

To cite this article: Nguyen Viet Thang and Ly Huy Tuan (2025). Road Transport Service Enterprises In The New Context In Vietnam. International Journal of Education, Business and Economics Research (IJEBER) 5 (1): 59-79

ROAD TRANSPORT SERVICE ENTERPRISES IN THE NEW CONTEXT IN VIETNAM

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<https://doi.org/10.59822/IJEBER.2025.5104>

ABSTRACT

The objectives and roles of road transport services are introduced after stating the need for research. Next, the article reviews the types and scales of road transport service enterprises in Vietnam, introduces the work that countries have done, and the gaps in recent research projects. After that, the article proposes criteria and specific criteria for general assessment of road transport service enterprises, assessment models, and gives examples of applying the AHP model to assess criteria and specific criteria; synthesize new context in the country. At the same time, it proposes feasible solutions for road transport business activities in the coming years in the context of the ever-changing world economy, Vietnam has joined many bilateral and multilateral international treaties and is applying integrated green growth policies, digitalization...in transport activities in general and road transport services in particular.

KEYWORDS:- Road transport service enterprises; AHP model; the new context in Vietnam.

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Published Online: January
2025

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1. NECESSITY OF THE STUDY

1.1 Objectives and roles of road transport

Objectives: After reviewing recent studies abroad and in the country, summarizing the work that countries have done related to the research topic; the article introduces the evaluation method with 4 criteria, 14 specific criteria, using weights and the analytical hierarchy method - AHP to evaluate road transport service enterprises in recent years and for the coming time; and proposes a number of solutions to develop road transport enterprise in the new context - changing world.

Role: Road transport/automobile transport plays an important role in national economic development, especially in the process of increasingly deep integration into global trade (eg WTO,

CPTPP, APEC...), in which road transport services (hereinafter referred to as road transport) account for a large volume, although modest in terms of passenger and cargo turnover due to short transportation distances. Therefore, this is an urgent topic, an indispensable factor in Vietnam today and in the future.

Road transport service enterprises and cooperatives (called transport enterprises) account for a fairly large proportion, about 70-80% of passenger-transport, 60-70% of freight transport-ton, but still quite low in terms of turnover, about 10-12% passenger.km, ton.km. In most countries and territories, road transport services account for a fairly high proportion of transport volume due to their superiority such as mobile, thorough, "door-to-door" transport, relatively fast, flexible and serving as a transit for other transport modes. However, the advantage of road transport is limited to items with large volumes, long and medium transport distances; large, uneven flows of goods and passengers. In the integration process, Vietnam has joined many multilateral and bilateral international treaties on services in general and road transport services (including transport support services) in particular. When joining the Asian Economic Community, GMS, ASEAN, etc., Vietnamese road transport enterprises are facing new challenges (Threats). Therefore, it is necessary to take full advantage of opportunities and strengths; overcome weaknesses, challenges and difficulties to stand firm and develop sustainably in the process of deep integration into the regional and world economy in the context of the new and ever-changing international situation.

1.2 Overview of the work done by countries

Most of the domestic and foreign works/articles [1-6,16,18,22,23] introduce the investment ratio in the road sub-sector compared to other sub-sectors and the market share of road transportation. However, there are few works on freight transport services; the connection, linkage or integration in road transport or between road transport enterprises and other modes of transport. In addition, most studies choose the method of interviewing, surveying customers, drivers at stations, border gates, transit points of goods, passengers or expert methods to implement study [5,12-15,17-20].

What countries have done: the volume of road transport accounts for a large proportion in Japan over 90%, in Europe 71-73% of passenger transport, in China 74-76% (railway, waterway 24-26%) [19]. Recently, the development trend has been towards rapid increase of road transport in Korea and gradual decrease of the transport proportion of rail and waterway. In the US, the volume of road transport accounts for ~75% [2,19] with the investment level in roads accounting for 63-65% and 3 forces of change are globalization, the emergence of new technology and their impact on road freight transport including cost, price and service [3].

In Vietnam: VITRANSS [5] all introduce road freight and passenger transport based on survey data, investigations or interviews with truck, bus drivers, people/passengers at ports, bus stations, transport stations or similar locations such as road border gates, railway border stations.

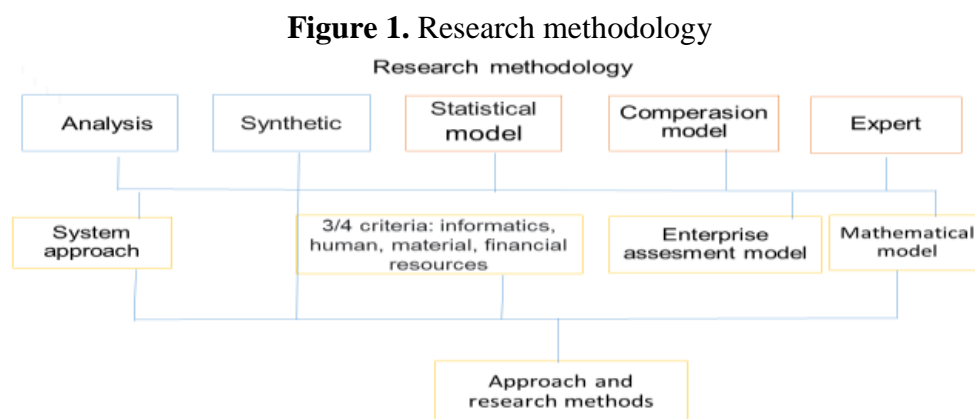
State management of freight transport, multimodal transport has 2 works; on road freight transport, assessment of road transport enterprises has 2 and urban public passenger transport has 1 study. Works [14] mention the assessment of road transport enterprises, [15] introduce road freight transport management, [18] mention multimodal transport management in logistics activities, [22]

introduce Vietnam's sea freight transport when participating in CPTPP; and [11] mentions factors affecting the development of urban public passenger transport services by bus in Vietnam. Through the above studies, it is clear that there are many gaps for further research, for example: criteria, specific criteria, evaluation indicators; weight of criteria, specific criteria & indicators; combination of qualitative and quantitative; approaches, research when the context changes.

Through the above studies, it is clear that there are many gaps for further research, for example: criteria, specific criteria, evaluation indicators; weight of criteria, specific criteria, indicators; combining qualitative and quantitative assessments; approaches when the domestic, international context changes.

1.3 Research methodology

In addition to using common research methods, most domestic and foreign studies use the method of interviewing customers, drivers...about the purpose of the trip, the type of vehicle used...to identify the problem to be solved. In this study, to using the above methods, based on the four main criteria of resources: human resources, material resources/transportation vehicle, financial resources and informatics resource, the author uses additional methods such as statistics; system approach; and combining qualitative with quantitative; mathematical modeling with weights, interview method and analytical hierarchy method-AHP to achieve the proposed research objectives. The research methodology is introduced in Figure 1.



2. TYPES AND MODELS OF ROAD TRANSPORT ENTERPRISES

2.1 Types of enterprises

There are many ways to classify road transport and road transport service enterprises operating in different types, such as the following main divisions: *By nature, by transport distance, by scope of operation, by method, by purpose of use, by type of vehicles...*

According to the Road Traffic Law in Vietnam, there are the following types of road transport business:

- a. *Passenger transport business by vehicles includes:* passenger transport business on fixed routes; passenger transport business by bus/coach on fixed routes; passenger transport business by taxi; passenger transport business under contract; tourist transport business.

- b. *Freight transport business by vehicle includes:* regular goods; by taxi truck; transport business of oversized, overweight goods; transport business of dangerous goods.
- c. *Specialized transport:* in production, business, service chains; supply, construction investment projects.
- d. *Transport business* by rudimentary vehicles, small motor-vehicles.

2.2 Road transport business models

Depending on the division, there are many types of road transport business models and road transport services being used in Vietnam.

According to the investment capital source, there are: enterprises invested by domestic organizations and individuals; road transport enterprises with foreign investment capital; state-owned road transport enterprises, single-member limited liability companies-LLCs; LLCs, joint stock companies, private enterprises, road transport cooperatives, road transport service cooperatives; individual and individual business households.

According to the nature of transport, there are: road freight transport, passenger transport; mixed road transport; passenger transport vehicles, school bus/vehicles, vehicles transporting workers, employees, etc.

According to the form of organization, there are: road transport companies with foreign investment capital - FDI, joint-venture companies; joint stock companies-JSCs, LLCs (including one-member LLCs); transport cooperative, private enterprise, individual business household & individual; partnership, joint-venture, association; self-managed transport union/team.

According to the route, there are: fixed-route road transport, non-fixed-route road transport.

Thus, the road transport business model can include one or several of the above types, models, classifications, and industries. In practice, road transport enterprises often use a multi-disciplinary, multi-industry, including road transport as their business line. The business lines and fields of road transport enterprises are very diverse and rich; many enterprises are inter-industry, multi-sector, and multi-field.

2.3 Enterprise scale

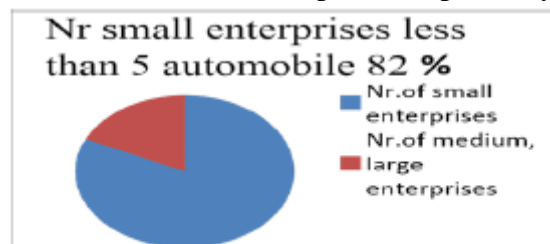
The number of transport enterprises operating under the FDI enterprise model is quite small, mainly small and medium scale due to the policy of attracting foreign investment capital in recent times. The number of transport enterprises operating under the joint stock company model is not much, mainly medium scale. However, there are small-scale joint stock enterprises like a family business. Limited liability companies-LLCs are a popular type of road transport enterprise, accounting for the majority of enterprises and vehicles, mainly small and medium scale. Transport cooperatives in the traditional sense are small and medium scale, operating mainly on intra-provincial routes due to transport policies in each period. However, in the form of transport service cooperatives, with a nationwide scope of operation, in medium/large scale. Private road transport enterprises are small in scale, not many in number, mainly operating in the field of freight transport within the provinces, cities.

Individual business households account for a large proportion but the number of vehicles is small, with different scales, mainly from 1-5 vehicles, 5-under 10 vehicles... depending on the nature and purpose of transport. Individual transport businesses account for a low proportion and mainly transport goods.

For example, some large-scale transport enterprises in the field of automobile transport include: Vinasun, Mai Linh Group, Phuong Trang Company, Hanoi Transport Corporation, SAMCO in HCM city; Multimodal Transport Company...

The figure 2 presents the number of small enterprises ratio in Vietnam in 2019.

Figure 2. Ratio of road transport enterprises by scale



Source [19]

2.4 Number of transport businesses, of passenger transport routes, of road vehicles operating and supporting services

Figure 3a. presents the chart of the total number of road passenger transport vehicles period 2013-2019 in Vietnam, figure 3b. presents the chart of the increase in the number of business vehicles, and figure 3c presents the changes in some indicators of GDP growth, the number of fixed inter-provincial/city passenger transport routes, the number of road enterprises, the number of road enterprises and road transport business households in the past few years and forecasts for the coming years. Some indicators are forecast for 2025 and 2030, example the number of passenger vehicles, number of fixed passenger routes.

Figure 3a. Number of road vehicles in 2013-2019 & forecast for 2025, 2030

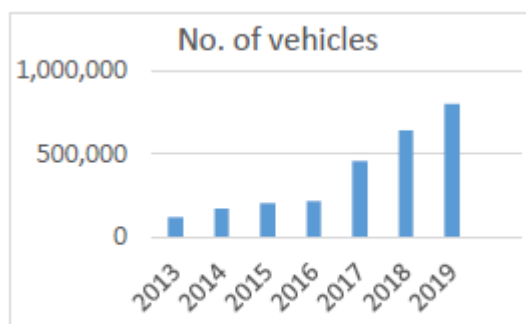
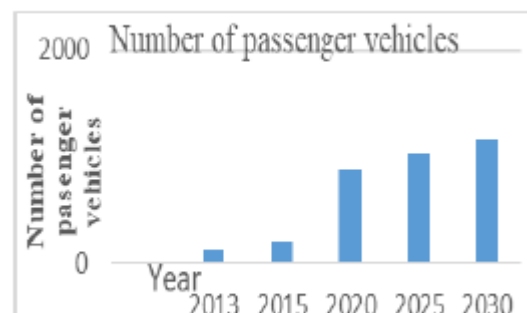
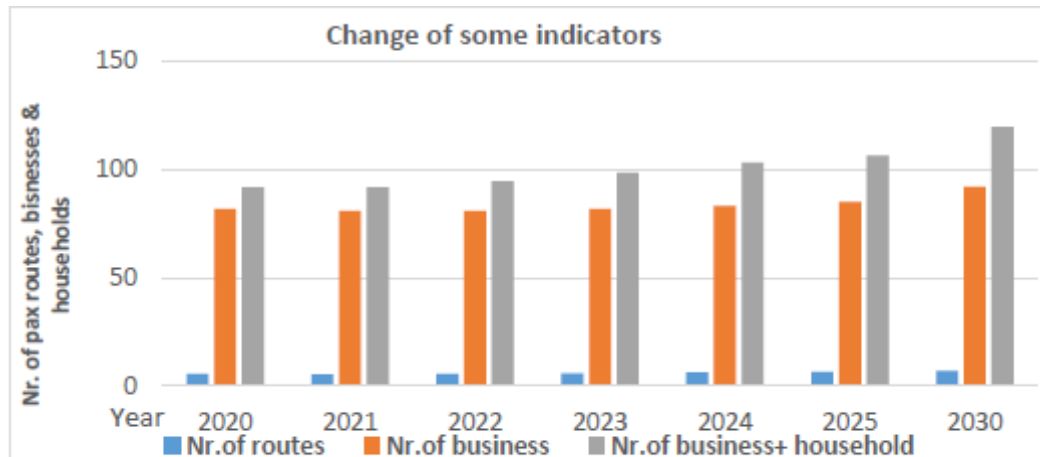


Fig.3b. No. of road passenger vehicles



Source [19 & author]

Figure 3c. Changes of indicators in some years and forecast for 2025, 2030 in Vietnam



Source [19 & author]

Note: The number of vehicles in 2013, 2014 and 2015 does not include the number of business households (only the number of road transport enterprises).

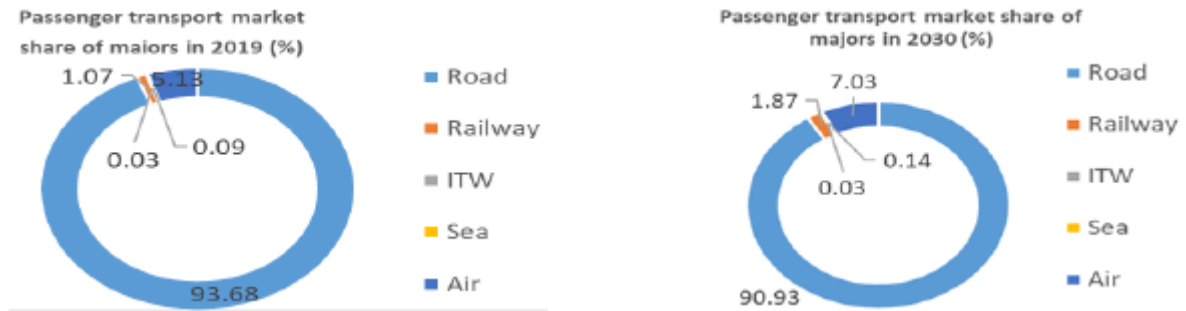
2.6. Difficulties and obstacles of road transport enterprises and services

Road transport infrastructure is overloaded on some routes, not meeting development needs, due to the large increase in the number of vehicles. Explosion in the development of individual vehicles (motorcycles, motorbikes, private cars) in some large cities (currently there are ~70 million motorcycles and motorbikes). There are still many low-level bus stations in the provinces and there is an overload phenomenon at some large bus stations (in the inner city, inner area of large cities).

Supply exceeds demand (for taxis, long-distance inter-provincial fixed-route public passenger transport). Public transport by bus in large urban areas: 59/63 provinces and cities have urban buses, but meet a low proportion; in Hanoi, Ho Chi Minh City - HCMC, meet about 10-15% of travel needs; slow to have large-volume means of public passenger transport such as metro, urban light rail (elevated, underground).

The transportation market is expanding, but fixed-route inter-provincial transport, taxi transport (including technological taxis) are increasingly narrowing, fierce competition due to contract vehicles, tourist transport vehicles, specialized vehicles - serving production lines, construction, school buses, worker transport vehicles, etc. Using the project results of the Vietnam general Road Administration (now Vietnam Road Administration-VRA 2021) [19], the market share of passenger transport by majors in 2019 & for 2030 present in figure 4a, b.

Fig.4a. Market share of passenger transport by majors in 2019 **Figure 4b** market share for 2030

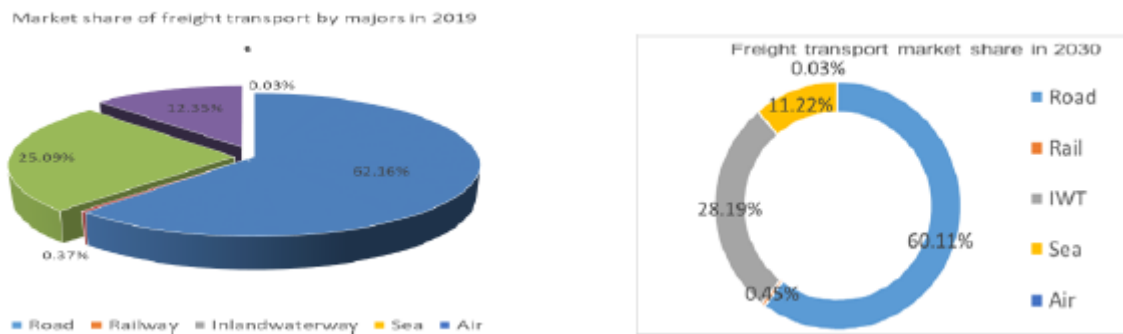


Source [19 & author]

The market share of freight transport by majors in 2019 and for 2030 present in figure 4c, d.

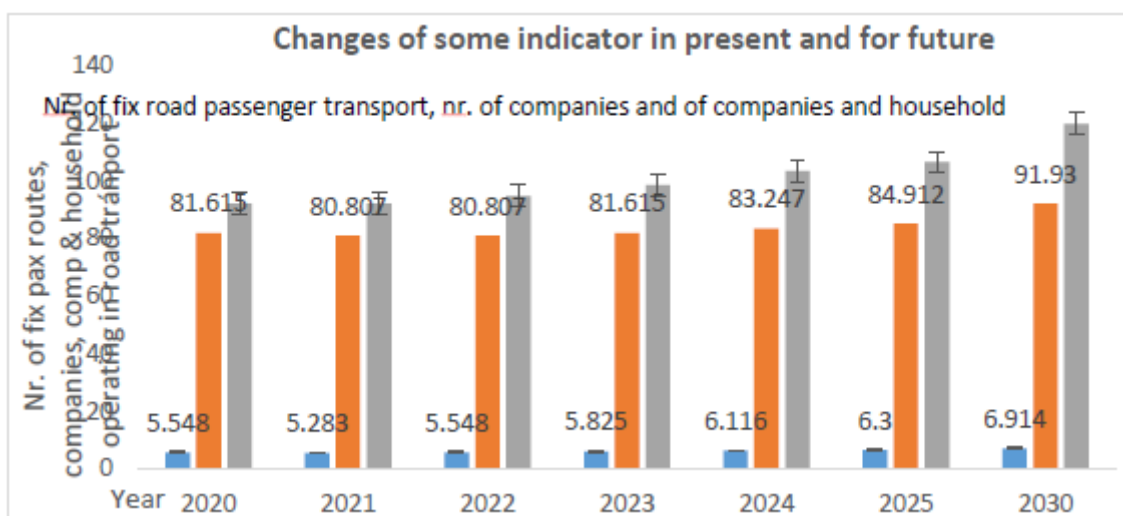
Fig.4c. Market share of freight transport by majors

Figure 4d. Market share for 2030



The figures show that by 2030, the market share of road transport for both passengers and goods will decrease but not much; the market share of railway and air transport will increase but not significantly. Changes of some indicators over the years present in figure 5.

Figure 5. Number of fixed passenger routes; number of road transport enterprises; number of registered road transport enterprises and households in past years and forecast for 2025, 2030



Source [19 & author]

Through figure 5, it can be seen that the number of enterprises and households doing business in road passenger and freight transport has increased significantly (in 2030, it increased by 30.41%

compared to 2020), although the number of enterprises has not increased much (compared to 2020, in 2025 it increased by 4%; in 2030 it increased by 11.26%).

3. MAIN RESEARCH RESULTS

3.1 Propose of model, selection criteria, specific criteria and weights

a. Model of organizational structure

- Building a "soft" and dynamic organizational structure model, depending on the actual (international, domestic) context and the actual conditions of the road transport sub-sector when there are socio-economic fluctuations. The soft organization of the enterprise can combine the functional structure and the advisory structure, organized when there are projects, plans, programs or sudden events. The soft organizational structure needs to be flexible, compact, combining the dynamism of individual managers, leadership organizations and creating motivation for employees towards the enterprise. "Dynamic" periodically (3, 5 years, 10 years) or when the domestic, international context significant changes.
- Selecting criteria, specific criteria for transport enterprises includes 4 criteria, 14 specific criteria, shown as follows:
 - Human resources criteria include 3 specific criteria: i) Number/structure of workers; ii) Training level; iii) Management level; leadership, organization and management of the enterprise.
 - Material resources criteria includes 4 specific criteria: i) Number, structure of road transport means; ii) Transport capacity; iii) Technical facilities including factories, garages, workshop, land and iv) Market share of the transport enterprise.
 - Financial resources criteria include 4 specific criteria: i) Volume/scale of capital; ii) Revenue; iii) Profit; iv) Cost/price of transportation.
 - The informatics resource criteria include 3 specific criteria: i) number of computers at the enterprise (digitalization); ii) digital/informatics infrastructure; and iii) connection, linkage, integration of network.
- Propose a model to evaluate the efficiency of road transport activities according to the formula:
 - General formula for both criteria, specific criteria, and/or indicators:

$$E_s = \sum_{i=1}^n Crc_i \cdot w_i \quad (1)$$

In which:

- E_s is the total efficiency of road transport activities;
- i is the number of specific criteria: $i = 1 \div n$, with n being the number of criteria, specific criteria or indicators;
- Crc_i is the efficiency value of the $(i)^{th}$ criteria, specific criteria (or indicator);
- w_i is the weight of the criterion, specific criterion or indicator (i) with $\sum w_i = 1$.

- Applied to illustrated case in the paper:

$$E_s = \sum_{i=1}^{14} Crc_i \cdot w_i \quad (2)$$

In which:

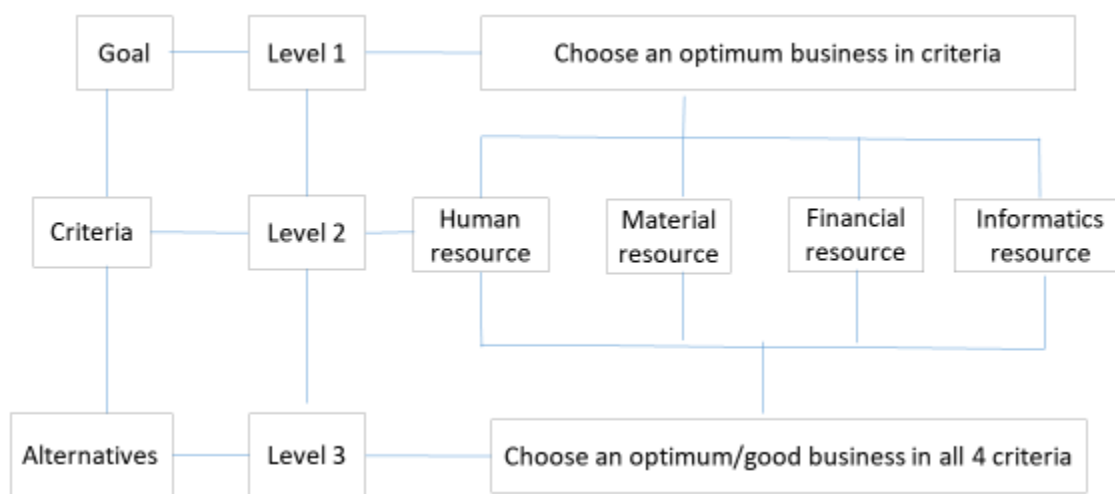
- E_s is the total efficiency of road transport; i is the number of specific criteria, $i = 1 \div 14$;
- Crc_i is the efficiency value of the specific criteria (i) ; w_i is the weight of the specific criteria (i) with $\sum w_i = 1$.

In this paper, we stop at the general model of criteria and specific criteria.

b. Applying the AHP method to evaluate businesses, choosing the optimal option

The Analytic Hierarchy Process - AHP method was proposed by Saaty in 1970. In 1994, Saaty and Vargas introduced the application of AHP in architectural model selection, pricing strategy, marketing strategy, technology selection, etc. In 1995, Saaty developed AHP for planning, conflict resolution, and benefit/cost analysis and resource allocation. To determine the weight of the criteria, the eigenvector method or the matrix normalization method can be used to solve [14, 20]. When comparing the importance of criterion X with criterion Y, the evaluator gives a score showing the comparison between the two criteria as stated in appendix 1, 2. The given value for the case of 3 or 4 criteria and the formula for calculating the weight vector component - CR, are ignored and go directly to the results of the criteria, specific criteria.

Figure 6. Choose an optimum/good business in criteria



Evaluation according to 4 criteria, specific criteria and all 4 criteria are shown in table 1,2,3,4,5 and 6.

- 1) Human resource criteria include 3 specific criteria: i) Number and structure of human resources - Hu1; ii) Educational/training level- Hu2; iii) Administration, organization, and management of human resources at the enterprise - Hu3.

The calculating of specific criteria on human resources is shown in table 1.

Table 1. Specific criteria on human resources

| | Hu1 | Hu2 | Hu3 | Weighted sum value | CW | CR |
|-----|-------|-------|-------|--------------------|-------|-------|
| Hu1 | 0.648 | 0.690 | 0.610 | 1.948 | 0.648 | 3.006 |
| Hu2 | 0.216 | 0.230 | 0.244 | 0.690 | 0.230 | 3.000 |
| Hu3 | 0.130 | 0.115 | 0.122 | 0.367 | 0.122 | 3.008 |

Results: $\lambda_{max} = 3.008$; $\lambda = (3.008 - 3.000) / 2 = 0.004$; $N=3$; $CR = CI/RI = 0.004 / 0.58 = 0.007 < 0.05$. Thus, CR is accepted as a weight with specific criteria on human resources.

- 2) The material criteria include 4 specific criteria: i). Facilities such as real estate, headquarters, workshops, garages of the enterprise - Ma1; ii). Means of transport of the enterprise - Ma2; iii).

Transport capacity of the enterprise - Ma3; iv). Transport market share of the enterprise - Ma4. An illustration on the results of the material criteria is introduced in table 2.

Table 2. Specific criteria on material resources

| | Ma1 | Ma2 | Ma3 | Ma4 | Weighted sum value | CW | CR |
|-----|-------|-------|-------|-------|--------------------|-------|-------|
| Ma1 | 0.087 | 0.072 | 0.088 | 0.101 | 0.348 | 0.087 | 4.000 |
| Ma2 | 0.174 | 0.143 | 0.132 | 0.127 | 0.576 | 0.143 | 4.028 |
| Ma3 | 0.261 | 0.286 | 0.264 | 0.253 | 1.064 | 0.264 | 4.030 |
| Ma4 | 0.435 | 0.572 | 0.528 | 0.506 | 2.041 | 0.506 | 4.033 |

Results: $\lambda \max > (4.033-4)/3=0.033/3= 0.110$; $n = 4$; $CI = 0.030$; $RI = 0.9$; $CR = (CI/RI) = 0.011/0.9= 0.012 < 0.1$. Thus, CR is accepted as a weight for the specific criteria on material resources.

- 3) The financial resource criteria include 4 specific criteria: i). Capital - Fi1; ii). Revenue - Fi2; iii). Profit - Fi3; iv). Cost/price of road transport - Fi4. The calculation an example results of the specific criteria on financial resources is presented in table 3.

Table 3. Specific criteria on financial resources

| | Fi1 | Fi2 | Fi3 | Fi4 | Weighted sum value | CW | CR |
|-----|-------|-------|-------|-------|--------------------|-------|-------|
| Fi1 | 0.328 | 0.324 | 0.466 | 0.233 | 1.351 | 0.328 | 4.119 |
| Fi2 | 0.252 | 0.249 | 0.262 | 0.255 | 1.018 | 0.249 | 4.088 |
| Fi3 | 0.137 | 0.185 | 0.194 | 0.278 | 0.794 | 0.194 | 4.093 |
| Fi4 | 0.312 | 0.217 | 0.155 | 0.222 | 0.906 | 0.222 | 4.081 |

Results: $\lambda \max= 4.119$; $n = 4$; $CI = 0.119$; $RI = 0.9$; $(CI/RI) = 0.119/3= 0.04$; $CR= 0.04/0.9= 0.044 < 0.1$. Thus, CR is accepted as a weight with specific criteria on financial resources.

- 4) Informatics resource criteria include 3 specific criteria: i). Number, structure of computers - In1; ii). Digital infrastructure, connectivity - In2; iii). Computer network connectivity, information media - In3. Calculation an example illustrated result for specific criteria on informatics resource is presented in table 4.

Table 4. Specific criteria on informatics resource

| | In1 | In2 | In3 | Weighted sum value | Criteria Weight | Consistency vector |
|-----|-------|-------|-------|--------------------|-----------------|--------------------|
| In1 | 0.557 | 0.640 | 0.492 | 1.689 | 0.557 | 3.032 |
| In2 | 0.279 | 0.320 | 0.369 | 0.968 | 0.320 | 3.025 |
| In3 | 0.139 | 0.107 | 0.123 | 0.369 | 0.123 | 3.000 |

Results: $N=3$; $\lambda \max = 3.032$; $CI = (3.032-3)/2= 0.016$; $RI = 0.58$; $CR = (CI/RI) = 0.016/0.58 = 0.028 < 0.058$. Thus, CR is accepted as a weight for specific criteria on information resource.

- 5) For all 4 criteria

The results of all 4 criteria according to all 4 criteria, specific criteria are introduced in table 5.

Table 5. All 4 criteria and specific criteria

| | In | Hu | Ma | Fi | 1st level weight | 2nd level weight | Weight |
|-----------|-----------|-----------|-----------|-----------|------------------------------------|------------------------------------|---------------|
| In | 0.379 | 0.462 | 0.396 | 0.311 | 0.379 | | |
| In1 | | | | | | 0.557 | 0.2115 |
| In2 | | | | | | 0.320 | 0.1215 |
| In3 | | | | | | 0.123 | 0.047 |
| Hu | 0.301 | 0.367 | 0.490 | 0.351 | 0.367 | | |
| Hu1 | | | | | | 0.641 | 0.2357 |
| Hu2 | | | | | | 0.246 | 0.0901 |
| Hu3 | | | | | | 0.113 | 0.0411 |
| Ma | 0.165 | 0.129 | 0.172 | 0.230 | 0.172 | | |
| Ma1 | | | | | | 0.087 | 0.015 |
| Ma2 | | | | | | 0.143 | 0.025 |
| Ma3 | | | | | | 0.264 | 0.045 |
| Ma4 | | | | | | 0.506 | 0.0871 |
| Fi | 0.100 | 0.086 | 0.061 | 0.082 | 0.082 | | |
| Fi1 | | | | | | 0.328 | 0.027 |
| Fi2 | | | | | | 0.249 | 0.020 |
| Fi3 | | | | | | 0.194 | 0.016 |
| Fi4 | | | | | | 0.222 | 0.018 |
| Sum | | | | | 1.000 | | 1.000 |

The results of the combined scores of 4 criteria and 14 specific criteria are presented in table 6.

Table 6. The combined evaluation of the criteria and specific criteria

| <i>Content</i> | <i>Rating level</i> | <i>Conversion score</i> | <i>Weight</i> | <i>Total score</i> |
|------------------------------------------|---------------------|-------------------------|---------------|--------------------|
| 1. Informatics resources-In | | | 0.379 | 1.3515 |
| a. No.ofcomputers,inf.facilities-In1 | B | 4 | 0.2115 | 0.8460 |
| b. Digital infrastructure/server-In2 | C | 3 | 0.1215 | 0.3645 |
| c. Networkconnection-In3 | C | 3 | 0.0470 | 0.1410 |
| 2. Human resources-Hu | | 3.333 | 0.367 | 1.3364 |
| a. Number &structureofemployees-Hu1 | B | 4 | 0.2357 | 0.9428 |
| b. Traininglevel-Hu2 | C | 3 | 0.0901 | 0.2703 |
| c. Leadership,corporategovernance-Hu3 | C | 3 | 0.0411 | 0.1233 |
| 3. Material resources-Ma | | 3.5 | 0.172 | 0.6509 |
| a. Infrastructure: land, factory, garage | C | 3 | 0.015 | 0.0450 |
| b. Number and structure of PTVTMa2 | C | 4 | 0.025 | 0.1000 |
| c. Transport capacity Ma3 | C | 3 | 0.045 | 0.1575 |
| d. Transport marketMa4 | C | 4 | 0.0871 | 0.3484 |

| | | | | |
|----------------------------------|---|------|--------------|---------------|
| 4. Financial resources-Fi | | 3.25 | 0.082 | 0.2630 |
| a. Capital-Fi1 | C | 3 | 0.027 | 0.081 |
| b. Revenue-Fi2 | B | 4 | 0.020 | 0.080 |
| c. Profit-Fi3 | C | 3 | 0.016 | 0.048 |
| d. Cost/priceoftransport-Fi4 | C | 3 | 0.018 | 0.054 |
| Total | | | 1.000 | 3.602 |

Note, 5 assessment levels: A=5 points, B=4 points, C=3 points, D=2 points; E = 1 point.

From the above calculation can be seen that the results according to each criteria, specific criteria and all 4 criteria reflect quite closely the current situation of enterprises in general and in terms of road transport and road transport services in particular.

With a total assessment score of 3.602 points, the road transport enterprise is ranked BB (Appendix 3) with general characteristics according to the ranking: Effective operation, potential for development but limited resources and potential risks. Through analysis and assessment of the actual situation at the enterprise, the biggest risk of the enterprise is the efficiency of capital use and labor efficiency is very low, so it is necessary to analyze the causes in depth to find solutions to help the road transport enterprise stand firm and develop sustainably to face of current and future fluctuations.

In summary, the road transport enterprise is currently in the BBB group (> 3.4), meaning it is operating well, has potential for development, but its competitiveness and financial potential are at an average level.

3.2 Proposed solutions to develop road transport enterprises in Vietnam

3.2.1 The new context

Opportunities for road transport enterprises: The explosion of science and technology, innovation, creativity, digital transformation, artificial intelligence-AI. The 3 areas that shape, lead and pioneer are: (i) Development of the digital economy; (ii) Development of a green, circular economy; (iii) Developing high-quality human resources, AI and the 4.0 industrial revolution. The trend of cooperation and development, mutual benefit or win-win strategy is increasing, so the exchange and scale of trade increase so that the volume of import and export goods and the number of passengers entering and exiting the country increase. Increasing the attraction of domestic and foreign investment capital; more opportunities to create new jobs, increase income of workers. Expanding the market, changing the product structure for transport, transport services and other support services. Bilateral and multilateral international treaties on facilitating transport, transport services and transport enterprises; the legal system and documents guiding the implementation of the law have been gradually completed. Globalization increases transport demand, expanding the market; the supply chain is restored; the system of road transportation policies is improved; transfer of labor, capital, and production-consumption allocation is increasing.

Challenges for road transport enterprises: The world is fluctuating affects some policies of the national economy, the transport sector, especially transport by vehicles, international, multimodal and domestic transport. High, fierce competitive pressure is greater and more intense, although the

market is expanded; improving competitiveness and productivity of road transport means is an urgent requirement. Security, accidents, traffic jams in road transport is complicated; environmental pollution is reduced slowly; human awareness is raised slowly; traffic culture has not been established in sync with the 4.0 industrial revolution. The gap is reflected in the scale of capital, level of transport technology, leadership, road transport management and road transport enterprise governance. Changes in employment, labor transfer between regions, provinces and city areas. High requirements for soft skills, international transport services; intensity, labor productivity; expertise, information technology, international law, foreign languages. Infrastructures of enterprises are slowly developed; business size affects activity of small enterprises.

Road transport enterprises need to take advantage of strengths and opportunities; overcome weaknesses, difficulties and challenges for sustainable, circular, digital development.

3.2.2 Solutions for developing transport, road transport services

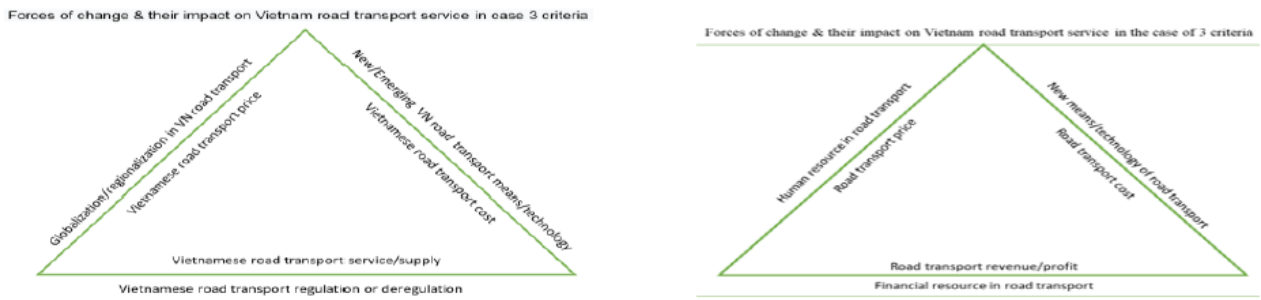
a). *The resources/forces and their impacts on road transport services* are presented in figure 7, in which figure 7a introduces 3 factors:

Globalization/regionalization, new types of transport vehicles/road transport technologies emerging, and transport services/supply side affecting 3 road basic resources: cost, price and regulation or deregulation. Similarly, figure 7b introduces 3 criteria: human resources, material resources - mains are transport vehicles, and financial resources, and impact of their on road costs, prices, revenue, and/or profits.

Figure 8a introduces 3 basic forces/resources: human, material and financial resources with the criteria of supply side, cost and price, that customers want to pay for service providers (Supply/Provider). These are 3 resources emphasized in road transport policy in addition to institutions (software). However, for the majority of road transport enterprises, the organizational structure is quite simple due to the very small scale (little capital, few in number of vehicles), so management is simple, mainly under the direction and operation of the enterprise director. Not to mention, up to now, only few road transport enterprises have built long-term/new strategic plans. In the plan of a road transport enterprise, the integration between types of plans also needs to be given timely and appropriate attention, and must be programmed, both in the development process as well as in the implementation stage, with a specific roadmap, especially for medium and large-scale enterprises (300-500 vehicles). The types of plans of road transport enterprises are introduced in figure 9, in which the right side of the figure is the new long-term plan or strategy (over 5-10 years) of the enterprise. In the middle is the medium-term plan (3 to under 5 years) and at the bottom is the operational plan (1- under 3 years, usually 1-2 years, 6 months or monthly).

Similarly, the 4 factors that affect the additional information/learning are considered, divided into many different cases. 2 cases are considered as having no weight or equal weight for all 3 or 4 criteria (Figure 7a) and (Figure 7b).

Figure 7a, b. Forces of change and their impact on road transport in case of 3 criteria



Source [3, Vietnamese case]

Figure 8a, b presents the 3 or 4 resource in case of unweighted with ratio 33.33% or 25% each; and figure 9 presents the types of road transport plans.

Figure 8a. The 3 resource in case of unweighted

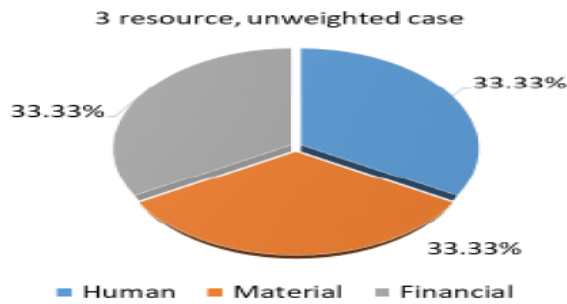


Figure 8b. The 4 resource

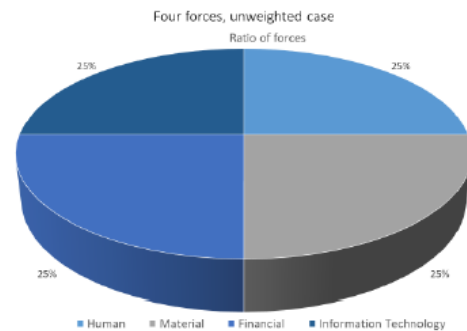
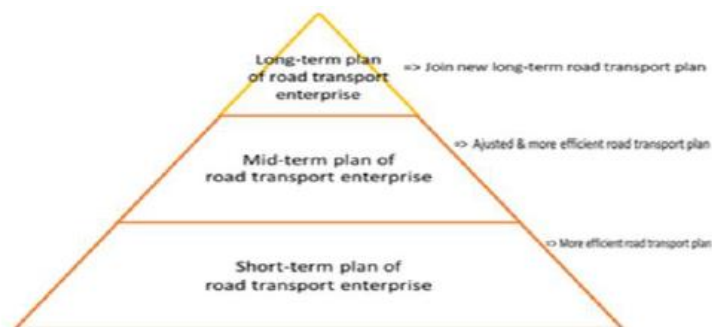


Figure 9. The road transport types of plan



Source [4, Vietnamese case]

In the planning of road transport enterprises, the integration between types of plans also needs to be timely and properly considered and must be programmed, both in the development process as well as in the implementation stage, with a specific roadmap, especially for medium and large-scale enterprises (300-500 vehicles).

The types of plans of road transport enterprises are introduced in figure 9, in which the right side of the figure is the new long-term plan or strategy (over 5-10 years) of the enterprise. In the middle is the medium-term plan (3 to under 5 years) and at the bottom is the operational p We have also

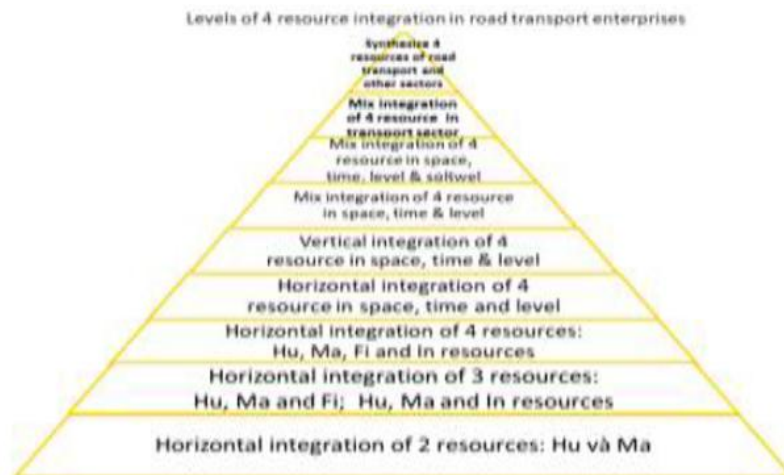
proposed a pyramid integrating the four main resources of a road transport enterprise, presented in point b below (plan- under 3 years, usually 1- 2 years, 6 months, monthly).

b. Solutions based on 4 criteria

- ✓ **Regarding human resources:** in addition to hard skills, it is necessary to develop soft skills for employees/workers, focusing on basic skills such as: communication; creativity; teamwork; management; engineering/technology; critical thinking; analysis, evaluation, measurement; problem solving; time management; presentation. Training according to programs and plans; combining on-site training, retraining and sending for training according to programs, plans and remotely; combining online and directly at school. Training knowledge on information technology, digitalization, combined with personalization, socialization of training programs at road transport enterprises.
- ✓ **Regarding material resources:** mainly accumulating and concentrating of transport means in the form of merger, dissolution, bankruptcy; joint ventures, associations. Specializing in means of transport according to types: transporting fresh goods, frozen & goods transported in refrigerated vehicles; container goods, import and export goods; oversized, overweight and heavy goods, overloaded goods; dangerous goods. Regarding business infrastructure: will compete with each other in terms of geographical or geopolitical position in new markets, emerging markets, traditional markets, transportation services, emerging technologies. It is necessary to continue to improve material and technical facilities, maintenance facilities, energy stations such as battery charging, gas supply station, transit point, etc.
- ✓ **Regarding financial resources:** socialize, mobilize capital sources inside and outside the enterprise in combination with domestic and foreign capital, improve investment capital efficiency, labor productivity, and financial efficiency. Many road transport enterprises will strive to become large road transport enterprises, some even want to become the central nucleus of inter-modal, multimodal, multi-sectoral, multi discipline road transport.
- ✓ **Regarding informatics resources:** gradually equip computer networks, computer systems connected to the network, digitization, to provide information to customers, passengers, especially for businesses with a scale of 100-200 vehicles. The next step is to connect digital networks, moving towards integrating information inside and outside the business, information for customers, passengers, and specialized state management agencies.
- ✓ **Integrate resources to improve the effectiveness and efficiency of the specialized sector, road transport businesses:** through weight analysis and elimination of unfeasible options, only options remain as shown in figure 10. Figure 10 introduces the integration of resources in road transport activities or road transport businesses.

The integration of 4 main resources in road transport is presented in figure 10, in which consists 9 levels of integration according to horizontal, vertical, level, in time, space and by software.

Figure 10. The integration of 4 resources in road transport



- Level 1 includes only horizontal integration of 2 resources: human and material resources.
- Level 2 includes horizontal integration of 3 resources: human, material and financial resources; or horizontal integration of human resources, material resources and informatics resources.
- Level 3 includes horizontal integration of 4 resources: human resources, material resources, financial resources and informatics resources.
- Level 4 includes integration of 4 resources: human resources, material resources, financial resources and informatics resources in space and time.
- Level 5 includes integration of 4 resources: human resources, material resources, financial resources and informatics resources in space, time & level.
- Level 6 includes integration of 4 resources: human resources, material resources, financial resources and informatics resources in space, time & level.
- Level 7 includes the integration of 4 resources: human resources, material resources, financial resources and informatics resources in space, by time, level and software (institutions such as organizational structure; coordination of people and organizations).
- Level 8 includes the integration of 4 resources: human resources, material resources, financial resources and informatics resources in space, by time, level and software in the road transport sub-sector.
- Level 9 includes the integration of 4 resources: human resources, material resources, financial resources and informatics resources in space, by time, level and software in the transport sector and with other sector/industries.

From level 5 and above, positions can be changed the order in some cases.

c. Other solutions

- ✓ Continue to supplement, amend and complete the system of legal documents; policies on development of transport and road transport services; strategies and integrated planning for national road transport, including strategies for development of transport enterprises, strategies for production and business of transport services to ensure feasibility, scientific, and suitability to the specific conditions of transport enterprises in each region with appropriate roadmaps.
- ✓ Develop and announce the planning of the inter-provincial and intra-provincial passenger transport network, bus/coach stations, parking lots, rest stops and technical standards and regulations; running schedules of inter-provincial passenger buses, urban and adjacent buses; build and form transit points for goods and passengers, especially in industrial parks, large

urban areas, international border gates, and main border gates; airports, railway stations, gateway ports, inland container ports-ICD...

- ✓ Transport enterprises need to develop, improve corporate governance, transportation production and business management, and transport services, at least for the next 3-5 years, especially knowledge of managing international transport, international multimodal transport and logistics. Complete the system of statistics, reporting on transport volume, volume of goods and passengers on national roads. Build a suitable management model; gradually shift management from a revenue contract mechanism to a centralized management mechanism, because only centralized transport management can improve the quality of transport, transport services, improve business efficiency of enterprises and limit traffic accidents and reduce environmental pollution. In addition, there is a system of reliable statistics as a basis for forecasting transport demand, regulating supply and demand, and developing sustainable transport and road transport services.
- ✓ Gradually approach advanced transportation technology, reasonable transport process based on the 4.0 industrial revolution and multimodal transport & logistics. Freight transport enterprises build and implement advanced transportation technology; passenger transport enterprises build and implement reasonable transportation processes and operation charts. Build a number of modern urban traffic management centers in large cities. Close and effective coordination between transport enterprises, state management agencies with local authorities, bus station management boards, rest stops, etc. during the implementation process.

d. Assessing the feasibility and effectiveness of the proposed solution

- *The feasibility assessment:* it can be seen that the proposed solution has a fairly high feasibility, for example, solutions integrating 4 criteria in road transport, because economic feasibility requires high requirements (minimum EIRR > 12%), while financial feasibility is minimum FIRR > 0, good with FIRR > 5%, but the bigger the better) [5]. In reality, the current economic efficiency EIRR is about 20%. When the volume of transport, especially long-distance transport, direct/direct transport decreases by ~10-15%, the efficiency of road transport will increase by ~1-3%. That is a quick calculation. In reality, it may be higher due to the need to reduce the volume of road transport at long and medium distances, including container transport, and increase the volume of transport at short distances, participating more in import and export freight transport. Feasibility can increase, for example: informatics resources from 60-80%; human resources from 70-85%; material resources from 70-85% and financial resources from 85-90% (Table 11).
- *Economic efficiency assessment:* Vietnam is currently moving strongly towards digitalization and digital society to take advantage of the strengths of 3 resources: human resources, material resources and financial resources combined with promoting the application of the 4.0 industrial revolution, AI...so it can be seen that the criteria will be significantly improved, both in terms of feasibility, economic efficiency/socio-economic efficiency. Efficiency by 2030 can increase, for example: informatics resources from 14-17%; human resources from 14.6- 14.4%; material resources from 11-12.3% and financial resources from 14.5- 16.9%. Thus, when estimating for 2030, almost all criteria and specific criteria have increased in ranking.

The assessment table of road transport enterprises according to the categories is introduced in table 11 and the assessment according to the 4 criteria and specific criteria at present and in the future is stated in table 11.

Table 11. Assessment according to 4 criteria and specific criteria for 2030

| <i>Content</i> | <i>Rating level</i> | <i>Conversed score</i> | <i>Weight</i> | <i>Total Score Before After</i> |
|-----------------------------------------|---------------------|------------------------|---------------|---------------------------------|
| 1.Informatics resources-In | | 3.333 | 0.379 | 1.3515 1.5793 |
| a.Computers,media-In1 | B | 4 =>4.5 | 0.2115 | 0.8460 |
| b. Digital infrastructure/servers-In2c. | C | 3 =>4.0 | 0.1215 | 0.3645 |
| Network connectivity-In3 | C | 3 =>4.0 | 0.0470 | 0.1410 |
| 2.Human resources- Hu | | 3.333 | 0.367 | 1.3364 1.5293 |
| a. Number /structureofemp.ees-Hu1 | B | 4 =>4.5 | 0.2357 | 0.9428 |
| b. Training level- Hu2 | C | 3 =>4.0 | 0.0901 | 0.2703 |
| c. Leadership, business admin.-Hu3 | C | 3 =>4.0 | 0.0411 | 0.1233 |
| 3.Material resources-Ma | | 3.5 | 0.172 | 0.6509 0.7310 |
| a. Technicalfacilities-Ma1 | C | 3 =>4.0 | 0.015 | 0.0450 |
| b.Quantity,structureofvehicles-Ma2 | C | 4 =>4.5 | 0.025 | 0.1000 |
| c. Transportcapacity-Ma3 | C | 3 =>4.0 | 0.045 | 0.1575 |
| d. Transportmarket-Ma4 | C | 4 =>4.5 | 0.0871 | 0.3484 |
| 4.Financial resources-Fi | | 3.25 | 0.082 | 0.2630 0.3075 |
| a. Capital-Fi1 | C | 3 =>4.0 | 0.027 | 0.081 |
| b. Revenue-Fi2 | B | 4 =>4.0 | 0.020 | 0.080 |
| c. Profit-Fi3 | C | 3 =>3.5 | 0.016 | 0.048 |
| d. Cost /transportprice-Fi4 | C | 3 =>3.5 | 0.018 | 0.054 |
| Total | | | 1.000 | 3.602 4.1471 |

According to the estimate in Appendix 3, road transport enterprises are ranked A. In case all 4 criteria and specific criteria are integrated for 2030, the enterprise will reach AA level in 2030.

4. CONCLUSION AND RECOMMENDATIONS

The article emphasizes the necessity, methodological approach, research to shape the development of road transport services. The basic objectives and contents of road transport services, Vietnamese road transport enterprises include a system of criteria and specific criteria to evaluate the profession, according to 4 criteria: human, material, financial and informatics resources with 14 specific criteria. At the same time, the article also evaluates and ranks road transport enterprises according to the AHP; briefly introduces the opportunities, challenges show them in the new context. In the final part, the paper proposes some solutions to improve the development of specialized sectors and road transport enterprises, especially emphasizing the integration of 4 criteria with 9 levels and a preliminary assessment of the feasibility and economic efficiency of the solution.

Completing the solution to evaluate road transport services in the new context is a task that needs to be carried out regularly but is quite complicated, requiring a lot of time, effort and cost. At the same time, this is also a long-term task, because it is necessary to review, update, supplement, adjust the integrated development of road transport services, complete legal documents periodically and organize implementation, inspect and supervise the implementation. Only then can road transport

enterprises stand firm and develop, in line with the 4.0 industrial stage, digitalization, and sustainable development of road transport services. Next, the article summarizes the opportunities and challenges for transport activities, road transport enterprises in the new context, and proposes solutions, recommendation to develop transport and road transport services in Vietnam in the coming time.

Proposed solutions are recommended to be studied, considered, and soon put into practical application by competent authorities, while the development of road transport services is encoded into legal documents, related road transport development policies, and soon completed. Hopefully, some of the above proposals will be considered and applied, meeting the requirements of practice in the ever-changing context.

Appendix

Appendix 1. Comparing the importance of two criteria

| Importance | Rating |
|-----------------------------------------------------------------|---------|
| Criteria X and Y are equally important | 1 |
| Criteria X is rated more important than criterion | 3 |
| Criteria X is rated much more important than criterion Y | 5 |
| Criteria X is rated very important compared to criterion Y | 7 |
| Criteria X is rated extremely important compared to criterion Y | 9 |
| Intermediate level between the above levels | 2,4,6,8 |

Source [14,18]

Appendix 2. Matrix for determining priority data for road transport criteria

| B_1 | B_2 | B_{1n} | B_1 | B_2 | ... | B_n |
|----------|----------|----------|------------|------------|-----|----------|
| B_{11} | B_{12} | ... | 1 | B_{21} | ... | B_{1n} |
| B_{21} | B_{22} | ... | $1/B_{21}$ | 1 | ... | |
| ... | ... | B_{ij} | ... | ... | ... | |
| B_{n1} | B_n | | $1/B_{1n}$ | $1/B_{2n}$ | ... | 1 |

Source [14,18]

Appendix 3. Ranking of road transport enterprises in Vietnam

| Rank | Symb ol | Total score | No criteria | General characteristics of road transport enterprises |
|--------------|------------|----------------|----------------|----------------------------------------------------------------------------------------------------------------|
| Optimum | AAA | $\geq 4,6$ | C;D;E | Are ranked in a state of perfect operation, high efficiency and good prospects. |
| Good | AA | $\geq 4,2$ | C;D;E | Are in good operating condition, with good prospects, but with scores lower than optimal. |
| Fair | A | $\geq 3,8$ | D;E | Are in good operating condition, but have disadvantages in the economic environment, have good prospects. |
| Average good | BBB | $\geq 3,4$ | E | this class operate well, have development potential, but have average competitiveness and financial potential. |

| | | | | |
|--------------|-----|------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Average | BB | $\geq 3,0$ | E | Operate quite effectively, have development potential but have limited resources and potential risks. |
| Average weak | B | $\geq 2,6$ | - | Are ineffective operations, potential for development but many risks from the environment/competitors, uncertain prospects. |
| Weak | CCC | $\geq 2,2$ | - | Are operating with low efficiency, poor adaptability; limited potential in terms of material, human and financial resources, low competitiveness, difficult development prospects. |
| Fairly weak | CC | $\geq 1,8$ | - | Have low efficiency, unstable financial situation, decreasing transport market share, at risk of dissolution and bankruptcy. |
| Very weak | C | $\geq 1,4$ | - | Have suffered long-term losses, market share has declined, financial resources are weak, & are on the verge of bankruptcy. |
| Very poor | D | $< 1,4$ | - | In this category are in a state of illiquidity, reduced market share, and awaiting bankruptcy. |

Source [14]

According to the ranking system, transport enterprises can be evaluated according to the above 4 categories and the total number of categories is 10. In addition, to increase the level of detail, you can fill in the (+) or (-) sign for each category and should not provide further details.

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