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Tecnologías de transporte autónomo disponibles: Un análisis de oferta y demanda

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Available Autonomous Transportation Technologies: A Supply and Demand Analysis

Abstract

Urban logistics are commercial activities and distribution of goods within the same urban environment. The state of supply of autonomous transportation technologies available on the market was determined. Positivist paradigm research, with quantitative method and descriptive-correlational approach, field research and non-experimental-transversal design. The sample was 28 courier companies, with at least one year of experience and a plant with at least five (5) workers in charge. The survey technique is used, using a collection instrument with a Likert-type scale. There is a general lack of knowledge about autonomous transport technologies applied to urban messaging processes available on the market; it can be indicated as little present in general. Consequently, these advances driven by large technology companies that are interested in the autonomous driving-assisted messaging sector are generating an ecosystem of innovations that denote a small percentage of availability of technological products.

Keywords: Technological management, Package logistics, Urban transportation, Autonomous vehicles.

Tecnologías de transporte autónomo disponibles: Un análisis de oferta y demanda

Resumen

La logística urbana son actividades comerciales y reparto de bienes dentro de un mismo entorno urbano. Se determinó el estado de oferta de tecnologías de transporte autónomo disponibles en el mercado. Investigación de paradigma positivista, con método cuantitativo y enfoque descriptivo-correlacional, investigación de campo y diseño no experimental-transversal. La muestra fue de 28 empresas de mensajería, con por lo menos un año de experiencia y una planta que contemple por lo menos cinco (5) trabajadores a cargo. Se utiliza la técnica de encuesta, utilizando un instrumento de recolección con escala tipo Likert. Existe un desconocimiento generalizado sobre las tecnologías de transporte autónomo aplicadas a procesos de mensajería urbana disponibles en el mercado, puede indicarse como poco presente en general. En consecuencia, estos avances impulsados por las grandes compañías tecnológicas que están interesadas en el sector de la mensajería asistida por conducción autónoma están generando un ecosistema de innovaciones que denotan un pequeño porcentaje de disponibilidad de productos tecnológicos.

Palabras clave: Gestión tecnológica, Logista de paquetes, Transporte urbano, Vehículos autónomos.

Introducción

The transport sector has a limited tradition of developing its own theories; this feature, coupled with a poorly defined approach to transport in recent urban mobility studies, facilitates the rapid spread of ideas that often lack a thorough debate or solid foundation [1]. Urban logistics are commercial activities and the distribution of goods within a single urban environment [2]. As cities are constantly growing, the infrastructure is suffering from overcrowding of vehicles, pedestrians and housing [3].

Urban transport systems are essential for the development and urbanisation of cities, as they facilitate mobility and integration, these reliable mass transport networks are essential for economic growth, connecting industrial and service sectors with supply chains [4]. They also play a crucial role in poverty reduction by improving access to labour markets and raising wages in disadvantaged communities. Their availability and sustainability promote long-term economic development, integrating spatial distribution, growth of urban flows and structural unification [5].

Thanks to the disruptive opportunities offered by the fourth industrial revolution, a number of devices have emerged, which, boosted by the implementation of Artificial Intelligence, do not require the partial or even total need of a human operator [6]. In this context, autonomous means of transport appear as a result of the evolution pushed by these innovations, This provides the market and industry with a range of new theories and implementations around this theme [7]. In summary, advanced mobility systems that, through the integration and orchestration of computing and vehicles (including drones), operate and move independently within an urban transport ecosystem [8].

Autonomous land vehicles are cars with movement and action capabilities that do not require any type of driver or remote teleoperator [9]. These represent a positive change, for business models involving intelligent transport systems, some research suggests that automated driving could bring several interrelated effects to mobility and society generating a "domino effect"The authors' study, in which autonomous driving technologies are surrounded by multiple implications, divided into three major layers [10-12]. In turn, air vehicles are fixed-wing aircraft, helicopters or helicopter-type vehicles that are capable of flying and being transported without the need for an on-board pilot or a remote operator [13]. Therefore, this research sought to specify the state of supply of autonomous transport technologies available on the market.

Metodología

The research work is framed in the positivist paradigm, with quantitative method and descriptive-correlational approach, field research and non-experimental-transversal design [14]. With regard to the study population, it is necessary to study the characteristics of the parcel delivery service providers, the sample was 28 courier companies, the selection criterion for the choice of companies to be characterised was small and

medium-sized urban courier companies operating only at local level, The Centre is a company with at least one year's experience and a plant with at least five employees.

The survey technique was used, using a Likert scale collection instrument and whose alternatives were, Totally agree, Agree, Neither agree, or in disagreement, In disagreement, Totally in disagreement [15]. The statistics are descriptive, in particular, frequency distribution and central trend measures were used.

In the study carried out, a point of comparison was established to interpret the collected data. The purpose of this was to compare the results obtained during the data collection process, based on arithmetic mean and set on a scale from 1 to 5, which corresponds to the lowest and highest possible value of the response scale used in the data collection instrument applied to the population under study [16]. Table 1 below shows the scale used for the average analysis of the indicator in this investigation.

Table I. Weighted scale for the analysis of averages

Courage	Alternative	Intervals	Categories	Convention
5	Totally agree	4,20 – 5,00	Very present	MP
4	Agreed	3,40 – 4,19	Present	P
3	Neither in agreement, nor in disagreement	2,60 – 3,39	Moderately present	MEP
2	At odds	1,80 – 2,59	Poco presente	PP
1	Totally at odds	1,00 – 1,79	Absent	A

In addition, to complement the results of the study, dispersion measures were calculated, specifically the standard deviation of the arithmetic averages obtained for each dimension and indicator by using the instrument. A corresponding scale was established for these dispersion measurements, ranging from 0.00 which is the minimum value by definition, to 1.74 as the maximum value of the standard deviation. Below, in Table 2, is the scale used for the analysis of the data collected from the application of the items of the data collection instrument in this research.

Table II. Weighted scale for standard deviation analysis

Courage	Intervals	Categories	Convention
5	1,39 – 1,74	Very high dispersion	MAD
4	1,05 - 1,38	High dispersion	ALD
3	0,70 – 1,04	Intermediate dispersion	DI
2	0,35 – 0,69	Low dispersion	BD
1	0,00 – 0,34	Absent dispersion	AD

Resultados y Discusión

Table III shows the results obtained for autonomous transport technologies, whose indicators are: Autonomous Land Vehicles and Autonomous Air Vehicles. The analysis of each of these indicators is presented below, in order to determine the level of presence of the dimension in reference.

Table III. State of the autonomous transport technologies supply

Indicators/ Items	Never		Almost never		Sometimes		Almost always		Always		Total		$\bar{X}$		σ	
	Fa	%	Fa	%	Fa	%	Fa	%	Fa	%	Fa	%				
Land-based autonomous vehicles/ 1,2,3,4,5,6,7,8	2	1%	120	61%	53	27%	21	11%	0	0%	196	100	2,47	PP	0,70	DI
Autonomous Vehicles Air/ 9,10,11,12,13,14,15,16,17	7	3%	137	54%	54	21%	53	21%	1	0%	252	100	2,62	MEP	0,86	DI
Average ($\bar{X}\bar{X}$)general of dimension													2,55			
General dimension category (Average $\bar{X}\bar{X}$)													Poco Presente (PP)			
General standard deviation (σ) of the dimension													0,78			
General dimension category (standard deviation σ)													Intermediate dispersion (DI)			

First, in the indicator Market availability of Land Autonomous Vehicles suitable for urban goods transport it is evident that 61% of the general managers of the The European Commission has published a report on the development of the European Community's telecommunications and information technology The number of people who are not in a position to be able to work is estimated at about 10% of the total.

This result shows that the indicator Land-based Autonomous Vehicles is not very present in the population under study, but it is The average of 2.47 according to the established scale for data analysis. Also, a standard deviation of 0,70 is obtained, indicating an intermediate dispersion of the responses.

For the second indicator Autonomous Aerial Vehicles, The results show that 57% of the general managers of home companies never, and almost never, know the existence of land-based autonomous driving technologies applied to urban messaging, The number of people who are not in a position to make a decision is estimated at about 10% of the total.

These results indicate that this indicator is present in the population under study, with an average of 3.62 according to the scale established for data analysis. Also, a standard deviation of 0,86 is obtained, which indicates an intermediate dispersion of the responses.

Considering these results, the general average places the autonomous transport technologies

dimension in the low-profile category, with an average of 2.55 according to the established scale. Additionally, the standard deviation of the dimension is estimated at 0.78 which indicates an intermediate dispersion in the overall responses of the dimension.

The results presented above, are due to that, although the indicator of Autonomous Air Vehicles, statistically marks as moderately present, its average measurement is relatively close to the limit value of presence, hence the low presence of the Land Autonomous Vehicles indicator, The sum of both indicators results in a low overall presence of indicators for this dimension.

The results of these two indicators are similar, but they are not. The European Commission has published a study on the role of the EU in the field of telecommunications. This is to be expected since, at present, autonomous transport technologies are still in the process of development and diffusion, which according to projections presented by [17, 18]will not be fully implemented until after 2030.

Based on these results associated with the first specific objective of the doctoral thesis, specify the current state of supply of autonomous transport technologies available on the market, The European Commission has recently published a report on the Community's training and employment policy. However, research and experiments such as those described in the theoretical bases [19 - 21] among others, generate expectations about the potential for The European Commission has published a report on the implementation of these technologies.

Conclusiones

Consequently, these advances driven by the large technology companies that are interested in the sector of autonomous driving-assisted messaging, The results of this study are that a small percentage of technological products available to meet this new market niche is generated by an ecosystem of innovations, and that it is only a matter of time before the predictions made by [22] about the autonomous transport technologies available on the market become reality.

There is a widespread lack of knowledge about autonomous transport technologies applied to urban messaging processes available on the market, which can be indicated as not being generally present. As a result, these advances driven by the large technology companies that are interested in the sector of autonomous driving assisted messaging are generating an ecosystem of innovations that indicate a small percentage of availability of technological products aimed at satisfying this new market niche, and that it's only a matter of time about the autonomous transport technologies available on the market, be met.

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