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INFLUENCE THE USE OF BLIND VAN TYPE ELECTRIC CARS OPERATIONAL ENERGY COSTS AND COSTS MAINTENANCE VEHICLE THROUGH EFFICIENCY COST OPERATIONS AT PT. DAPENSI DWIKARYA

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Abstract

The transition toward electric vehicles has encouraged logistics companies to empirically evaluate operational cost efficiency as part of sustainable transportation strategies. This study aims to analyze the effect of using electric blind vans on energy operational costs and vehicle maintenance costs through operational cost efficiency at PT. Dapensi Dwikarya, a logistics company operating in Indonesia. This research employs a quantitative explanatory approach using a survey method to examine the causal relationships among variables. Data were collected through structured questionnaires measured on a seven-point Likert scale and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The analysis involves four main constructs: the use of electric blind vans, operational cost efficiency, energy operational costs, and vehicle maintenance costs. The results indicate that the use of electric blind vans has a positive and significant effect on operational cost efficiency. Furthermore, operational cost efficiency significantly affects both energy operational costs and vehicle maintenance costs. The findings also show that operational cost efficiency mediates the relationship between the use of electric blind vans and operational costs. Specifically, operational cost efficiency partially mediates the effect of electric blind van usage on energy operational costs and fully mediates its effect on vehicle maintenance costs. These results suggest that the economic benefits of adopting electric vehicles in logistics operations depend not only on vehicle technology but also on effective operational cost management to achieve long-term cost efficiency.

Keywords: electric vehicles; energy operational costs; maintenance costs; operational cost efficiency; blind van

INTRODUCTION

Development global transportation today This move going to electrification as response to challenge environment and economy . Transition to vehicle electricity believed can lower emission carbon at a time reduce cost operational term long Because efficiency energy more electricity height and needs more care low compared to machine burning in (ICE). The 2025 Electric Vehicle Outlook Report shows trend increase penetration vehicle electricity worldwide is influenced by policies and progress technology battery , though infrastructure and costs beginning Still become obstacles . (BloonbergNEF , 2025). In Indonesia, the development of vehicle electricity also becomes focus policy with attention to the obstacles and prospects , including need more research Lots related cost operations and maintenance vehicle electricity commerce , in particular in context company logistics (Sidabutar, 2020) . In practice operational company logistics such as PT. Dapensi Dwikarya, costs operational vehicle become component important in control total cost . Although theory state that vehicle electricity can produce efficiency cost through energy more electricity cheap and more maintenance simple , condition real in the field Not yet Lots investigated in a way empirical , especially in vehicles commerce types of blind vans in operation intensive every day . This is cause question whether use car electric blind van really impact significant to cost energy operational and costs maintenance in context company logistics in Indonesia. Problems This important Because cost energy For electricity and spare parts spare parts battery can different in a way significant from estimation theory , while cost beginning investment vehicle electricity is still on relatively tall .In perspective gap analysis , there is gap between ideal conditions of theory (Das Sollen) and reality operational (Das Sein). Ideally , literature automotive and energy state that vehicle electricity capable lower cost operational in a way significant in term long Because rates electricity per kWh more low compared to cost material burn fossils per liter, as well as maintenance more machines

simple . For example , comparison cost operational car electric vs car conventional show potential economical real energy and care . (Geely, 2025) . However , in condition real in Indonesia and in context vehicle commerce like blind van, empirical data related effectiveness cost This still minimal and not yet represent operation intensive company logistics here it is gap empirical who wants filled by research This . Research study previously show a number of Relevant findings . Research in E- Journal of Development Economics by Mantik & Sukadana (2023) compare cost operations and maintenance car electricity with vehicle conventional , as well as show that system vehicle electricity own cost higher operational and emission low in a way statistics If compared to car made from burn fossils . (Mantik & Sukadana, 2023) . Another study that discusses analysis cost fleet transition in the company logistics show that comparison of total cost of ownership (TCO) between EV and ICE can be give description eligibility economy in term long , with consider price purchase , cost energy and costs maintenance (Ștet, 2024) . In addition , the global market report estimates that global electric van demand will grow rapidly in the segment logistics and distribution , which shows an upward trend adoption vehicle commerce electricity globally . (The Business Research Company , 2024) Although the literature above Lots review vehicle electricity in a way general or commercial in global context , research that focuses on vehicles types of blind vans in Indonesia with condition operational real still very limited .

From the study mentioned , the novelty (state of the art) of the research This lies in: first , focus on the car electricity blind van type vehicle specific and intensive trade used in distribution goods , which have not been Lots investigated in a way empirical in Indonesian literature as well as international ; second , research This done in context company logistics real (PT. Dapensi Dwikarya) so that the result give contribution practical in taking decision fleet management ; third , research This compare cost energy operational and costs maintenance vehicle in a way measurable , not just potential or projection economy theoretically , so that provide empirical data new for study vehicle commerce electricity in Indonesia. Based on phenomena , problems , theoretical-empirical gaps , and study to study previously , then objective study This formulated in a way general For analyze influence use car electricity blind van type against cost energy operational and costs maintenance vehicle through efficiency cost operational at PT. Dapensi Dwikarya. In general specific , research This aims : (1) to analyze influence use car electricity blind van type against efficiency cost operational at PT. Dapensi Dwikarya. (2) for analyze influence efficiency cost operational to cost energy operational vehicles at PT. Dapensi Dwikarya. (3) for analyze influence efficiency cost operational to cost maintenance vehicles at PT. Dapensi Dwikarya. (4) for analyze influence use car electricity blind van type against cost energy operational vehicle through efficiency cost operational at PT. Dapensi Dwikarya. (5) For analyze influence use car electricity blind van type against cost maintenance vehicle through efficiency cost operations at PT. Dapensi Dwikarya.

LITERATURE REVIEW

1. Efficiency Energy and Operational Costs Electric Vehicles

One of study systematic latest show that adoption vehicle electricity bring various impact comprehensive Good from side technology , environment , organization , and policy . This study explore more of 80 peer-reviewed articles on EVs and found that efficiency energy and costs more operational low is one of the the most frequent aspects identified in EV literature . Efficiency This especially seen from use energy electricity as material the usual burn own cost more low per unit energy compared to fuel, even though variables price electricity different in each country (Zaino et al., 2024) . Other studies have specific study cost operational vehicle electricity with Total Cost of Ownership (TCO) approach . general , although cost acquisition vehicle electricity often more tall than vehicle conventional , TCO research shows that cost EV operations and maintenance tend to be more low in term long Because efficiency energy electricity and reduced component moves that require routine servicing (de Albuquerque Felizola Romeral & Zancul, 2025) .

2. Operational Energy Costs Electric vs Conventional Vehicles

Various studies empirical and literature local strengthen findings said . As For example , research in the ANGKA Journal found that that car electricity show cost higher operational and maintenance costs low compared to car conventional , although investment initially more high and necessary support sufficient infrastructure . Efficiency energy this is what it is driver main cost more operational savings on electric vehicles (Ar-Razy et al., 2025) . Comparison practical others published online also confirms that cost energy per kilometer for vehicle electricity Can Far more low compared to car made from burn gas or diesel, depending rates electricity and patterns usage . This provides indication that EV use , especially in fleet operations , can reduce total costs energy operational in a way significant (Geely, 2025).

3. Cost EV Component Maintenance and Durability

Literature next show that cost maintenance vehicle electricity often more low compared to vehicle conventional . This is because EV has structure more mechanics simple (no need oil machine , system transmission complex , or replacement Lots ethnic group regular spare parts), so that cost service periodic and worn components become more little . Industrial studies automotive estimate that cost maintenance annual car electricity Can reach almost 50% more cheap compared to cost cars that use machine internal combustion (MG Motor, 2024). In addition , articles that analyze cost operational vehicle electricity underline fact that although EV batteries are expensive components for replaced , but with technology more modern batteries durable and rates relative electricity stable , cost overall maintenance Can more economical compared to cost replacement oil , timing belt, and components machine others on the vehicle conventional (Aprillia et al., 2024) .

4. Total Cost of Ownership (TCO) as an EV Economic Evaluation Tool

Relevant TCO research Keep going developing . The TCO study combines all costs incurred in cycle life vehicle cost purchasing , taxes , maintenance , energy , etc. for give description better economy complete . Research from journal international show that although in a number of EV TCO conditions can more high in the years initial , efficiency cost energy and care make EV into competitive or even more superior when viewed on a long-term horizon long certain (Irsyad et al., 2025) . Other comparative studies also support this . importance consider factors like duration ownership , intensity usage , as well as price energy local in TCO analysis . EV adoption in operational fleets , including vehicle commercial such as vans and buses, often only can show superiority the economy after a number of year operation certain (Lee & Park, 2025)

5. Case Studies and Research Related in Indonesia

In context local Indonesian, some research and studies show growing interest to vehicle electricity although adoption Still relatively low . As example , a study in the Journal of Economics and Business take notes that EV adoption can support sustainability economy and efficiency energy , as well as lower greenhouse gas emissions glass in urban areas through development supporting infrastructure and policies (Ravellino Dwi Cahyaa, 2024) . Other research also found that that comparison cost operational car electricity versus materials burn fossil show existence significant efficiency , but need noted that condition infrastructure and prices stable electricity become factor supporters main for efficiency This truly come true (Puma-Benavides et al., 2024) .

6. The gap Research and Focus of This Research

Based on from literature that discusses efficiency costs , TCO, and components EV maintenance , some big studies Still focus on vehicles passenger or big bus , while research that is special analyze vehicle commerce electric blind van types are very limited , especially in context operational company logistics in Indonesia. In addition , research empirical using real data from the operational fleet company such as PT. Dapensi Dwikarya including cost energy , maintenance , and efficiency in practice operational daily Not yet Lots available in literature scientific . Therefore that , research This own mark plus significant Because can provide proof empirical new enriching understanding about comparison cost in context commercial EV use , especially those assessing cost energy operational and costs maintenance in a way specific , and analyze How efficiency cost operational achieved in condition company real .

7. Study Previously

Study entitled Research Trends in the Total Cost of Ownership for Electric Vehicles (2025) examines various studies about comparison cost ownership vehicle electricity and vehicles made from burn fossil through Total Cost of Ownership (TCO) approach . Study results show that vehicle electricity tend own cost operational and costs more care low compared to vehicle conventional , although cost beginning purchase relatively more high . Research This emphasize that efficiency cost energy and care become factor main contributors to superiority economy vehicle electricity in term medium until long , especially in use intensive such as merchant fleets .

The Total Cost of Ownership of Electric Vehicles: A Synthesis of Critical Factors (2025) study identified factors main influencing factors cost ownership vehicle electricity , including price energy , costs maintenance , infrastructure filling power , as well as policy government . Research This find that stability price electricity and availability infrastructure filling is prerequisite important for efficiency cost operational vehicle electricity can

come true optimally . Findings This relevant with study moment this is what puts efficiency cost operational as variables key .

Research conducted by Mantik & Sukadana (2023) in Analysis Comparison Costs and Carbon Emissions of Electric Cars and Conventional Cars show that vehicle electricity own cost energy operational and costs more care low compared to vehicle made from burn fossils . However Thus , research this also emphasizes that limitations infrastructure filling Power Still become constraint in implementation vehicle electricity in a way area . Research results This support assumptions that vehicle electricity more efficient in a way costs , but need support system adequate operations . Study Analysis Comparison Use of Electric Cars and Conventional Cars (2025) study efficiency cost vehicle electricity in context policy energy in Indonesia. Research results show that car electricity more economical in cost energy and care compared to car conventional , especially in routine use . However , research This confirm that efficiency it really depends on the tariff electricity and patterns use vehicle . Findings This relevant with study moment this is what highlights importance efficiency cost operational as a mediator of influence vehicle electricity to cost .

Study Analysis Cost Operational Electric Car Vehicles that are carried out in context academic technique transportation analyze cost energy vehicle electricity compared to vehicle made from burn gasoline and diesel. Research results show that vehicle electricity own cost more energy per kilometer low , especially in use distance medium until long . Research This give base methodological in calculate and compare cost energy operational vehicle electric and conventional . Analysis Study Comparison of the Economic Value of Electric Cars and Conventional Cars (2023) assesses eligibility economy vehicle electricity through calculation cost energy , costs care , and age vehicle . Research results show that vehicle electricity own mark more economical Good in term long although need investment a better start big . Research This strengthen argument that efficiency cost operations and maintenance is factor determinant success adoption vehicle electricity .

Study Energy Cost Analysis and Operational Range Prediction (2024) analysis cost energy vehicle electricity based on consumption electricity , distance travel time and price energy . Research results show that vehicle electricity own cost energy more operational low compared to diesel and petrol vehicles , with notes price electricity relatively stable . Research This relevant Because show that efficiency cost energy is greatly influenced by factors external like rates electricity . The Comparative Study of Electric Vehicles and Internal Combustion Engine Vehicles (2025) compares cost maintenance and costs energy between vehicle electricity and vehicles engined burning in . Research results show that vehicle electricity own cost more care low Because system more mechanics simple and minimal components that require routine replacement . Findings This support variables cost maintenance vehicle in study This .

Study Electric Vehicles: Benefits, Challenges, and Potential (2023) discusses benefit economy vehicle electricity at a time challenges faced in implementation . This study conclude that vehicle electricity own potential big in lower cost energy operational and costs maintenance Because use electricity as source energy main as well as design more vehicles simple compared to vehicle engined burning in . However Thus , research this also confirms that benefit economy the No always direct felt , especially at the stage beginning adoption , because influenced by costs investment initial , rate electricity , and availability infrastructure filling power . Therefore that , efficiency cost operational become factor the key to success whether use vehicle electricity truly capable pressing cost energy and care in term long .

Research conducted by Pranata et al., (2023) entitled " Analysis Comparison of the Economic Value of Electric Cars and Conventional Cars with Total Cost of Ownership (TCO) Approach ” aim For compare mark economy car electricity and cars conventional made from burn gasoline and diesel in term time ten year . Research This use Total Cost of Ownership (TCO) approach which includes cost still like price purchases , taxes , and depreciation vehicles , as well as cost No still like consumption energy , costs service and spare parts spare parts . Research results show that mark economical car electricity (Rp. 134,336,622) more low compared to car conventional made from burn petrol (Rp 213,377,184) and diesel (Rp 301,136,733), which indicates that car electricity more economical in long- term .

Another study conducted by Mantik & Sukadana, (2023) with title " Analysis Comparison Cost and Sell Carbon Emissions , Cost Maintenance Purchasing an Electric Car, Costs Electric Car Operations and Transition with Conventional Cars” research comparison between car electricity and cars conventional from aspect emission carbon , costs operational costs maintenance and price purchase . Research This use method quantitative with two- sample t-test analysis free For compare performance second type vehicle . Research results show that car electricity own cost more operational low compared to car made from burn fossils , especially in calculations cost energy per 100 km distance travel . Research conducted by Sudarso, Danan, and Melia Eka

Lestiani, (2025) entitled "The Effect of Electric Vehicle Implementation, Utilization of Renewable Energy, and Operational Digitalization on Operational Cost Efficiency at PT Pos Indonesia (Persero)". Study This apply approach quantitative with design causal-associative . Data collection was carried out through distribution questionnaire structured to 165 employees in the operational and logistics units who are direct involved in use vehicle electricity , utilization energy solar , and implementation system logistics digital- based . Data analysis using SMARTPLS 4.0 with the Partial Least Squares–Structural Equation Modeling (PLS-SEM) method shows that implementation vehicle electricity influential positive and significant to efficiency cost operational ($\beta = 0.268$; $p < 0.001$). Utilization energy renewable also provides impact significant positive ($\beta = 0.336$; $p < 0.001$), while digitalization operational become factor with the most dominant influence ($\beta = 0.306$; $p < 0.001$). This result confirm that combination innovation technology friendly environment and digital capable increase efficiency cost operational in a way real in activities PT Pos Indonesia logistics , as well as become reference strategic for company logistics other .

Another study was conducted by Nizar, Catur , Erna, and Agus Purnomo (2025) entitled "The Mediating Effect of Employee Performance on the Influence of Human, Relational, and Organizational Capital on Retail Logistics Improvement: Evidence from PT Pos Indonesia (Persero)" . Study This done as response on Not yet optimally achievement revenue in business units retail PT Pos Indonesia (Persero) Regional III Bandung, the realization of which Still is below target , and low performance source Power human . With use method quantitative through analysis descriptive and verification research This involving 125 leaders level middle and upper classes who have served at least one term year . Test results show that human capital , relational capital , and organizational capital , together with performance employees , proven contribute in a way positive and significant to improvement performance company . Findings This give base strategic for PT Pos Indonesia in strengthen quality of human resources and services to improve Power competitiveness in the sector logistics national .

8. Framework Study

Framework study is something description conceptually structured in a way systematic For explain connection between the variables studied based on runway theory and results study previous . Framework This functioning as guidelines think researchers in formulate direction research , so that the research process can walk in a way structured , logical , and directed . In research quantitative , framework study own role important as base in compilation hypothesis . Relationship between the variables depicted in framework study Then tested in a way empirical through data collection and analysis . Therefore that , the framework study No only nature theoretical , but also become reference operational in determine indicators , methods measurement , as well as technique analysis used .

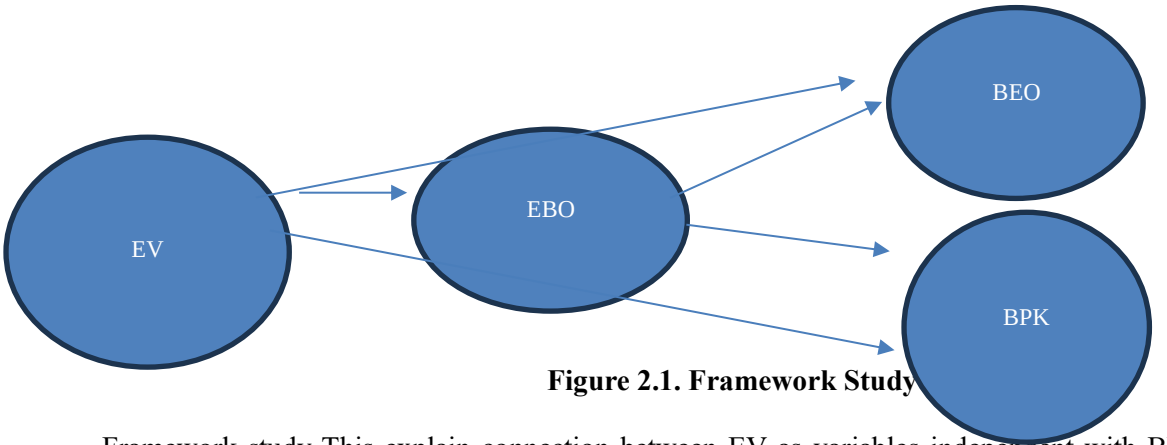


Figure 2.1. Framework Study

Framework study This explain connection between EV as variables independent with BEO and BPK as variables dependent , mediated by EBO. EV is assumed capable increase EBO because characteristics vehicle more electricity economical energy and have system more care simple compared to vehicle conventional . The increase in EBO furthermore expected can reduce BEO and BPK. In addition to EBO, EV is also assumed own influence direct towards BEO and BPK. With Thus , EBO plays a role as intervening variables that explain mechanism influence use car electricity to structure cost vehicles at PT. Dapensi Dwikarya.

9. Hypothesis Study

Hypothesis study is suspicion temporary or answer temporary to formulation problem research that is true Still need proven in a way empirical through data collection and analysis . Hypothesis arranged based on study theory , results study previously , and framework thoughts that have been designed by researchers . In the research quantitative , hypothesis functioning as base in testing connection or influence intervariable study use method statistics certain . Based on framework research and studies theories that have been put forward previously , research This formulate a number of hypothesis For test influence use car electricity blind van type against cost energy operational and costs maintenance vehicle through efficiency cost Operational analysis at PT. Dapensi Dwikarya. Explanation of each hypothesis is as following :

Hypothesis 1 (H1)

Use car electricity type of blind van has an effect to efficiency cost operational .(2)

Hypothesis This based on assumptions that vehicle electricity own characteristics more technical efficient compared to vehicle conventional , especially in use energy and systems maintenance . Use energy more electricity economical as well as lack of component mechanics that require routine maintenance is estimated capable increase efficiency cost operational company . With Thus , the more optimal the use car electricity blind van type , then efficiency cost operational company expected the more increase .

Hypothesis 2 (H2)

Efficiency cost operational influential to cost energy operational .(3)

Hypothesis This state that level efficiency cost high operational will impact on control and reduction cost energy operational efficiency cost operational reflect ability company in manage use energy vehicle optimally , including arrangement pattern operational and utilization energy electricity in a way efficient . Therefore that , the increase efficiency cost operational estimated can lower cost energy operational vehicle .

Hypothesis 3 (H3)

Efficiency cost operational influential to cost maintenance vehicles .(5)

Hypothesis This based on the view that efficiency cost operational No only related with use energy , but also with management maintenance vehicle . Vehicle electricity own more systems simple so that allows more care planned and minimal damage . With increasing efficiency cost operational costs maintenance vehicle expected can pressed in a way significant .

Hypothesis 4 (H4)

Use car electricity type of blind van has an effect to cost energy operational through efficiency cost operational .(4)

Hypothesis This emphasize role efficiency cost operational as bridging intervening variables influence use car electricity to cost energy operational . Use car electricity estimated increase efficiency cost operational moreover first , next impact on the decline cost energy operational . With Thus , efficiency cost operational functioning as mechanisms that explain connection No direct between use car electricity and costs energy operational .

Hypothesis 5 (H5)

Use car electricity type of blind van has an effect to cost maintenance vehicle through efficiency cost operational .(7)

Hypothesis This state that influence use car electricity to cost maintenance vehicle No only nature directly , but also through improvement efficiency cost operational . With system more vehicles simple and manageable more operational efficient , company expected capable reduce cost maintenance vehicle in a way sustainable . Efficiency cost operational play a role as variables strengthening mediation connection the .

Hypothesis 6 (H6)

Influence use electric car type blind van to cost energy operational

Hypothesis 6 (H6) in study This state that use car electricity type of blind van has an effect to cost energy operational vehicle . Hypothesis This built on base difference characteristics source energy between vehicle conventional made from burn fossil fuels and vehicles electricity that uses energy electricity as source main driving force . In conceptual , cost energy operational is all over expenses incurred company or users vehicle For fulfil need energy for vehicles can operate optimally in support activity distribution and logistics .

Hypothesis 7 (H7)

Influence use electric car type blind van to cost maintenance vehicle .

Hypothesis 7 (H7) states that use car electricity type of blind van has an effect to cost maintenance vehicle . Hypothesis This based on differences structure mechanics and complexity component between vehicle electricity

and vehicles conventional made from fuel costs maintenance vehicle covers all over related expenses with routine maintenance and repair component vehicle to remain is at in condition worthy operation .

RESEARCH METHODS

A. Research methods

Research methods in study This arranged For give systematic overview about method researchers obtaining data, processing data, and analyze connection between the variables studied . Research methods covering specification research , type research , methods approach , technique data collection and methods analysis of the data used . Retrieval technique sample in study This using saturated sampling (census), namely technique taking sample with make all over member population as sample research . This technique chosen Because amount population relatively limited and all respondents considered own relevant information with research . For amount samples used by researchers is as many as 100 respondents .

B. Specification Study

Study This is study explanatory research , namely research that aims For explain connection causal between variables independent variables , intervening variables , and dependent variables dependent . Specifications study This chosen Because study No only make an effort describe phenomenon use car electricity blind van type , but also testing influence and relationships cause and effect between use car electricity , efficiency cost operational costs energy operational and costs maintenance vehicles at PT. Dapensi Dwikarya.

C. Types of research

Type of research used is study quantitative , because the data collected in the form of numerical data that can measured and analyzed in a way statistics . Research quantitative chosen For test hypothesis that has been formulated previously as well as For know size influence intervariable in a way objective and measurable approach quantitative allows researchers get conclusions that are generalization to object study .

D. Approach Method Study

The approach method used in study This is approach survey . Approach This done with method collect direct data from respondents involved in use and management car electricity blind van type at PT. Dapensi Dwikarya. Approach survey assessed appropriate Because can describe perception and experience respondents related efficiency cost operational costs energy and costs maintenance vehicle in activity operational company .

E. Data collection technique

Data collection techniques in study This done through a number of method . First , the questionnaire , which was used as instrument main primary data collection . Questionnaire arranged based on indicators of each variable research and measured use Likert scale , so that allows respondents give evaluation in a way systematic to the statement submitted . Second , the study library , namely secondary data collection through books , journals scientific , report research , and sources written other relevant with topic vehicle electricity , efficiency cost operational , as well as cost energy and care vehicles . Literature study used For strengthen runway theory and support analysis results research . Third , documentation , in the form of supporting data related companies with use vehicle operational , internal policies , and information general about operational of PT. Dapensi Dwikarya.

F. Measurement Scale Study

Measurement variables in study This use seven-point Likert scale points (1–7). According to Sugiyono (2022) , the Likert scale is scale measurements used For measure attitudes , opinions , and perceptions respondents to something object or phenomenon research . This scale allows researchers For transforming qualitative data in the form of perception and assessment subjective respondents into quantitative data that can be analyzed in a way statistics . Usage seven-point Likert scale points chosen Because capable give level sensitivity more measurements tall compared to five- point Likert scale . With range more answers area , respondents own freedom in express level agreement or disagreement in a way more detail, so that variation of data obtained become richer and more accurate . This is important in study quantitative which uses SEM-PLS method , because data quality is very influential results testing of measurement models and structural models . In research this , every statement in questionnaire arranged based on indicators of each variable , then measured use Likert scale 1–7 with criteria as following : score 1 indicates absolutely not agree , score 2 indicates No agree

, score 3 indicates not enough agree , score 4 indicates neutral , a score of 5 indicates Enough agree , score 6 indicates agree , and a score of 7 indicates strongly agree . The score is getting higher tall reflect perception respondents are increasingly positive to statement submitted .

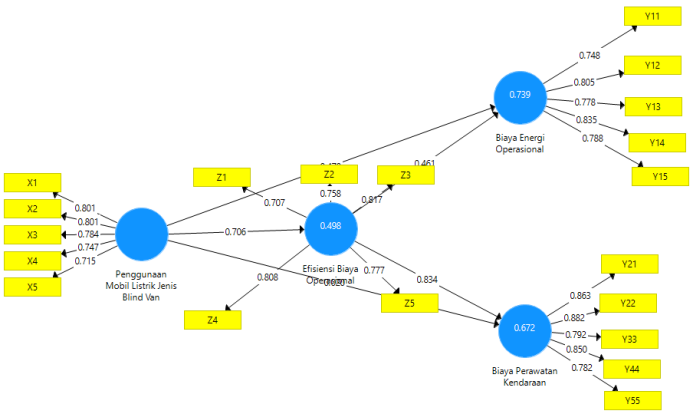
G. Data Analysis Methods

Data analysis methods used in study This is analysis statistics quantitative . Stages data analysis begins with analysis descriptive For describe characteristics respondents as well as trend answer against each variable research . Next instrument testing was carried out research that includes validity testing and reliability testing For ensure that questionnaire used worthy and consistent in measure variables study . After instrument declared valid and reliable , analysis to be continued with analysis relationships and influences intervariable use method appropriate analysis with research models , such as linear regression or analysis path analysis , for test influence direct and indirect direct between variables use car electricity blind van type , efficiency cost operational costs energy operational and costs maintenance vehicle . The results of the data analysis are then used For test hypothesis research and interesting conclusion in accordance with objective study .

Study This use Structural Equation Modeling–Partial Least Squares (SEM-PLS) as method data analysis for test connection intervariable research . SEM-PLS was chosen Because capable analyze connection complex causality , including influence direct and indirect direct (mediation), as well as in accordance used in research with size sample relatively limited and unavailable data must normally distributed . Data processing and analysis is carried out with help application SmartPLS , which allows testing the measurement model (outer model) and structural model (inner model) in detail simultaneous . Use of SEM-PLS in study this is very relevant because of the research model involving efficiency intervening variable cost operational , which functions bridge influence use car electricity blind van type against cost energy operational and costs maintenance vehicle .

RESULTS AND DISCUSSION

Based on results analysis use method Structural Equation Modeling–Partial Least Squares (SEM-PLS) as shown in the structural model image , can explained that study This involving four construct main , namely EV, EBO, BEO, and CPC. Each construct measured by several indicators that have been through the evaluation process validity and reliability .



Outer Model Research Image

1. Discussion of Measurement Models (Outer Model)

Analysis results show that all over indicators on the EV variables (X1–X5) have mark loading factor which is in the range of 0.715 to 0.801. This value has exceeding the recommended minimum limit of 0.70 in SEM-PLS, so that all over indicator declared valid in represent construct use car electricity . This is show that indicators the capable describe in a way consistent level utilization car electric blind van in activity operational company . In the EBO variable , indicators Z1 to Z5 show mark loading factor between 0.707 to 0.834. This value indicates that efficiency cost operational can measured in a way Good through indicators like savings cost , optimization use vehicles , as well as effectiveness management operational . With Thus , the construct efficiency cost operational own validity good and proper convergence used in structural model testing . Next , the BEO variable was measured through Y11 to Y15 indicators show mark loading factor range between 0.748 to 0.835. This value show that indicators the capable represent cost energy operational in a way accurate , good from side consumption energy , stability costs , as well as expenditure energy

vehicle . High loading factor value signify that cost energy operational is defined construct with Good in the research model This . In the BPK variable , indicators Y21 to Y55 have mark loading factor between 0.782 to 0.882. This value show that the indicators used are very strong in measure cost maintenance vehicles , including cost routine service , repairs components and requirements maintenance others . With Thus , all construct in study This has fulfil criteria validity and reliability , so that analysis can to be continued to the structural model .

2. Discussion of Structural Model (Inner Model)

Based on structural model image , the R-Square (R^2) value for the EBO variable is 0.498, which means that 49.8% of EBO variations can be explained by EV. This value including in category moderate , which indicates that use car electricity own role Enough strong in increase EBO, although Still there is other factors outside the model that influence efficiency the . The R-Square value for the BEO variable is 0.739, which indicates that 73.9% of the variation cost energy operational can explained by EV and efficiency cost operational . This value classified as strong , which indicates that second variables the is factor main in determine big small cost energy operational vehicles at PT. Dapensi Dwikarya. Temporary that , the R-Square value for the BPK variable is 0.672, which means that 67.2% of the variation cost maintenance vehicle can explained by EBO and EV. This value is also classified as strong , which shows that management efficiency operational own role important in pressuring the BPK.

3. Discussion Connection Intervariable

Analysis results track show that EV has an effect positive against EBO, with coefficient track of 0.706. This is show that more optimal use car electricity in operational company , then the more tall level efficiency cost operational that can achieved . Findings This in line with characteristics vehicle more electricity economical energy and have system more mechanical simple . Furthermore , EBO has an impact positive against BEO, which shows that improvement efficiency operational contribute significant in lower cost energy vehicles . In addition , efficiency Cost Operations also have an impact positive and strong towards the BPK, which indicates that management efficient operations capable reduce frequency and cost maintenance vehicle . Connection direct between EV and BEO is also visible significant , which shows that transition from vehicle made from burn fossil to vehicle electricity in a way direct impact on the decline cost energy . However , the influence direct use car electricity to cost maintenance vehicle relatively more weak compared to influence No direct through efficiency cost operational . This is confirm that efficiency cost operational play a role as variables important mediation in explain connection the .

4. Implications Findings Study

In a way overall , results SEM-PLS analysis on images the confirm that EV provides benefit significant economic impact , especially in pressing cost energy operational . However , the benefits the will more optimal if followed with good EBO management . In other words, technology vehicle electricity need supported by management effective operations so that the impact to cost maintenance vehicle can felt in a way maximum . Findings This give implications managerial that PT. Dapensi Dwikarya does not only need focus on adoption vehicle electricity , but also on efficiency strategies operational as key main in control cost energy and costs maintenance vehicle in a way sustainable .

CONCLUSION

Based on results analysis and discussion that has been done use SEM-PLS method , can concluded that use car electricity blind van type provides significant influence to efficiency cost operational costs energy operational and costs maintenance vehicles at PT. Dapensi Dwikarya. The results of the measurement model test (outer model) show that all over indicators on the EV variable have mark loading factor between 0.715–0.801, EBO between 0.707–0.834, BEO between 0.748–0.835, and CPC between 0.782–0.882, all of which exceeds the minimum limit of 0.70, so construct study declared valid and reliable . In the structural model (inner model), the R-Square EBO value of 0.498 indicates that 49.8% of the variation efficiency cost operational can explained by the use of car electricity , while the BEO R-Square of 0.739 indicates that 73.9% of the variation cost energy operational influenced by use car electricity and efficiency cost operational , and the BPK R-Square was 0.672, which means 67.2% of the variation cost maintenance vehicle explained by the use of car electricity and efficiency cost operational . Analysis results track show that use car electricity influential positive and strong to efficiency cost operational with coefficient of

0.706, which proves that increasingly optimal utilization vehicle electricity in operational company , then the more tall level efficiency costs achieved . Furthermore , efficiency cost operational proven influential significant to decline cost energy operational and costs maintenance vehicles , as well as play a role as variables important mediation in explain influence No direct use car electricity to second variables cost said . Although use car electricity also provides influence direct to cost energy operational , influence to cost maintenance vehicle relatively more strong when through efficiency cost operational , which confirms that adoption technology vehicle electricity need accompanied with management efficient operations for benefits the economy can felt optimally and sustainably .

Suggestion

Based on conclusion research , some suggestions that can be given is as following .

1. Practical Advice (Managerial)

PT. D apensi Dwikarya is recommended For Keep going develop use car electricity blind van type as part from efficiency strategy cost operational , in particular in control cost energy operational . Companies also need strengthen system management operational vehicles , such as arrangement timetable use , control consumption energy , and monitoring performance vehicle in a way periodically for benefits efficiency cost can felt optimally . In addition , the company recommended For compile standard operational special procedures (SOP) related maintenance vehicle electricity . This SOP important For optimize cost maintenance in term long , considering system maintenance vehicle electricity own different characteristics with vehicle conventional training technical for operators and technicians vehicle electricity is also necessary be increased so that the potential efficiency cost maintenance can maximized .

2. Policy and Strategic Suggestions

Management company recommended For make results study This as base consideration in taking decision strategic related vehicle fleet investment electricity . In addition to considering cost purchase vehicles , companies need evaluate efficiency cost operational in a way comprehensive as factor main in determine eligibility economy use car electricity in term long .

3. Academic Suggestions (Research Furthermore)

Study furthermore recommended For add other variables that have not been investigated in study this , like cost investment early , age economical vehicle , value residue , and support infrastructure filling power . In addition , research upcoming can use period further observation length so that the difference cost maintenance between vehicle electricity and vehicles conventional can observed in a way more comprehensive . Use method other analysis or combination approach quantitative and qualitative are also recommended For get greater understanding deep about effectiveness use vehicle electricity in operational company logistics .

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