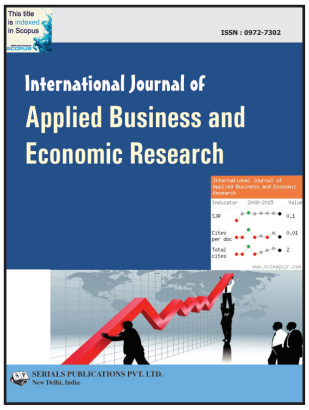


International Journal of Applied Business and Economic Research

ISSN: 0972-7302

available at http: www.serialsjournal.com

Volume 15 • Number 13 • 2017

Youth Awareness on Drones – A New Paradigm in Freight Logistics

V. Rengarajan[1], R. Alamelu[2], R. Amudha[3], L. Cresenta Shakila Motha[4] and S.C. Sivasundaram Anushan[5]

[1-3]*Faculty Members, School of Management, SASTRA University, Thanjavur*

[4]*Faculty Member, Training & Placement, SASTRA University*

[5] *Visiting Faculty, Madurai Kamaraj Univesity*

ABSTRACT

The term drones covers a very broad category of unmanned aerial vehicles (UAVS) that can be used for anything from military or commercial purposes, to personal entertainment. The term drones covers a very broad category of unmanned aerial vehicles (UAVS) that can be used for anything from military or commercial purposes, to personal entertainment. The government has granted permission to the Gas Authority of India Limited (GAIL) to use drones for aerial surveillance of its pipelines. This follows the use of drones for similar purposes by the Indian Railways and the National Highways Authority of India. as line patrolling is extremely difficult for pipeline sections passing through forests, rivers, environmentally sensitive areas and other inaccessible areas, GAIL (India) Limited has awarded an order for aerial surveillance of 200 kilometres for the Hazira Vijaipur Jagdishpur/Dahej Vijaipur pipelines with drones as a pilot project by Minister of State (independent charge) of Petroleum and Natural Gas Dharmendra Pradhan. Currently, it is being achieved through regular, periodic, foot-patrolling and air surveillance by hiring helicopter services on a monthly basis. With limited transport infrastructure Indian logistics must look in to use of drones Safely. Before any such change can happen in logistics industry it is high time to measure and monitor the awareness towards drone logistics among Indians. This forms the need for the present study. The study objective covers the overall awareness towards drone logistics among public. Specifically, it focuses on the awareness on benefits and cost aspects of the service in India. The study was conducted among the online customers of Snapdeal and Amazon for a specific period of two months. The customers are chosen from a reputed educational institution randomly selected using simple random sampling. The results of the study showed that 'Awareness that drone was trialed by Amazon. inc' and 'not used by Snap deal/Flipkart/Amazon.in', 'awareness of non-availability of drone delivery in India, drones are impersonal way of delivering goods' and 'awareness that drones are comparatively costlier'

are significant while estimating overall awareness towards drone delivery, as the significance of 't' is less than 0.05. To conclude, the public awareness towards the usage of drone services was good and identifies it as one of the costlier services in India.

1. INTRODUCTION

Rapid urbanization and technological advancements in the recent years and in the coming future is making markets emerge with creative and innovative inventions and ideas to facilitate many aspects of our life in this digital world. Drones which are of multi category and of unmanned aerial vehicles are in use for big energy suppliers/infrastructure monitors, in agriculture and forestry to track animals, to spot and map forest fires as well aid farmers in getting a real time data of crops. They are also used in construction sector in site and layout planning, for environmental protection to protect endangered species from poachers, in case of emergency response and police and military application to gather information on major threats, disasters, in film and photography industry where aerial films are of commercial value and have now ventured into logistics as well.

Drones include wide category of unmanned aerial vehicles (UAVS) which vary in their utility from military to commercial purposes, to individual entertainment. These quad-copters have in them two sets of propellers which enable them to move both indoors and outdoors. With developments in technology modern quad-copters inbuilt with electronic sensors become easily controllable with the help of smart phone app instead of using bulky controllers. Models have been developed and programmed even to fly set paths or patterns. Logistics though with advanced technologies have reached great heights still linger behind in their services due to heavy trafficked roads, increase in pollutions, reduction competence as a result of delays in the flow of people, products and services. Therefore it becomes an herculean task for city planners to go hand in hand with the pace of urbanization and population explosion. Hence we find that infrastructure developments and projects cannot bring permanent solution.

Current research which advocates using of drones for delivering tools fails to exhibit a complete and well ground base for its utility. When utilizing drones for delivery purpose it requires in depth planning considering the focus on multiple areas for evaluating the efficiency and feasibility. Drones are becoming an important subject in the arena of retail and e-commerce provided if done with right effort and right cost, it could bring about a catalytic change in the logistics industry.

2. REVIEW OF LITERATURE

M. A. Ditmer & et. al., (2015) In this planet which has seven billion people, nearly half of the population have accessibility to internet services which has made Facebook and Google like corporations to enhance internet connection to the underprivileged sections of the world using balloons at high level altitudes and using drones. **McNeal, G. (November 7, 2014)** in his article has clearly stated how Amazon and Google have the hope of delivering their services effectively with the use of drones. It also addresses the present state of drones with Amazon and how they have been developed.

Research studies reveal that Amazon.com was the pioneer who brought their idea of using drones for delivery of their services mostly connected to military. These drones which are operated with remotes which control aircraft though gained momentum until the last two years when Amazon announced their

plan to launch a drone based delivery systems is still struggling its way out in the process of the first launch of program which has brought doubt as to when this program would be launched. In this article we find details about the cost of drones, the problems encountered by Amazon with Federal Aviation Administration and also information on drone regulation outside The United States **(Keeney, T., 2015).**

Johnson, Daniel (March 26, 2015) in his article has made efforts in explaining nine potential threats to drones and addresses the need to develop security checks not just physical but also digital means to increase its efficiency of service delivery. The nine threats include theft of packages before reaching the destiny as it happened in Amazon Prime Air drones, hacking into the personal data through tapping of the delivery drones in operation, chances of package falling from the sky which could happen due to drainage of battery or a mechanical fault, the bad weather which could also be reason to stop the drone from taking off or blow of the drone as in the case of Boeing 747 despite the high thrust engine, friendly fires when people find something that is not usual they may shoot it or damage them along with the customers package, another threat foreseen is lost bearings though Amazon drones use GPS to locate the customer at times it could go in vain and worse of it is, drones could take diversion when somebody manipulates and pockets all the purchases and finally airspace restrictions can trigger a lot of issues as it happened with the US being warned of flying into China's air defense zone which the Chinese assert is their airspace resulting in diplomatic issues.

According to **Paul, Fredrick (March 23, 2015)** there exists limitations in any of the products of technology and so with drones with regard to efficiency in delivering. Drones are widely not long lasting and hence these limitations can expose small business sectors to high risk. Also there is risk of shooting the drone as well capturing the package and creates very many issues to the business. Moreover drones cannot operate on their own and cannot avoid obstacles. In an article posted by **Chris Cunnane on March 23, 2016** titled The Current and Future State of Drones it is mentioned that the world's largest containership operator A.P. Moller Maersk A/S has ventured in deploying drones on board in their giant vessels to study the port operations and thereby cutting the cost of ships at sea for this purpose. Though this study is in the early stage it has gone to extent of saving $9,000 per ship thereby reducing the annual operating cost.It is also said that this maritime industry has over 600 vessels and therefore restocking of these vessels when in the port is a time consuming and costly affair.Adoption of drones by the industry made deliveries easy by saving fuel and money.

Tekendra Parmar December 4, 2014 in article on Drones in India at the Centre for the study of the drone at Bard College has highlighted that drones have boomed to become a serious business in India, serving the commercial and military spheres and India is becoming a big player in the drone game. It was during the Kargil War the first military drone used in India in 1999 by the Indian Air Force deploying manned English Canberra PR57 aircraft for the purpose of army search and scouting missions which proved to be difficult due to inefficient Line of Control in the mountainous region of Kargil terrain. Again India deployed Heron surveillance drones in a limited capacity to explore Maoist rebels in the east. The crash of Heron UAV in Bhuj in Gujarat with no reason has been probed into. It has been also highlighted that there has been many upcoming startup companies on drones such as Social drones, Airpix, Garuda Robotics, Edall system, Ideaforge and Aurora Integrated Systems.

3. NEED FOR THE STUDY

When the whole world is seeing lot of developments in Drone logistics area, the commercial logistics industry in India has not taken Drones seriously. With limited transport infrastructure Indian logistics must look in to use of drones safely. Before any such change can happen in logistics industry it is high time to measure and monitor the awareness towards drone logistics among Indians. This forms the need for the present study.

4. ANALYSIS AND DISCUSSION

Overall Awareness Towards Drone logistics: The below table shows the overall awareness of the respondents towards drone logistics

Table 1
Overall awareness towards Drone logistics

Awareness towards drone delivery	*Frequency*	*Percentage*
Slightly Aware	18	4.5
Aware	194	48.5
Highly Aware	188	47.0
Total	400	100.0

Source: Primary Data

The above table shows that 94 respondents forming 47% of the total respondents were having high awareness towards drone logistics and 97 respondents forming 48.5% of the total respondents were having awareness about drone logistics.

Descriptive statistics for agreement towards statements describing drone delivery aspects: The table below shows the descriptive statistics for the statements describing drone delivery aspects.

Table 2
Descriptive statistics for agreement towards statements describing drone delivery aspects

Statements	*Stat.*	*HD*	*D*	*NAND*	*A*	*HA*	$\bar{x}$	*s*
Drone delivery is being used by Snapdeal.com	Freq.	18	108	194	48	32	2.92	.94
	%	4.5	27	48.5	12	8		
At present Drone delivery service is not available in India	Freq.	0	0	182	186	32	3.63	.63
	%	0	0	45.5	46.5	8		
Drones use the water ways at times for reaching the delivery destinations	Freq.	98	140	146	16	0	2.20	.87
	%	24.5	35	36.5	4	0		
Amazon. in offers this service to its customers along with other mode of delivery.	Freq.	90	124	142	28	16	2.39	1.14
	%	22.5	31	35.5	7	4		
Drone delivery is costlier than other modes of services.	Freq.	0	32	92	188	88	3.83	.86
	%	0	8	23	47	22		
It was practically tested by Amazon.inc in USA.	Freq.	18	62	88	30	202	3.89	1.05
	%	4.5	15.5	22	7.5	50.5		

Statements	*Stat.*	*HD*	*D*	*NAND*	*A*	*HA*	$\bar{x}$	*s*
The most popular mode of transport used by drones is roadways.	Freq.	104	154	60	50	32	2.38	1.16
	%	26	38.5	15	12.5	8		
It is frequently used in India for online products delivery.	Freq.	130	150	86	34	0	2.06	.91
	%	32.5	37.5	21.5	8.5	0		
A non-manual mode of delivering the products is known as drone.	Freq.	0	0	70	120	210	4.35	.68
	%	0	0	17.5	30	52.5		
Air way mode is used to reach the destination.	Freq.	0	16	124	64	196	4.10	.76
	%	0	4	31	16	49		
Presently this method of delivery is used by Flipkart.com.	Freq.	62	112	138	40	48	2.75	1.15
	%	15.5	28	34.5	10	12		
Drones deliveries are personally handed over by service providers.	Freq.	48	16	126	82	128	3.57	1.07
	%	12	4	31.5	20.5	32		
Drone deliveries are economical comparing other mode of deliveries.	Freq.	66	212	90	32	0	2.22	.82
	%	16.5	53	22.5	8	0		

Note: Stat. = Statistics, Freq. = Frequency, HD = Highly disagree, D = Disagree, NAND=Neither agree nor disagree, A = Agree, and HA = Highly agree, $\bar{x}$ = Mean, s = Sample standard deviation)
Source: Computed from Primary Data)

The reliability score (Cronchbach Alpha) for the 13 statements describing various aspects of awareness towards drone delivery was 0.89.

The highest agreement is observed for the statement *'A non-manual mode of delivering the products is known as drone'* with a mean of 4.35, followed by *'Air way mode is used to reach the destination'* with a mean of 4.10, and *'It was practically tested by Amazon.inc in USA'* with a mean of 3.89.

The lowest agreement is observed for the statement *'It is frequently used in India for online products delivery'* with a mean of 2.06, followed by *'Drones use the water ways at times for reaching the delivery destinations'* with a mean of 2.20, and *'Drone deliveries are economical comparing other mode of deliveries'* with a mean of 2.22.

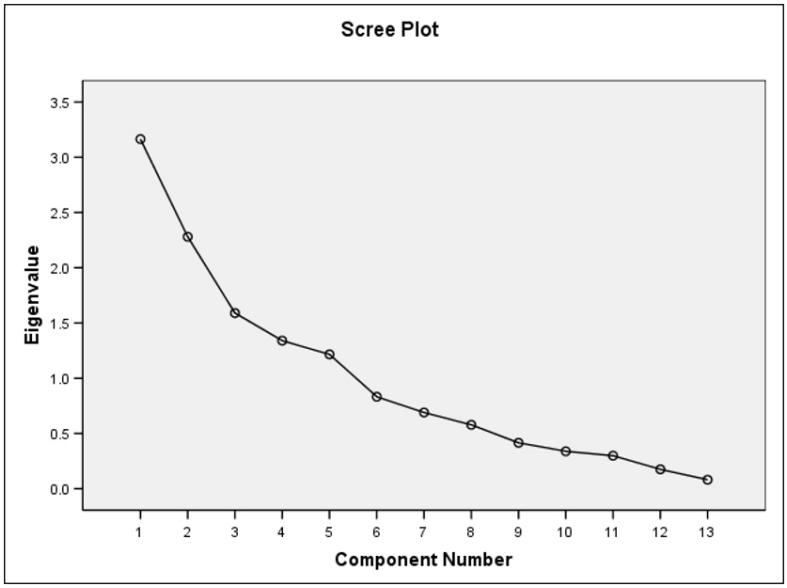
The lowest variation in opinion is observed for the statement *'At present drone delivery service is not available in India'* with a standard deviation of 0.63, followed by *'A non-manual mode of delivering the products is known as drone'* with a standard deviation of 0.68, and *'Air way mode is used to reach the destination'* with a standard deviation of 0.76.

The highest variation in opinion is observed for the statement *'The most popular mode of transport used by drones is roadways'* with a standard deviation of 1.16, followed by *'Presently this method of delivery is used by Flipkart.com'* with a standard deviation of 1.15, and *'Amazon. in offers this service to its customers along with other mode of delivery'* with a standard deviation of 1.14.

4.3. Factor Analysis of Statements Describing Drone Delivery Aspects

A factor analysis was conducted to reduce the 13 statements describing Drone logistics concepts. The method used is Principal Component Analysis using varimax rotation and Kaizer normalization. As the factors extracted are displayed in scatter plot below.

Chart 1
Scree plot for the factor analysis of statements describing drone logistics concepts



From the scree plot it can be observed that 5 factors are having less than 1 Eigen Values.

Table 3
Total Variance Explained

Component	*Rotation Sums of Squared Loadings*		
	Total	*% of Variance*	*Cumulative %*
1	2.715	20.882	20.882
2	1.962	15.093	35.975
3	1.748	13.450	49.425
4	1.748	13.443	62.868
5	1.417	10.903	73.771

Extraction Method: Principal Component Analysis.

The first factor is able to explain 20.882% of variance, the second factor is able to explain 15.093% of variance, the third factor is able to explain 13.450% of variance, the fourth factor is able to explain 13.443% of variance and the fifth factor is able to explain 10.903% of variance. All the factors are able to explain 73.771% of variance.

Rotated component matrix for the statements describing awareness towards drone logistics.

5 factors were extracted and the researcher has named them as follows on the basis of factor loading.

1. Awareness that drone was trialed by Amazon.inc and not used by Snap deal/Flipkart/Amazon.in
2. Awareness of use of airway mode and nonuse of roadways and waterways for delivery of products
3. Awareness of non-availability of drone delivery in India

Table 4
Factor matrix for the statements describing awareness towards drone logistics

Variable statements	*Component*				
	1	*2*	*3*	*4*	*5*
Drone delivery is being used by Snap deal.com	–.838	Awareness that drone was trialed by Amazon.inc and not used by Snap deal/ Flipkart/Amazon.in			
Presently this method of delivery is used by Flipkart.com	–.836				
It is being trialed by Amazon.inc	.821				
Amazon. in offers this service to its customers along with other mode of delivery.	–.761				
Air way mode is used to reach the destination.		.917	Awareness of use of airway mode and nonuse of roadways and waterways for delivery of products		
The most popular mode of transport used by drones is roadways		–.725			
Drones use the water ways at times for reaching the delivery destinations		–.721			
At present Drone delivery service is not available in India			.893	Awareness of non-availability of drone delivery in India	
It is frequently used in India for online products delivery.			.504		
Drones deliveries are personally handed over by service providers.	Aware that drones are impersonal way of delivering goods			–.627	
A non-manual mode of delivering the products is known as drone.				.588	
Drone delivery is costlier than other modes of services.	Awareness that drones are comparatively costlier				.923
Drone deliveries are economical comparing other mode of deliveries					–.633

4. Awareness that drones are impersonal way of delivering goods
5. Awareness that drones are comparatively costlier

Regression model for estimation of overall awareness towards drone delivery concepts from factors extracted out of individual awareness variables: A model of overall awareness towards drone delivery concepts from factors extracted out of individual awareness variables such as awareness that drone was trialed by Amazon.inc and not used by Snap deal/Flipkart/Amazon.in, awareness of use of airway mode and nonuse of roadways and waterways for delivery of products, awareness of non-availability of drone delivery in India, drones are impersonal way of delivering goods and awareness that drones are comparatively costlier.

Table 5
Model summary for estimation of overall awareness towards drone delivery concepts from factors extracted out of individual awareness variables

r^2	*Source of variation*	*Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
.707	Regression	11.419	5	2.284	15.972	.000
	Residual	55.456	394	.143		
	Total	66.875	399			

The modal summary above shows that r^2 which is the power of the model is which shows that independent variables are able to explain 70.7% of variance and the significance of F being less than 0.05 signifies that the model is good fit.

Table 6
Coefficients for estimation for estimation of overall awareness towards drone delivery concepts from factors extracted out of individual awareness variables

Predictors	*Unstandardized Coefficients*		*Standardized Coefficients*	*T*	*Sig.*
	B	*Std. Error*	*Beta*		
(Constant)	2.425	.038		64.143	.000
Awareness that drone was trialed by Amazon.inc and not used by Snap deal/Flipkart/Amazon.in	.088	.038	.151	2.310	.022*
Awareness of use of airway mode and nonuse of roadways and waterways for delivery of products	.020	.038	.034	.519	.604
Awareness of non-availability of drone delivery in India	-.087	.038	-.150	-2.292	.023*
Drones are impersonal way of delivering goods	.183	.038	.316	4.840	.000*
Awareness that drones are comparatively costlier	.090	.038	.156	2.380	.018*

*significant at 5% level

$$\text{Awareness towards drone delivery} = a + b_1X_1 + \ldots + b_5X_5$$

'Awareness that drone was trialed by Amazon.inc and not used by Snap deal/Flipkart/Amazon.in', 'awareness of non-availability of drone delivery in India, drones are impersonal way of delivering goods' and 'awareness that drones are comparatively costlier' are significant while estimating overall awareness towards drone delivery, as the significance of '*t*' is less than 0.05. Since the significance of *t* is more than 0.05 for 'awareness of use of airway mode and nonuse of roadways and waterways for delivery of products' is insignificant in estimating overall awareness towards drone delivery, as the significance of '*t*' is less than 0.05.

5. CONCLUSION

Thus we see that service providers in logistics are exploring new avenues and delivery methods to augment their operational effectiveness due to the incorporation of E-commerce in logistics services. The technology of drone serves the best alternative for logistics service providers to handle supply chain related issues involving connectivity and labor. Therefore it becomes a necessity that businesses which plans of utilizing drone technology need to be aware of the barriers to adopting drones, the technological shortcomings, fully and thoroughly understand the breach of privacy and ways to counterfeit them, study vulnerability to cyber attacks which highly penetrated into the present society, develop sound regulatory procedures to make it viable and feasible in the near future. It is apparent that there exist mammoth challenges and risks in using drones.

References

M. A. Ditmer, J. B. Vincent, L. K. Werden, J. C. Tanner, T. G. Laske, P. A. Laizzo, D. L. Garshelis and J. R. Fieberg, "Bears Show a Physiological but Limited Behavioral Response to Unmanded Aerial Vehicles," Current Biology, pp. 2278-2283, 2015.

McNeal, G. (November 7, 2014). Six Things You Should Know About Amazon's Drones.Forbes. Retrieved from

http://www.forbes.com/sites/gregorymcneal/2014/07/11/six-things-you-need-to-know-about-amazons-drones/

Keeney, T. (April 17, 2015). Amazon Drones Could Deliver A Package In Under 30 Minutes For $1. Seeking Alpha. Retrieved from http://seekingalpha.com/article/3077136-amazon-drones-could-deliver-a-package-in-under-30-minutes-for-1

Johnson, Daniel (March 26, 2015). Amazon drones: nine ways it could go horribly wrong. The Telegraph. Retrieved from http://www.telegraph.co.uk/technology/amazon/10488104/Amazon-drones-nine-ways-it-could-go-horribly-wrong.html

Paul, Fredrick (March 23,2015). 10 reasons Amazon's drone delivery plan still won't fly. Techwatch. Retrieved from http://www.networkworld.com/article/2900317/wireless/10-reasons-amazons-drone-delivery-plan-still-wont-fly.html

https://logisticsviewpoints.com/2016/03/23/the-current-and-future-state-of-drones/

http://dronecenter.bard.edu/drones-in-india/