENB	PI	SB
ENB1		0.711	0.513	0.281
ENB2		0.748	0.311	0.369
ENB3		0.835	0.751	0.785
PI1		0.707	0.853	0.465
PI2		0.701	0.952	0.773
PI3		0.539	0.849	0.684
SB1		0.695	0.715	0.941
SB2		0.568	0.597	0.887
SB3		0.618	0.662	0.897

The results in Table 4.13, shows that according to Fornell and Larcker, (1981) criterion of discriminant validity measures, the values on all diagonals are greater than those on the off-diagonal which indicates that the discriminant validity of the measurement tools is accepted.

Table 4. 14: Result of discriminant validity measures-Fornell-Larcker criterion

Latent Variable			ENB	PI	SB
ENB			0.766		
PI			0.755	0.908	
SB			0.693	0.727	0.886

4.6.1.3 Formative construct assessment

A reflective model was used to measure the dimensions of the economic purchase behavior (ECB),. In the first test we tested convergent validity for the indicators to ensure that the entire domain of the construct has been covered by the formative indicators. The bootstrapping was used to assess the significance with 0.05 significance level. The critical t-values for a two-tailed test were 1.96 with error probability of 5%. The empirical t value was larger than the critical value and the p-values were smaller than 0.05.

Therefore, we conclude that the coefficient is statistically significant at a certain probability error of (5%) and the relationship under consideration is significant as shown in Table 4.14.

Second test of the formative indicator is a predictor constructs tolerance (VIF). All VIF values result of formative economic purchase behavior were below the threshold of 5. So, collinearity among the predictor constructs is not a critical issue in the structural model, and we can continue examining the results report.

Table 4. 15: Intention- Purchase behavior model formative construct assessment

Formative construct	Formative indicator	Weight	t-value	p-value	VIF
Economic purchase behavior	ECB 1	0.685	5.402	0.000	2.720
	ECB 2	0.908	13.378	0.000	2.567
	ECB 3	0.799	8.488	0.000	1.463

Figure 4.5 displays the model of EV purchase Intention- Purchase behavior study with all the results from the assessment of the measurement model that conducted through PLS-SEM.

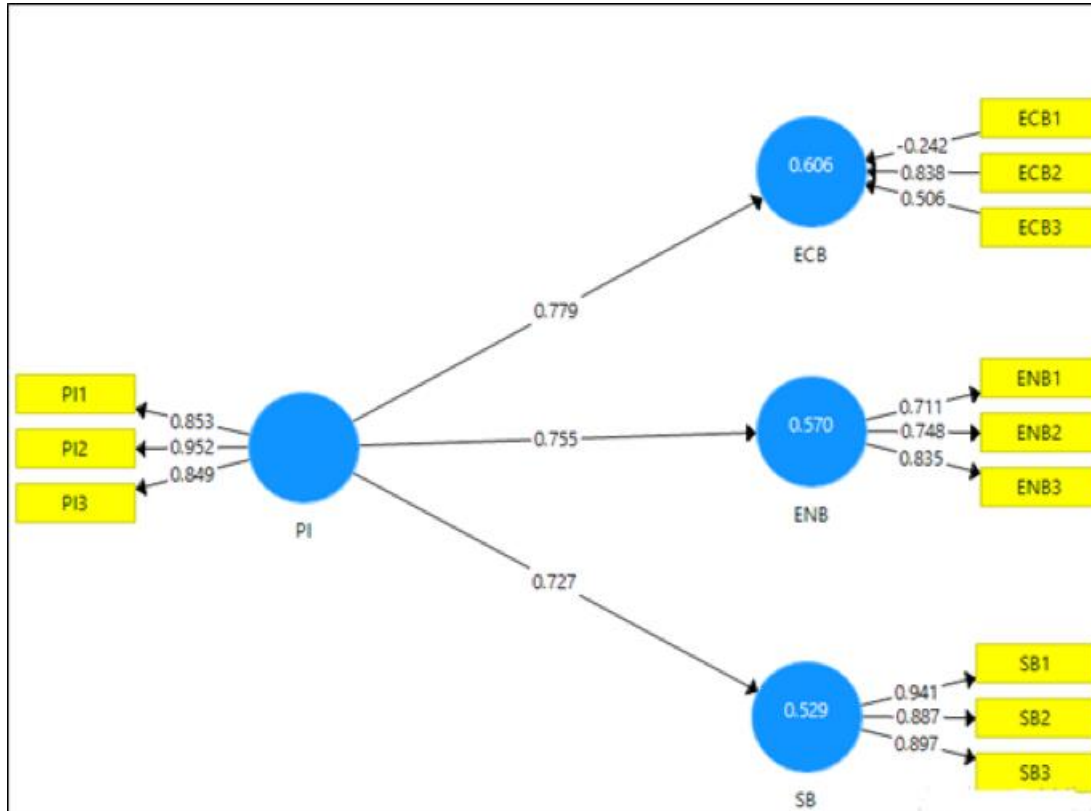


Figure4. 5: Measurement model of EV purchase intention- Purchase behavior relationship

4.6.2 Assessment of intention- purchase behavior structural models

For assessing the structural model of the intention- purchase behavior relationships we also conducted two tests in PLS-SEM: the coefficient of determination (level of the R^2 values), and the predictive relevance (Q^2).

4.6.2.1 Coefficient of determination (R^2 Value)

Chin (1998) stated that R^2 of 0.67 is considered high, while values range from 0.33 to 0.67 are moderate, whereas values between 0.19 and 0.33 are low. Whereas R^2 values of 0.20 are considered high in disciplines such as consumer behavior (Hair et al., 2016). Table 4.15 shows moderate level R^2 for intention endogenous variable with R^2 values of 0.606 , 0.579 and.529,

for economic purchase behavior, environmental purchase behavior and social purchase behavior respectively.

Table 4. 16: R-Square of the endogenous latent variables for intention – purchase behavior model

Construct	R ²	Result
Economic purchase behavior (ECB)	0.606	Moderate
Environmental purchase behavior (ENB)	0.570	Moderate
Social purchase behavior (SB)	0.529	Moderate

4.6.2.2 The predictive relevance (Q² value)

The results of Q² values should be larger than zero to indicate that the exogenous constructs have predictive relevance for the endogenous construct (Hair et al., 2016). The cross-validated redundancy values for economic purchase behavior, environmental purchase behavior and social purchase behavior were listed to be 0.344, 0.250, and 0.422, respectively, which support the assumption that the model has a sufficient predictive quality.

4.6.2.3 Hypotheses testing

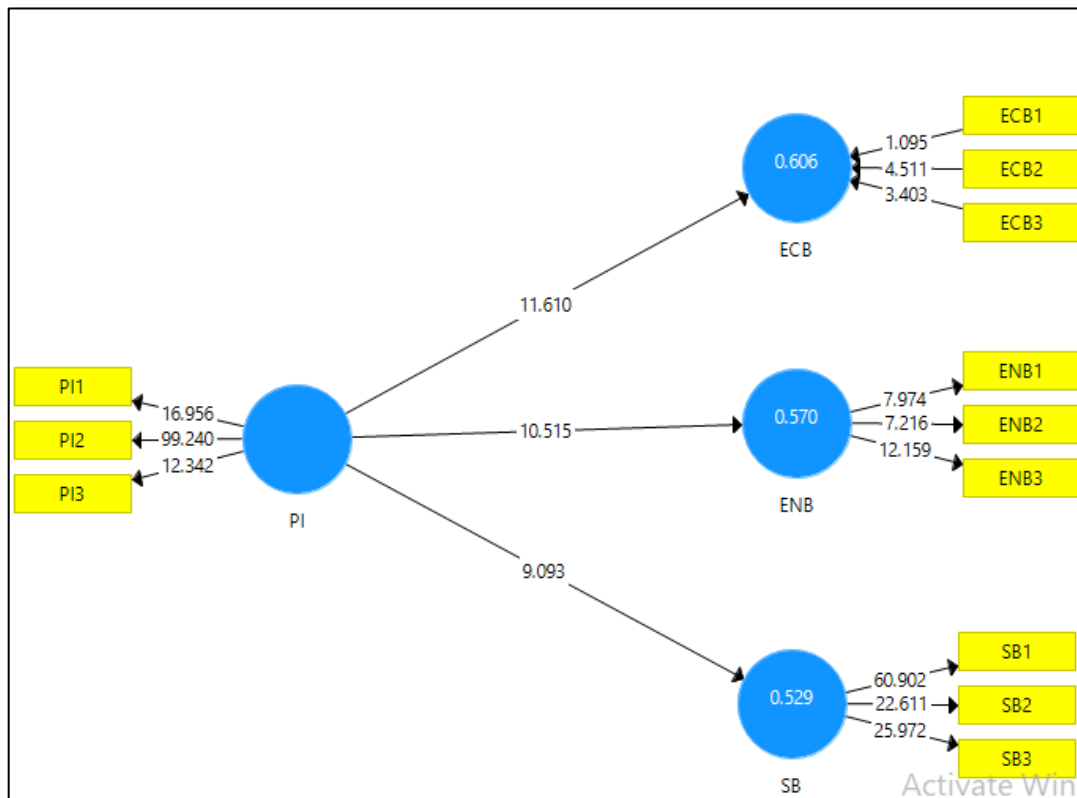
The testing of the hypothesized relationships was done using the path coefficients test, based on the two-tailed t-test. Bootstrapping running presented in in Table 4.16 and Figure 4.6 showing the numerical data related to the beta, Std. Error, t-values and P-values.

Table 4. 17: Results of the model and hypothesis testing

Path	Hyp.	(β)	Std. Error	T-value	P-value	Decision
PI -> ECB	H8	0.779	0.067	11.610	0.000	Supported***
PI -> ENB	H9	0.755	0.072	10.515	0.000	Supported***
PI -> SB	H10	0.727	0.080	9.039	0.000	Supported***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Results output indicates that the test results of H8, H9 and H10 are consistent with the hypotheses, which indicates that consumers' intention has a significant positive impact on sustainability's purchase behavior; economic, environmental and social.

**Figure4. 6: PLS bootstrapping (t-values) for the intention –purchase behavior study model**

4.7 Results discussions

This study aimed to explore the impact of proposed factors in consumer's intention to purchase an EV in the West Bank and to assess the impact in sustainability's purchase behaviors. The research assesses six direct factors that promote consumers' EV purchase intention: "environmental concerns, perceived behavioral control, cognitive status, product perception, and incentive policies" as well as the indirect promotion effect of the antecedent variables of attitude identified.

This study assesses also the direct impact of EV intention on sustainability purchases behaviors.

4.7.1 Factors influencing EV purchase intention

The factors include environmental concerns, subjective norms, cognitive status, incentive policies and product perception. H7 also supports that attitude has mediation positively affect between environmental concern and purchase intention. Regarding the actual adoption, H8, H9, H10 are also consistent with the hypotheses, this indicates that EV intention has significant positive impact on the sustainability.

On the other hand, H3 was rejected which indicates that perceived behaviors control does not affect consumers' purchase intentions toward EVs.

4.7.1.1 Environment concerns

We have analyzed the effect of environmental concern as antecedent variable on consumers' purchase intention. The environmental concern significantly asserts positive influence on consumers' purchase intention of an EV ($\beta=0.755$, $p < 0.05$), which indicates that the consumers with high awareness of environment issues have a greater preference for EVs. The result is consistent with many previous study results which confirm that early adopters of EVs are more environmentally- conscious, and that people with higher awareness toward environmental issues have more intention to adopt EVs (Jensen et al., 2013, Axsen et al., 2016).

4.7.1.2 Subjective Norm

The study results show that cognitive status significantly positive influence consumers' purchase intention of adopting an EV ($\beta=0.0086$, $p < 0.05$). Many previous studies also prove significant positive impact of subjective norms on consumers' behavior intention (Han et al., 2010; Castanier et al., 2013; Wang et al., 2016; Shi et al., 2017) and this confirms that perceived social pressure and influence of important people around the person have affected their intention to purchase an EV.

4.7.1.3 Perceived behavioral control

In our study, PBC does not pass the test, which means that it does not have a significant effect on EV purchase intention, and it contradicts original TPB as well as past studies on pro-environmental consumer behavioral

intention in other contexts (Huang and Ge, 2019; Tan et al., 2017). The study suggested that PBC is a strong predictor of pro-environmental consumer behavioral intention.

Few studies have concluded similar results (Greaves et al., 2013). Purchasing electric vehicles is difficult for low-income consumers. The majority of the participants is low-income consumers and needs financial assistance to purchase EVs. Therefore, the perceived behavioral control of consumers has little influence on the purchasing intention of EVs. On the other hand, PBC is important when consumers feel they lack control over behaviour (Armitage and Conner, 2001). Within the current study, a variable influence of the perceived control on the consumers' intentions depends on populations studied. Therefore, perceived control plays a role in developed economies but not in a low-income developing country such as Palestine.

4.7.1.4 Cognitive Status

This study shows that cognitive status has significantly positive influence on consumers' purchase intention of adopting an EV ($\beta=0.242$, $p < 0.001$), and the path coefficient is relatively high. Therefore, it is safe to assume that consumers who have more knowledge about EVs and any related incentive policy measures are more willing and have more intentions to buy EVs. The direct effect results of this study are consistent with past studies (Huan & Ge, 2019) where extended TPB and added cognitive statuses were

considered as one of the variables that affect Chinese consumers towards purchase intention of an EV.

4.7.1.5 Incentive policies

In this study, IP measures have a high direct significant positive impact on EV purchase intention ($\beta=0.179$, $p < 0.001$). Our findings are consistent with previous studies in terms of how high levels of incentives are correlated with higher levels of PEV and PHEV market share among regions (Huang & Ge, 2019; Melton et al., 2017; Zhang & Bai, 2017; Langbroek et al., 2016). This incentive should be supported by government regulations to electrify the transportation sector (Melton et al., 2017). Bjerkan et al. (2016)' findings support convenience measures for Norway's EV costumer; such like how free parking is very effective in terms of increasing EV sales, as well as how tax exemptions were significant motivators for more than 80% of the respondents.

4.7.1.6 Product Perception

The PP has a significant positive effect on EV purchase intention ($\beta=0.106$, $p < 0.01$). This result shows that consumers' evaluation of the product's attributes such as battery life, charging infrastructure, and after-sale service of EVs are a few of the main determinants influencing consumers' purchase intention.

We had used formative model to analyse the impact of EV attributes as every indicator of these attributes present a feature of electric vehicle product. Our results are consistent with Hung and Geb (2019) when they used reflective model and confirmed that consumers with high subjective evaluation of EVs' product attributes are the ones with stronger purchase intention. Cecere et al. (2018) also show that the performance of an EV is the most important factor in increasing purchasing intention.

We conducted multi-group analysis between PP and PI to find whether the EV experience can improve the consumer evaluation of product attributes or not, and the study did not find a significant difference between the consumers consumer who had a previous experience with EVs and consumers who did not have any experience. Therefore, we can conclude that the test drive is not the main factor that can give a good evaluation for consumers product attributes. Thus it does not affect the EV purchase intention. This finding approach needs more investigation as most of respondent have had short or a one-time experience with EVs. According to Jensen et al. (2013), individual preferences change significantly after a real experience within a three-month test period with an electric vehicle in their household. Also, this may be due to the limited range for some EV models in the West Bank, with only about 100KM for one full charge.

4.7.1.7 Attitude

This study finds the indirect positive affect of attitude between environmental concern and EV intention (H7). This indirect effect (mediation) is consistent with existing studies on pro-environmental consumers (Adnan et al., 2018).

The analysis also concludes that there is a direct positive effect of attitude on EV purchase intention. This result is in line with the original TPB model and many previous studies (Beck & Ajzen 1991; Kim & Han, 2010; Huang & Ge, 2019), indicating that attitude is an important antecedent and mediator to purchase intention.

4.7.2 EV sustainability Purchase behavior pillars

This study has analyzed all the sustainable consequence variables, and the results show that the EV intention has a significant positive impact on economic, environmental, and social purchase behavior aspects.

EV adoption has a high significant positive impact on the economic purchase behavior ($\beta = 0.779$, $p < 0.001$). This is consistent with Zhao et al. (2016) in contrast with Jenn et al. (2015) when they examined how different vehicles change the annual fees, and when they assessed the effects of adoption of alternative vehicles on revenues. They confirmed that the massive adoption of electric vehicles in the USA would reduce the revenue from the transportation sector. Nevertheless, the economic impact needs more investigating in the West Bank on a micro- and macro-levels.

the result also consistent economically with (Hassouna & Al-Sahili, 2020), the result showed that if 10% of conventional vehicles could be replaced by EV by 2030, this could save USD 464.31 million in operating energy costs during 2030

Environmental purchases behavior also had a significant positive (H9) ($\beta = 0.755$, $p < 0.001$). The economic result is consistent with previous research of (Choi & Song, 2018; Zhao et al., 2016) as the electrified of transportation can reduce the GHG with an emphasis on how to get actual benefits from EV adoption; the countries that generate electricity using fossil fuel sources need to decarbonize their electricity-generating sources and adopt more environment-friendly renewable energy resources (Hofmann et al., 2016). Hassouna and Al-Sahili (2020) showed that significant amounts of GHG emissions could be reduced in Palestine considering that 10% of conventional vehicles could be replaced by EV during next 10 years (2020- 2030), and estimated reduction in NH_4 , N_2O , and CO_2 emissions could be around 10.51%, 10%, 6.86%, respectively, as the electricity is imported mainly from Israel and the main sources are oil (42%) and natural gas (35%), which produces less GHG emissions than coal (Hassouna & Al-Sahili, 2020a). Also, replacing 20% of internal combustion engine vehicles (ICEVs) by hybrid vehicles compared to 100% ICEVs would lead to decrease the overall CO_2 -equivalent by 5% (Hassouna & Al-Sahili, 2020b). More investigation is needed in order to study the actual impact of EV adoption on the environment in the West Bank.

The final section of sustainability tests the social side, and the impact of EV adoption in social significant positive ($\beta = 0.727$, $p < 0.001$). Some social indicators such as safety, noise reduction, and the social activities aimed at environmental goals have been mentioned and the result confirm that more EV adoption in the West Bank will increase the social sustainability, which is associated with a better quality of life. Also, these results are in line with previous research (Pautasso et al., 2019; Onat et al., 2019) as their results find that EVs can have an impact on human health.

4.8 Managerial framework development

- It is the government's duty through decision makers to maintain sustainability by meeting future needs and supporting the global green vision for transportation. Some of policies can be obtained from research findings for promoting the development of EVs in West Bank. Strong policy support is needed and incentive policy measures should be improved to increase consumers' EVs purchase intention. This incentive should take into consideration the charging infrastructure and its distribution to cover the costumer charging needs, taking into account how to formulate supportive policies for installing fast charging stations and ensuring their effectiveness as well as regulating the charging fees. Reduction of importing tax registration fees, vehicle tax, sale tax and the set-up of customized free parking that have charging stations with low fees will also reduce EV driver costs to improve the Palestinian intentions towards EVs.

- Subsequently, adopting the green vision for transportation from the decision makers will be reflected in establishing sustainability plan in corporation and support from retailer, sustainable plan should take measures to provide more knowledge about EVs and relevant incentive policy measures, and should make efforts to improve consumers' cognition of EVs. It is necessary for the Palestinian government and vehicle retailers to pay more attention to attributes of the imported vehicles, specifically for traveling range in order to improve the impression of the EVs on consumers, as they (consumers) suffered previously from limited traveling ranges of the initial models available in the Palestinian market. Safety, cruising range and after-sales service must also be taken into consideration. Developing strategic plans for number of vehicles that the state seeks to import within a specific timeframe and thus providing support to the private sector in order to properly market EVs.
- Policy implications could be done by creating and popularizing EVs' product information and illustrating how EVs can help to improve the environmental and social aspects, and reduce the cost of use. In addition, promoting public-private-partnership model in EVs infrastructure development, which includes major incentive, policies and it would be effective to focus on people with high environmental concerns as they have a positive relationship with EVs purchase intention. In addition, the scenario where electric vehicles are charged through solar energy should be investigated by studying the possibility

of using the sites of charging stations to provide these stations with sufficient amount of energy, whether home or public charging stations. This would reduce dependence on the electricity networks in addition to the continuity of charging in the event of disasters.

- Sustainability impact on Economic, environment, and social should be assessing periodically, to ensure the positive feedback aligning the sustainable plan line. In addition, the competent experts in Economic, environment, and social issues should measure many criteria such as EVs sales, employment opportunities, air quality, safety of the EVs in roads, after sale service, GDP, and appropriate number of charging stations in a city per capita. See Figure (5.1)

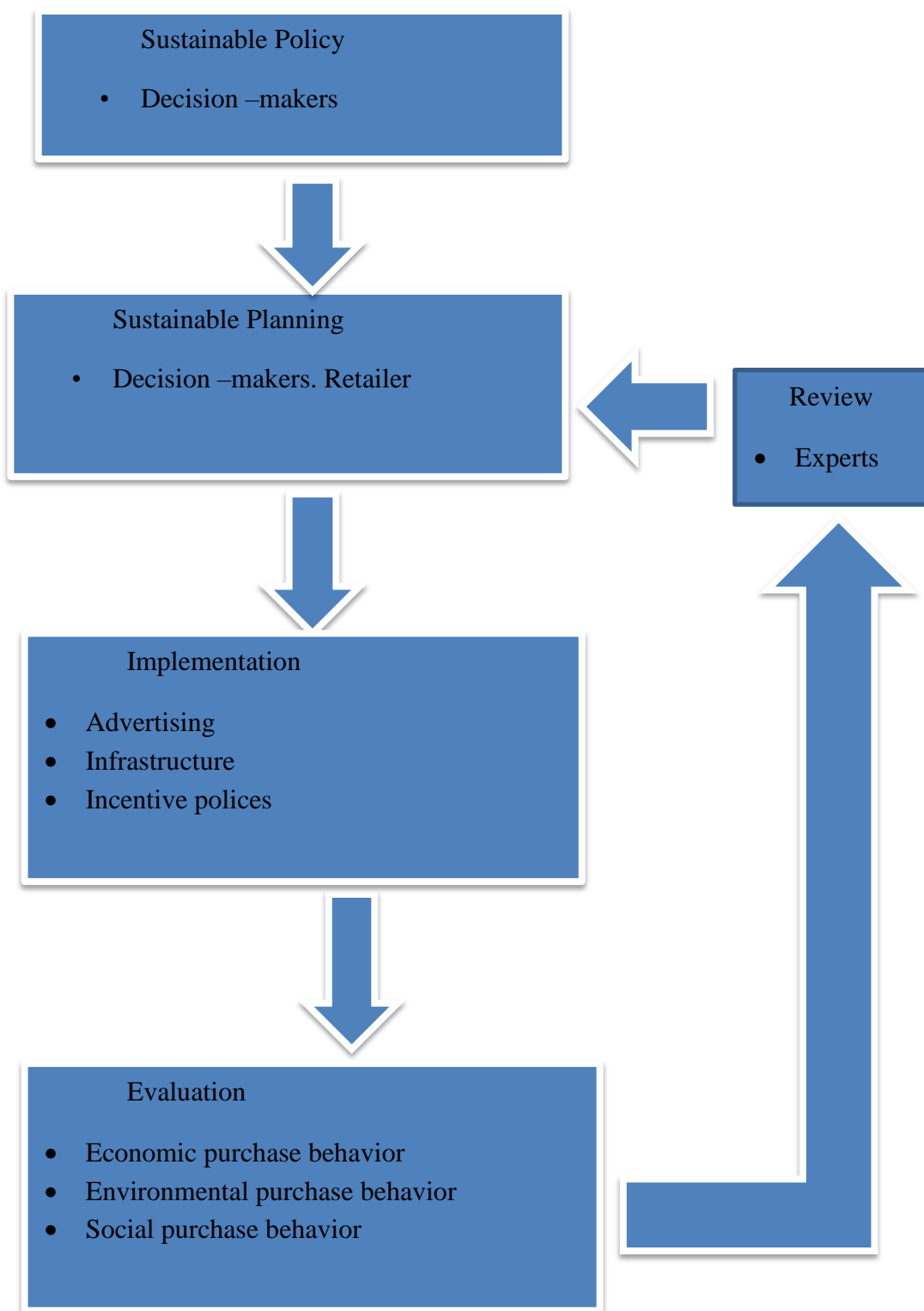


Figure 4. 7: Managerial framework for EV adoption in the West Bank.

4.9 Summary of chapter

This chapter has documented the results offered by the study. It has also presented results on the response rate, descriptive analysis, and examined the validity and reliability of the survey.

Furthermore, results of PLS analysis presented what was gained from the assessment of the measurement model and the structural model hypothesis testing. Twelve hypotheses were tested, and eight of these hypotheses were accepted. Finally, Managerial framework for improving EV purchase intention were also proposed, were linked to the research results in order to increase the EV intention in West Bank.

Chapter Five

Conclusions and Recommendations

5.1 Chapter overview

This chapter aims to summarize the conclusions of the study, and highlights its contributions to the theoretical and literature in EVs field. In addition, it offers recommendations for the policy-makers working at the vehicle agencies as well as state institutions such as the Ministry of Transportation and the Energy Authority. It also shows the limitations of the study and offers suggestion points that can be added and worked on in the future.

5.2 Conclusions

The study identifies six factors that promote consumers' EV purchase intention in West Bank: attitude, environment concerns, subjective norms, cognitive status, incentive policies, and product perception. Furthermore, we found attitude mediates the relationship between environment concerns and consumers' intentions to purchase EVs. However, perceived behaviors control does not significantly affect purchasing intention toward EVs in West Bank. Regarding the impact of EVs purchase behavior intention on sustainability purchase behaviors, the result shows that the EVs intention has a significant positive impact on economic, environmental, and social purchase behavior aspects in West Bank.

5.3 Research contributions

Most researches in this field did not analyze the link between purchasing intention and actual behavior, which leads to an attitude-behavior gap (Huang & Ge, 2019). This research focuses on the conversion mechanisms between purchase intention and sustainability purchase behaviour pillars. It also analyzes the link between the two mechanisms, depending on response of EVs –owners and non-EVs owner.

Moreover, this research considers West Bank as a unique research domain and explores a positive impact of EV purchase behavior on sustainability dimensions of economic, environmental and social, which has not been explored yet in developing countries and requires more attention from decision makers.

Furthermore, most previous studies only explored the direct impact of factors on purchase intention, while this research studies the indirect promotion effect of the antecedent variables of attitude on purchase intention.

5.4 Research limitations

A number of limitations were presented through this study; the first limitation is the small sample size of EVs actual owners, as this research depends on this layer to obtain the effect of EV intention on sustainability aspects. The second imitation is the high privacy of EVs owners' information in West Bank. It was difficult to reach them as most of EV

owner's in West Bank belong to the commercial sector, government sector, or rich persons. Thirdly, the political and health situation, due to COVID-19 pandemic, which makes it difficult for researchers to access to some cities in the West Bank such as Jerusalem and Gaze strip.

5.5 Future directions

This research gives a direction for future research for more exploration of moderating and mediating effects of the mentioned variables. Future research can improve this research model by including all possible factors affecting the adoption of EVs worldwide including for example the effect of word-of-mouth in EV marketing.

Regarding the Palestinian region, more investigations are needed with larger samples of EV customers in order to explore the actual gap between consumer' intentions towards and adoption of EVs and develop a theoretically advanced model of the actual benefits of EV adoption, taking into the account the critical situation of fuel importation in the West Bank. In addition, it is worth studying the possibility and actual benefits of charging EVs through clean energy stations. Researchers are encouraged to link the topic of EVs to modern mobility innovations, such as autonomous driving and connected mobility.

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Appendixes

Appendix A



An-Najah National University

Faculty of Graduate Studies

Engineering Management Program

Survey

**Purchasing Intention and Adoption of Electric Vehicles and their
Impact on Sustainability in the West Bank**

Respected Sir/Mrs,

This survey is part of the Master's thesis research at the Engineering Management program at An-Najah National University. You will help us investigating the factors influencing the purchasing intention of electric vehicles in West Bank. And assessing the impact of electric vehicles intention on sustainable consumer purchasing behavior. This evaluation will take you 10 minutes from your time to complete. All information will be kept confidential and will only be used for scientific research purposes. Thank you in advance for dedicating part of your time to filling out this questionnaire.

Kind Regards

Manar Ramadan

Researcher, Master of Engineering Management

Email: engmanarramadan@gmail.com

Mobile +972-598-558575

Section I: Personal Information and Socio-demographic variables

Kindly answer the following questions by signal (X) in the answer Suitable for you

1. Have you ever driven an electric car?

- ☐ Yes, a hybrid electric/petrol car (PHEV)
- ☐ Yes, a fully electric car
- ☐ No, I have never driven an electric car

2. Have you ever personally owned an electric car?

- ☐ Yes, a hybrid electric/petrol car (PHEV)
- ☐ Yes, a fully electric car
- ☐ No, I have never owned an electric car

3. You are driver of a vehicle that belongs to:

- ☐ Private vehicle
- ☐ Commercial Sector
- ☐ Government Sector
- ☐ Non-profit organization

4. What is your gender?

- ☐ Male
- ☐ Female

5. How old are you?

- ☐ 18 – 29
- ☐ 30 - 44
- ☐ 45 - 59
- ☐ 60+

6. What is your level of education?

- ☐ High school and below
- ☐ Junior college
- ☐ Bachelors
- ☐ Master
- ☐ Ph. D. and above

7. Monthly disposable income of household (NIS)

- ☐ Less than 4,000
- ☐ 4,000 - 10,000
- ☐ 10,000 - 20,000
- ☐ More than 20,000

8. Where do you live (permanent and/or temporary address)?

- | | | | |
|------------------------------------|--|------------------------------------|--------------------------------|
| <input type="checkbox"/> Ramallah | <input type="checkbox"/> Nablus | <input type="checkbox"/> Jerusalem | <input type="checkbox"/> Jenin |
| <input type="checkbox"/> Bethlehem | <input type="checkbox"/> Qalqilya | <input type="checkbox"/> Salfit | <input type="checkbox"/> Tubas |
| <input type="checkbox"/> Hebron | <input type="checkbox"/> Jericho and the Jordan Valley | <input type="checkbox"/> Tulkarm | |

9. You live in a _____?

- ☐ A House
- ☐ An apartment building

10. Number of cars owned by the household?

- ☐ 1
- ☐ 2
- ☐ More than 2

11. How often on average do you travel daily (km)?

- ☐ Short distances near to where I live (0-50 Km trip)
- ☐ Medium distance (50-100 Km trip)
- ☐ Longer distance (over 100 Km Trip)

Section 2: Investigating the factors influencing the purchasing intention of electric vehicle:

Please mark (✓) in the appropriate column.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Source
Attitude						
12. I think buying an electric vehicle is a good choice.						Huang and Ge (2019), Han et al. (2017)
13. I support replacing the old fuel vehicle with an electric vehicle.						Klößner et al. (2013)
14. It is essential to use electric vehicle in West Bank to reduce the fuel consumption						Adnan et al. (2018), Huang and Ge (2019)
Subject Norm						
15. If the people around me use electric vehicles, this will prompt me to buy one.						Huang and Ge (2019)
16. Media propaganda will prompt me to buy an electric vehicle.						Huang and Ge (2019)
17. If I purchase electric vehicles, then the most people who are important to me may also buy electric vehicles.						Adnan et al. (2018), Wang et al. (2014)
Perceived Behavioral Control						
18. It is completely up to me to decide whether or not to buy an electric vehicle at home.						Huang and Ge (2019)
	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Source
19. The price of electric vehicle is important to me and I can afford it when I decide to buy one.						Huang and Ge (2019), Wang et al. (2014).
20. I am sure that I can decide on buying an electric vehicle in the future.						Wang et al. (2014), Klößner and Matthies (2009).
Cognitive Status						
21. I would be willing to pay more for a vehicle that I know is not harmful to the environment.						Huang and Ge (2019); Bunce and Burgess (2014)
22. I have a certain understanding of the brand, policy and product attributes of electric vehicles.						Huang and Ge (2019)

23. I would rather stick with a brand I usually buy than try something I'm not very sure of.						Ttjip (1996)
Purchase Intention						
24. I look forward to more brands and models of electric vehicles to be introduced to the Palestinian market.						Huang and Ge (2019)
25. I support purchase electric vehicles instead of current fuel vehicles.						Degirmenci and Breitner (2017).
26. I plan to adopt electric vehicle when adopting a vehicle in the near future.						Wang et al. (2014), Huang and Ge (2019)
Incentive policies						
27. Public vehicle parking that contains charging stations at low fees will encourage me to purchase an electric vehicle.						She et al. (2017), Huang and Ge (2019),
28. Exemption from purchase tax will encourage me to purchase an electric vehicle.						Wang et al. (2017), Huang and Ge (2019),
29. Reducing the annual electric vehicle insurance fee will encourage me to purchase an electric vehicle.						Huang and Ge (2019),
Product Perception						
30. I believe that electric cars are limited from a mileage/distance perspective						Huang and Ge (2019),
31. I believe that electric vehicles are not safe						Huang and Ge (2019),
32. I believe that electric vehicles have a short battery life						Huang and Ge (2019),
33. I believe that electric vehicle's top speed is limited						Hidrué et al. (2011)
34. I'm worried about after-sales service						Huang and Ge (2019),
35. I'm worried about long charging time of electric vehicle						Huang and Ge (2019),
Environmental concern						
36. I think individuals have the responsibility to protect the environment.						Adnan et al. (2017)
37. I feel more comfortable to environment friendly product						Adnan et al. (2017)
38. I think we must do more to save the environment						Adnan et al. (2017)

Section 3: Investigating the factors moderator the purchasing intention adoption relationship of electric vehicle:

Please mark (✓) in the appropriate column

Source	Strongly agree	Agree	Neutral	Disagree	strongly disagree
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Section 4: assessing the impact of electric vehicles intention on sustainable performance

Please mark (✓) in the appropriate column

Source	Strongly agree	Agree	Neutral	Disagree	strongly disagree
Economic purchase behavior					
Zhao et al. (2016)					39. I believe that life cycle cost of electric vehicle is less than old fuel cars vehicles.
Özdemir and Hartmann (2012).					40. I believe that cost of maintenance for electric vehicle is less than old fuel cars vehicles.
Zhao et al. (2016), Joshi & Rahman(2019)					41. I believe that total cost of ownership for electric vehicle is less old fuel cars vehicles.
Environmental purchase behavior					
Nienhueser and Qiu (2016).					42. I prefer charging with renewable energy such as solar energy instead of typical electricity charging stations
Ramoniand Zhang(2013)					43. I support recycling electric vehicle battery at the end of battery life.
Carley et al. (2013), Joshi & Rahman(2019)					44. Owning an electric vehicle will support care for environment
Social purchase behavior					
Carley et al. (2013). Murphy (2012)					45. I deliberately choose EV because safety is one of the most important vehicle attributes.
Poullikkas (2015)					46. I believe that noise reduction is one of the most important vehicle attributes for comfort driving.
Murphy (2012)					47. I believe that owning an electric vehicle will support my commitment to promoting social activities aimed at environmental goals

Thanks for taking the time to fill in our survey!

Appendix B

جامعة النجاح الوطنية

كلية الدراسات العليا

برنامج ماجستير الإدارة الهندسية

نية شراء وتبني المركبات الكهربائية وأثرها على الاستدامة في الضفة الغربية

عزيري القارئ/القارئة:

تحية طيبة ":

هذا الاستبيان هو جزء من بحث علمي، وذلك استكمالاً لمتطلبات الحصول على درجة الماجستير في تخصص الإدارة الهندسية. سوف تساعد مشاركتك في هذا الاستبيان على تحديد العوامل المؤثرة وكذلك العوائق ومستقبل تبني المركبات الكهربائية في الضفة الغربية وتقييم مدى تأثيرها على سلوك الشراء للمركبات من حيث الاستدامة البيئية، الاقتصادية والمجتمعية.

هذا التقييم سوف يستغرق منك عشرة دقائق لإتمامه بدقة علماً بأن كافة المعلومات سوف تكون سرية لن يذكر فيها الاسم ولن يتم استخدامها إلا لأغراض البحث العلمي والتي ذكرت أهدافه اعلاه

شكراً جزيلاً على تخصيص جزء من وقتك لتعبئة هذا الاستبيان

الباحثة: منار رمضان

ماجستير الإدارة الهندسية

Email: engmanarramadan@gmail.com

القسم الأول: المعلومات الشخصية والعامة

نرجو وضع علامة (√) على الخيار المناسب

1. هل تمتلك مركبة؟

☐ نعم، مركبة ذات محرك تقليدي (ديزل/بنزين)

☐ نعم، مركبة كهربائية

☐ لا، لا امتلك مركبة

2. هل سبق وقمت بقيادة مركبة كهربائية:

☐ نعم

☐ لا

3. إذا كنت سائق/تمتلك مركبة فإن المركبة تنتمي ل:

☐ مركبتي الخاصة

☐ قطاع عام أو أهلي

☐ قطاع تجاري

☐ مواصلات عامة

☐ لا، لا امتلك مركبة

4. الجنس:

☐ ذكر

☐ أنثى

5. كم عمرك؟

☐ 18 – 29

☐ 30 – 44

☐ 45 – 59

☐ 60+

6. ما هو مستواك التعليمي؟

☐ ثانوية عامة فأقل

☐ كلية جامعية (تعليم متوسط)

☐ بكالوريوس

☐ ماجستير

☐ دكتوراه فأعلى.

7. معدل الدخل الشهري للأسرة؟

☐ أقل من 4000 شيكل

☐ 4,000 - 10,000 شيكل

☐ 10,000 - 20,000 شيكل

☐ أكثر من 20,000 شيكل

8. انت تقيم في؟

<input type="checkbox"/> رام الله	<input type="checkbox"/> نابلس	<input type="checkbox"/> القدس	<input type="checkbox"/> جنين
<input type="checkbox"/> بيت لحم	<input type="checkbox"/> قلقيلية	<input type="checkbox"/> سلفيت	<input type="checkbox"/> طوباس
<input type="checkbox"/> أريحا والاغوار	<input type="checkbox"/> طولكرم	<input type="checkbox"/> الخليل	

9. أنت تعيش في؟

☐ بيت مستقل

☐ شقة في عمارة سكنية

10. عدد السيارات التي تمتلكونها في المنزل :

☐ واحدة

☐ اثنتان

☐ أكثر من اثنتين

☐ لا يوجد

11. ماهي معدل المسافة التي تقطعها يومياً:

☐ مسافات قصيرة حول السكن (0-50 كم)

☐ مسافات متوسطة (50-100 كم)

☐ مسافات طويلة (أكثر من 100 كم)

القسم الثاني: العوامل المؤثرة على نية شراء المركبة الكهربائية:

نرجو وضع علامة (√) على العمود المناسب

الرقم	الجملة	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
المعتقدات السلوكية:						
12.	أعتقد أن شراء مركبة كهربائية خيار جيد					
13.	أنا أدمج تبديل المركبات التي تعتمد على الوقود الى مركبات كهربائية					
14.	من الضروري استخدام السيارة الكهربائية في الضفة الغربية لتقليل استهلاك الوقود					
المعتقدات المعيارية						
15.	إذا استخدم الأشخاص من حولي مركبات كهربائية، فسوف يدفعني ذلك لشراء واحدة					
16.	تحتوي الدعاية الإعلامية على شراء سيارة كهربائية					
17.	إذا اشتريت مركبة كهربائية، فقد يشتري معظم الأشخاص المهمين بالنسبة لي أيضاً مركبات كهربائية					
معتقدات التحكم						
18.	الأمر متروك تماماً لي لأقرر شراء أو عدم شراء سيارة كهربائية في المنزل					
19.	سعر المركبات الكهربائية مهم بالنسبة لي ويمكنني تحمله عند شراء واحدة					
20.	أنا متأكد من أنه يمكنني أن أقرر شراء سيارة كهربائية في المستقبل					
الحالة المعرفية والتجربة						
21.	سأكون على استعداد لدفع المزيد من المال مقابل سيارة أعرف أنها غير ضارة في البيئة					
22.	لدي فهم معين لسمات السيارات الكهربائية وأنواعها والسياسات المتعلقة بها					
23.	أفضل التمسك بعلامة تجارية أشتريها عادةً على تجربة شيء لست متأكدًا منه					
نية الشراء						
24.	إنني أتطلع إلى تقديم المزيد من العلامات التجارية ونماذج السيارات الكهربائية لتقديمها إلى السوق الفلسطينية					
25.	أؤيد شراء المركبات الكهربائية بدلاً من مركبات الوقود الحالية					

الرقم	الجملة	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
26.	أخطط لشراء سيارة كهربائية عند قراري شراء واحدة في المستقبل القريب					
سياسات الحوافز						
27.	وجود مواقف السيارات العامة التي تحتوي على محطات شحن برسوم منخفضة عامل مشجع لي على شراء مركبة كهربائية.					
28.	الإعفاء من ضريبة المشتريات عامل مشجع لي على شراء سيارة كهربائية					
29.	تخفيض رسوم التأمين السنوية على السيارة الكهربائية عامل مشجع لي على شراء سيارة كهربائية					
إدراك المنتج						
30.	أعتقد أن السيارات الكهربائية محدودة من حيث المسافة التي تستطيع أن تقطعها					
31.	أعتقد أن السيارات الكهربائية ليست آمنة					
32.	أعتقد أن المركبات الكهربائية لها عمر بطارية قصير					
33.	أعتقد أن السرعة القصوى للمركبة الكهربائية محدودة					
34.	أنا قلق بشأن خدمة ما بعد البيع					
35.	أنا قلق بشأن وقت الشحن الطويل للسيارة الكهربائية					
الاعتبارات البيئية						
36.	أعتقد أن الأفراد يتحملون مسؤولية حماية البيئة					
37.	أشعر براحة أكبر تجاه المنتجات الصديقة للبيئة					
38.	أعتقد أننا يجب أن نفعل المزيد لإنقاذ البيئة					

القسم الرابع: تقييم أثر تبني السيارات الكهربائية على سلوك الشراء المستدام

سلوك الشراء الاقتصادي						
39.	أنا أعتقد أن تكلفة دورة حياة المركبات الكهربائية أقل من مركبات الوقود التقليدية					
40.	أنا أعتقد أن تكلفة صيانة المركبات الكهربائية أقل من مركبات الوقود التقليدية.					
41.	أنا أعتقد أن التكلفة الإجمالية لمركبة الكهرباء أقل من تكلفة امتلاك مركبات الوقود التقليدية					
سلوك الشراء البيئي						
42.	أفضل الشحن باستخدام الطاقة المتجددة مثل الطاقة الشمسية بدلاً من محطات الشحن الكهربائية التقليدية					
43.	بالتأكيد أنا أؤيد إعادة تدوير بطاريات السيارات الكهربائية في نهاية عمر البطارية					
44.	لا بد أن امتلاك مركبة كهربائية سيدعم العناية بالبيئة					
سلوك الشراء المجتمعي						
45.	أنا أعتقد السلامة هي واحدة من أهم خصائص السيارة الكهربائية					
46.	يعد الحد من الضوضاء من أهم سمات السيارة لقيادة مريحة					
47.	إن امتلاك سيارة كهربائية سيدعم التزامي بتعزيز الأنشطة الاجتماعية التي تهدف إلى الأهداف البيئية					

نشكرك على تخصيصك بعض الوقت للمشاركة في الاستبيان

جامعة النجاح الوطنية

كلية الدراسات العليا

نية شراء وتبني المركبات الكهربائية وأثرها على الاستدامة في الضفة الغربية

إعداد

منار حسن رمضان

إشراف

د. محمد عثمان

قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في برنامج الإدارة الهندسية، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس - فلسطين.

2021

ب

نية شراء وتبني المركبات الكهربائية وأثرها على الاستدامة في الضفة الغربية

إعداد

منار حسن رمضان

إشراف

د. محمد عثمان

الملخص

شهدت القضايا المتعلقة في المركبات الكهربائية تزايداً ملحوظاً في العقود الأخيرة وذلك بهدف التقليل من الاعتماد الحالي على الوقود الأحفوري، وتقليل الانبعاثات المؤدية الى الاحتباس الحراري (GHG). استند هذا البحث على نظرية السلوك المخطط (TPB) من أجل تحديد العوامل التي تؤثر على نية شراء المركبات الكهربائية واعتمادها في الضفة الغربية، فلسطين، والتحقيق في تأثير اعتماد هذا النوع من المركبات على جوانب الاستدامة الاقتصادية، والبيئية، والاجتماعية. تم إجراء مجموعة من المقابلات غير المنظمة (Unstructured interview) مع مستوردي المركبات الكهربائية وكذلك ممثلين من وزارة المواصلات ،بالإضافة الى توزيع استبيان بين المستهلكين المحتملين لهذه المركبات في الضفة الغربية وتم الحصول على ما مجموعه 384 إجابة مسح صالحة من مالكي المركبات الكهربائية ومن غير المالكين للمركبات الكهربائية، فيما تم استخدام البرنامج الإحصائي (Smart PLS 3) لتحليل النتائج وصولاً للعوامل التي تؤثر على نية شراء المركبات الكهربائية، والعلاقة التي تربط نية الشراء مع الشراء الفعلي للمركبة، بالإضافة الى تأثير اعتماد المركبات الكهربائية على جوانب الاستدامة. أظهرت النتائج أن المخاوف البيئية، والمعايير الذاتية، والحالة المعرفية، وسياسات الحوافز، وتصور المنتج، كلها لها آثار إيجابية كبيرة على نوايا المستهلكين لشراء المركبات الكهربائية في الضفة الغربية. كما تبين أيضاً ان المعايير الذاتية تشكل عامل وسيط (mediator) بين المخاوف البيئية لدى المستهلكين وبين نية المستهلك لشراء المركبات الكهربائية. على النقيض لم تؤكد النتائج وجود علاقة موجبة بين السيطرة السلوكية ونية الشراء، يمكن أن توجه هذه النتائج صانعي السياسات في كل من سلطة الطاقة والنقل وكذلك مستوردي المركبات والقطاع العامل بها في فلسطين الى العوامل التي يجب التركيز عليها، وتفتح

ج

الباب لمزيد من البحث في نوايا المستهلكين وسلوكهم تجاه المركبات الكهربائية والاثـر الفـعلي لتبني هذه المركبات في السوق الفلسطينية.

