CAR USERS' INCLINATION ON AMELIORATION IN VEHICLE SECURITY COMPONENTS

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ABSTRACT

Driving a car can signify the realization of a long held dream or goal and the fulfillment of it brings a great sense of accomplishment to the car users. It is an established fact that everything precious and expensive in life had the intrinsic need to be safeguarded. That could not be truer than with keeping one's car safe. It will be natural for such a car users to worry about the safety of the car. Most cars nowadays come with default vehicle security systems like locks and alarms to deter theft and alert when broken into. The purpose of this study is to understand how the car users are willing to make improvements on their vehicle security systems. First the concern is to have a security system and the second would be to make changes and augmentations to the existing systems to achieve the best possible coverage. The study conducted with a sample size of 231 respondents by using Snowball sampling Method. The study found that secure wheel locking bolts Airbag and igniter safety feature are much preferred by customers. Wheel sensors and the Lane departure warning system were highly preferred. Seatbelts ranked first as the most preferred car safety feature. The study concluded that thet customers were not aware of most of the security components and depended on the dealers to make appropriate choices which are mostly influenced by the cost incurred and profit margin. It is clearly evident that the manufacturers must focus on low-cost devices in order to improve the vehicle security system usage levels.

Keywords: *Vehicle Security Components, Car Users Inclination*

1. INTRODUCTION

"Security is always excessive until it's not enough"

Robbie Sinclair

Feeling safe enough is in the mind of a person and doesn't reflect the actual sense of security in place. People view safety and security based on their life experiences which can be both positive and negative. It goes without saying that the threat to life, assets and people is part and parcel of life and navigating that risk of loss is a life skill that every human grows up to adapt to. As the earlier stated adage says the need to take precautions is on our part and when those

preparations are made they are done so with an approximate assessment of future risks. Any security system is only as safe as it can be tampered with. The main goal of a good security system is to help frighten, deter and prevent theft and break-ins to the car. This is achieved by installing alarms that blare out the sirens to create the shock effect and to alert passersby of a crime in progress. Security devices and systems are created to counter every form of car break-ins and thefts experienced in the past. A good security system must be a good mix of device and mutli-layers of protection to actually make a successful defense system.

Theft can be of different kinds like theft by force is when the thief over powers the driver and takes control of the car or of opportunity when the car is vulnerable and unprotected. The vehicle is also taken out on joy rides and either damaged in an attempt to get cheap thrills. In any case the effects of a theft or break-in makes the car users feel threatened and unsafe apart from physical safety, the emotional wellbeing is deeply affected too. Vehicle security Systems are best categorized based on what problem they help overcome. Let's see a few devices and their uses.

- **Alarms:** Alarms are the most basic of the security devices out there. Their primary work is to pick up the vibrations from the sensors on the door or from glass shattering and sound the sirens. They help deter than prevent a crime on the car. These are helpful when in a crowed parking lot or street to alert the attention of the passersby. Alarms can be passive where the system is automatically armed on shutting the door or active which will require the car users to manually activate the system.
- **Immobilizers:** It is a device that comes as a manufacture fitted part that shuts off the power to the fuel tank in attempt to foil actions that try to start a car without the proper key. They basically are a device fitted to cut the ignition from turning on and giving the idea to the thief that the car had engine troubles. This device is more effective in preventing theft as the car cannot be started or moved. The advancement that can be made on this device is that the circuit can be made to connect to a tracker that will notify the car users of any illegal entry or starting of the car by a thief. They are the most effective in reducing car crimes around the world as much as two-thirds of crimes were prevented with its use.
- **Tracking devices:** These devices use GPS and GSM capabilities to track a vehicle by relaying geographical co-ordinates from a satellite to a tracker app on the car users's phone. The cellular network is used to relay an SMS to the car users if the car is stolen or damaged or broken into. Tracking devices are the most sought after in the category of security devices in the market not

only are they capable of tracking a vehicle that is stolen but can be paired with other devices to make a multi-layer protection system that can prevent theft and recover a car when stolen.

There are many locks and devices that are external security devices like steering wheel locks and tire clamps and car hood locks which help add an additional layer of protection to the car. Window decals and the installation of kill switches and hidden cameras are all viable options to keeping the car safe from theft and break-ins.

2. REVIEW OF LITERATURE

Bang Liu et al, (2018)[1] have in their paper made it possible to have an inexpensive tracking device with the use of an old smart phone. Tracking devices which use GPS and GSM modalities which are very expensive and also require a substantial investment. With the new device called PhoneInside, a regular smart phone is fitted in the car with a charger and the phone using cellular networks will track the movement of the car. The device can also track the turns of the car and relay it properly in a map for the car users to review the location of the car. This goes to show that simple components can be used to create an anti-theft and tracking device in the car. They have used the Velocity Aware Dead Reckoning to eliminate the errors that is present in a normal dead reckoning situation. With the Long Short Term Memory the device can even provide individualized driving reports unique to the specific driver driving the car. The device can compare and report abnormal driving to the concerned car users.

Christopher Robinson-Mallett and Sebastian Hansack, (2018)[2] the paper explains the vulnerabilities to security devices in cars through the use of Internet. All wireless systems and capabilities in the security system rely heavily in the use of Internet and the many components communicating within the system are backed by the Internet. The paper specifically looks into the vulnerabilities attacking through the use of remote locking and unlocking as put forth by Spaar. The paper also investigates the need for industry level processing and tools to combat the vulnerabilities and test for better safety standards in the products. Any time more technology and moving parts are introduced into the system it makes for an opening for external attack. The need of the offer in the security industry is standardization and protocols backed with stronger authentication to security a system from attack.

Ng Ju Hung and Rashad Yazdanifard, (2015)[3] a car affected the purchasing decisions of the customers in the Malaysian car market. The researchers are certain that the want of safety features

in car made the buyer even change brands to accommodate the need for better safety and security features offered by the car company. For this purpose a survey was done and 100 respondents gave their answers. It was found that the overall Malaysian customer was quite aware of all the safety features in the market. The more educated a customer was the more they made sure to by a car with the best fit of safety features. There was disparity in the way these safety features were marketed and priced. For example, companies like Toyota was found to fit basic safety features in their cars and then charge the customer a higher rate for them.

Bhanu Prakash and K. Sirisha, (2014)[4] the developers of this security system for a car have designed a security system to help prevent theft. The design has the following capabilities installed in it, GSM modalities so that smartphone installed in the car uses cellular network to track the car and report to the car users in case of a break-in. The system also uses a CAN bus which works on the Radio Frequency Identification medium. A microcontroller in the car interacts with the RFID reader to locate, hospitals, hotels, rest areas and ATM locations. The car is fitted with an Engine Control Module (ECM) that interacts with the smart phone that is embedded in the car that can turn on and off the engine through a CAN bus. The system was connected and run on the keil software.

Shuryo Fujita, (2010)[5] the aim of this paper is to find the risk factors of theft to cars. This is very valuable when deciding on a vehicle security system. There isn't a one size fits all security system, instead the car users will have to figure out the risks in the area he is driving and have a system that faces those particular challenges. The report was able to pin point certain places and habits that could add to the risk of a car being stolen or robbed. The examples cited were when a vehicle is parked in a dark and lonely parking lot or in an industrial area after dark where proven by data to be places that attacked thieves and break-ins. Avoiding the areas listed in the report and engaging in safe parking habits will help in protecting the vehicle from harm and danger.

2.1 STATEMENT OF PROBLEM

By now it is an established fact that the vehicle is in need of a security system, one it gives peace of mind to the car users and the other is the actual safety of the car from threat. So now the question is what kind of device to be implemented in the car? It is here that the car users must exercise caution by not unnecessary loading of a car with devices and gadgets that are either too expensive for the car it is in or difficult in its everyday operation. So to start the customer could

feel overwhelmed to strike an optimum balance between need and want in light of the threats that face the safety of the car. The focus in this study is going to be to know how the customer will arrive on a security system and will they be open to making changes and needed augmentation as more risks are discovered in the future.

2.2 OBJECTIVES OF THE STUDY

1. To study the Car users' level of Preference given to High-Security Features needed in Vehicle Security Components.
2. To ascertain the Car users' level of Preference towards Road Safety Car Features.
3. To identify the Car users' level of inclination towards Car Safety Features on Vehicle security Components

3. RESEARCH METHODOLOGY

The present research centers on Car Users' inclination on amelioration in vehicle security components. The reasoning that is utilized in this research is realism. The specialist gathers and investigations information utilizing adequate learning to answer the questions, so the exploration is more disposed towards realism.

3.1 RESEARCH DESIGN

The type of research chosen for the study is descriptive research. In descriptive research, various parameters will be chosen and analyze the variations between these parameters. This was done with an objective of the study.

3.2 DATA SOURCES

The data collected for the study is mainly through the distribution of a questionnaire; to be precise the data collected for the study was both primary and secondary sources.

3.3 PRIMARY DATA

Primary data is the information collected from the selected Car users in Coimbatore. In this project, it was obtained by questionnaires. The questionnaire was prepared and distributed to the Car users in Coimbatore district.

3.4 SECONDARY DATA

Secondary data needed for conducting research work were collected from selected manufacturing companies' websites, library and search engines.

3.5 SAMPLING DESIGN

Sampling design is to clearly define set of objective, technically called the universe to be studied. Sampling technique used is a Snowball Sampling Method in which the car users of various brands are difficult to find. This is a sampling technique, in which existing subjects provide referrals to recruit samples required for the present research.

3.6 SAMPLE SIZE:

This refers to the number of items to be selected from the universe to constitute a sample. The sample size for this study was taken as 231.

4. DATA ANALYSIS AND INTERPRETATION

Table 4.1 Distribution based on demographic profile of the respondents

Category	Sub-Group	Frequency	Percent	Total %
Gender	Male	124	53.7	100%
	Female	107	46.3	
Age Group	Below 25 years	52	22.5	100%
	26 to 35 years	83	35.9	
	36 to 45 years	43	18.6	
	Above 45 years	53	22.9	
Marital Status	Single	89	38.5	100%
	Married	142	61.5	
Residential Area	Rural Area	31	13.4	100%
	Urban Area	86	37.2	
	Semi-Rural Area	41	17.7	
	Semi-Urban Area	73	31.6	
Educational Qualification	School Level	34	14.7	100%
	Graduate	52	22.5	
	Post Graduate	36	15.6	
	Diploma / ITI	46	19.9	
	Professional	63	27.3	

Occupation	Private Employee	36	15.6	100%
	Government Employee	24	10.4	
	Agriculturist	34	14.7	
	Business	82	35.5	
	Others	55	23.8	
Sources of awareness about car security components	Advertisements	56	24.2	100%
	Friends	49	21.2	
	Relatives & Neighbours	21	9.1	
	Own ideas	26	11.3	
	Dealers	63	27.3	
	Others	16	6.9	
Purpose for purchasing the car	Personal use	56	24.2	100%
	Business use	69	29.9	
	Both purposes	106	45.9	
Economic Scale of the car presently in use	Economic Car	102	44.2	100%
	Midrange car	81	35.1	
	Premium Car	48	20.8	
Type of vehicle possessed by you	Hatchback	43	18.6	100%
	Sedan	68	29.4	
	CUV/Crossover	31	13.4	
	Sports Utility Vehicle	23	10.0	
	Multi Utility Vehicle	42	18.2	
	Others, Specify	24	10.4	
Level of Preference given to overall Vehicle Security Components	Very High	109	47.2	100%
	High	68	29.4	
	Neutral	34	14.7	
	Low	12	5.2	
	Very Low	8	3.5	

INTERPRETATION:

The above table 4.1 captures several factors based on different variables from the respondents. It can be seen that 53.7% of the respondents are male and 46.3% are female. Among these respondents 22.5% are below 25 years, 35.9% are in the age group of 26 to 35 years, 18.6% are between 36 and 45 years and 22.9% are above 45 years. Out of this 38.5% of the respondents are single and 61.5% or married.

Based on the residential area, 13.4% are from rural areas, 37.2% are from urban areas, 17.7% are from semi-rural areas and 31.6% are from semi urban areas. Look into the educational qualification of the respondents reveals that 14.7% are at the school level while 22.5% are graduates, 15.6% are postgraduates, 19.9% have completed diploma or ITI while 27.3% of the

respondents were professionals. While questioned about the source of awareness regarding car security components, 24.2% mentioned advertisements as a major source of awareness, 21.2% mentioned friends, 9.1% mentioned relatives and neighbours while only 11.3% mentioned that it was their own idea to install car security components. 27.3% of the respondents mention that the car dealers were their source of awareness towards different security components. 24.2% of the respondents bought a car for personal use, 29.9% purchased it for business purpose while majority of 45.9% use the car for both personal and business use.

18.6% of the respondents possessed a hatchback car, 29.4% possessed a sedan, 13.4% owned a CUV or crossover model, 10% possessed sports vehicles, 18.2% owned a multi utility vehicle and 10.4% mentioned as other type of cars. On an economical scale 44.2% of the respondents processed an economical model of car which indicates a widely appreciated preference of cars. 35.1% of the respondents used mid-range cars while only 20.8% owned premium cars. Out of the respondents, 47.2% mention that their preference to install vehicle security components was very high, 29.4% mentioned a high preference, 14.7% were neutral towards installation of vehicle security components, 5.2% hello preference and 3.5% mentioned a very low preference.

Table 4.2 Level of Preference towards High Security Features needed in Vehicle Security Components

Descriptive Statistics			
Factors	**N**	**Mean**	**Std. Deviation**
Double locking feature to all doors	231	3.7706	1.25947
Embedded chip creates encrypted key code to immobilize vehicle	231	3.6364	1.24666
Secure Wheel locking bolts/ nuts	231	4.0779	1.07662
Secure Shielding of vulnerable components	231	3.9004	1.33955
24 into 7 tracking systems	231	2.9654	1.24363
Major components are individually coded for ease of traceability	231	3.2338	1.41633
‘Rolling code’ keyless entry system technology	231	3.0952	1.27502
Battery back-up alarm siren	231	3.1732	1.44324
Interior Movement Sensing	231	3.2165	1.15942
Anti-jacking/lifting sensor	231	3.0260	1.28848
Valid N (listwise)	231		

The above table 4.2 discusses different security features preferred by customers. Secure wheel locking bolts are much preferred by customers with the mean of 4.078 under standard deviation of 1.076 which is lesser than 1/3 the mean value indicating that it is much preferred. Anti-jacking or lifting sensors have the least preference with the mean of 3.026 and standard deviation of 1.288 which is greater than 1/3 the mean value indicating that a few of the respondents are not sure of their preference.

Table 4.3 Level of Preference towards Safety features needed in Vehicle Security Components

Descriptive Statistics			
Factors	**N**	**Mean**	**Std. Deviation**
Front impact sensors	231	3.3074	1.40678
Energy-absorbing bumper mounts	231	3.2641	1.24567
Front Crumple zones	231	3.1558	1.03081
Cross-car beams for side impact	231	3.0476	1.39327
Padded knee bolster	231	3.2294	1.32343
Side-Guard door beams	231	3.1385	1.48553
Airbag and igniter	231	3.9134	1.24807
Energy-absorbing steering column	231	3.0693	1.34632
Front and rear shoulder safety belts	231	3.0216	1.45795
Child-seat accommodations	231	2.7532	1.42483
Reinforced door hinges and latches	231	2.9610	1.31983
Child-Safety-Seat compatible Safety belt	231	3.1515	1.46806
Rear Crumple zones	231	3.4286	1.37457
Head restraints	231	2.9827	1.37356
Laminated windshield	231	3.0173	1.43244
Padded Instrument Panel	231	2.9697	1.29008
Side Airbag	231	3.4892	1.38897
Diagnostic module	231	3.0000	1.53510
High strength steel safety cage surrounding passengers	231	2.8182	1.34547
Valid N (listwise)	231		

The above table 4.3 looking at the safety features preferred in a car, it can be discerned from the above table that airbag and igniter safety feature is much preferred by customers with the mean of 3.91 and deviation of 1.24 which is less than 1/3rd the mean value indicating that most of the respondents had a high preference for this feature. Child seat accommodation has an exceptionally low preference with the mean of 2.75 and standard deviation of 1.42. The deviation is greater than 1/3 the mean value indicating that a few of the respondents may still prefer this feature.

Table 4.4 Level of Preference towards Anti-Lock Braking Systems needed in Vehicle Security Components

Descriptive Statistics			
Factors	**N**	**Mean**	**Std. Deviation**
Control Module	231	3.5022	1.43519
Modulator Unit	231	3.3939	1.45834
Wheel Sensors	231	3.6147	1.19184
Brake Disc	231	3.1429	1.42994
Gear Pulser	231	3.2814	1.28319
Valid N (listwise)	231		

The above table 4.4 displays the customer preference towards anti-lock braking systems. It can be observed that the wheel sensors were highly preferred with a mean of 3.61 and a standard deviation of 1.19 which is lesser than 1/3 the mean value which indicates a high preference level. Brake disc received a mean of 3.14 and a standard deviation of 1.429 which is nearly haugh of the mean value. This indicates that the low mean value does not mean that the brake discs are not preferred. Nevertheless, wheel sensors are clearly the favourite of the customers.

Table 4.5 Level of Preference towards Road Safety Car Features needed in Vehicle Security Components

Descriptive Statistics			
Factors	**N**	**Mean**	**Std. Deviation**
External Airbags	231	3.0563	1.48948
Lane Departure Warning	231	3.4719	1.30145
Emergency Brake Assist	231	3.4069	1.34770
Frontal Collision Warning Systems	231	3.2771	1.33883
Fatigue Detection	231	3.0433	1.31805
Intelligent Speed Assistance	231	3.3463	1.38673
Electronic Stability Control	231	3.3550	1.36874
Blind-Spot Monitoring	231	3.1818	1.50414
Night Vision	231	3.2814	1.34925
Telematics	231	3.4632	1.34720
Valid N (listwise)	231		

Looking at the road safety car features, the above table shows that the Lane departure warning system with the mean of 3.47 and deviation of 1.30 and telematics with the mean of 3.46 and deviation of 1.34 are very much preferred by the respondents. Fatigue detection system has the least mean of 3.04 with standard deviation of 1.31 indicating that the preference or awareness towards the safety system is very less.

Table 4.6 Level of inclination towards Car Safety Features on Vehicle security Components

Car Safety Features	**Mean**	**Rank**
Shatter resistant glass	5.41	7
Seatbelts	6.12	1
electronic sensor to set off air bags	5.50	3
Anti-lock braking systems	5.45	5
Stability control to avoid dangerous rollover accidents,	5.30	8
Break lights, turn signals and headlights	5.48	4
Proper positioning of side and rear view mirrors	5.42	6
Bumper to prevent damage to the main body and engine of the car	5.48	4
Four Wheel Steering - precise maneuvering ability	5.58	2
Pre-collision technology - impending collision is detected	5.27	9

The table above 4.6 discusses customer preference towards car safety features. The presence of seat belts ranks first with a higher mean value of 6.12 and pre collision technology ranks 9th with the least mean of 5.27.

5.RESULTS AND DISCUSSION

5.1 FINDINGS:

From the above analysis, the following findings can be listed:

- 53.7% of the respondents were male and 46.3% were female.
- 35.9% of the respondents were in the age group of 26 to 35 years indicating that the middle age people had a higher awareness towards vehicle security systems.
- 61.5% of the respondents were married indicating that married people had a higher preference towards security systems.
- 37.2% were respondents from urban areas indicating that the awareness towards vehicle security sentence was higher in urban regions.
- 27.3% of the respondents were professionals and 22.5% were graduates indicating that the educational qualification had an impact on the awareness levels.
- 35.5% of the respondents were businesspeople who preferred vehicle security systems.
- 27.3% Mentioned the dealers as a major source of awareness towards vehicle security systems.
- Almost half of the respondents preferred economic cars which indicates wider problem in the vehicle security system market.
- 29.4% of the respondents pointed out that Sedans were Clearly a customer favourite.
- 47.2% of the respondents accepted to have remarkably high preference towards vehicle security components.
- Secure wheel locking bolts are much preferred by customers with the mean of 4.078.
- Airbag and igniter safety feature is much preferred by customers with the mean of 3.91
- Wheel sensors were highly preferred with a mean of 3.61.
- The Lane departure warning system with the mean of 3.47 was highly preferred.
- Seatbelts ranked first as the most preferred car safety feature.

5.2 SUGGESTIONS

The findings of the study clearly indicate a correlation between the user preference, inclination, and ability to buy and install vehicle security systems. India is a ridiculously huge country with a very remarkable amount of population which attracts the attention of automobile manufacturers. The study has been carried out using a limited number of respondents which cannot be clearly accepted as the preference of the whole nation. Hence, further studies are suggested on widely used vehicle security systems, maintenance cost of security components and availability of

replacement parts. A widespread survey on the manufacturing cost of vehicle security components may throw some light on the future and scope for low-cost components.

5.3 CONCLUSION

From the above study and the analysis data, it can be concluded that Indian public had a high preference towards vehicle security systems and growing awareness towards different security components. But it can be observed that the economic preferences towards the vehicles pose a threat to the vehicle security system market. The Indian public prefer to own an economy class vehicle or a mid-range vehicle with the basic vehicle security systems rather than a fully loaded high range vehicle. The inclination and intention towards vehicle security systems is mired by the economic requirements as well as the lack of widespread awareness. It can be observed that the customers were not aware of most of the security components and depended on the dealers to make appropriate choices which are mostly influenced by the cost incurred and profit margin. It is clearly evident that the manufacturers must focus on low-cost devices in order to improve the vehicle security system usage levels.

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