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Driver Preference for Automatic or Manual Transmission Systems for Vehicles: A Case Study in Ghana

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Abstract
Systems in vehicles are being modified due to current technological trends. One of the commonest modified systems in vehicles was the transmission system. This study presented views of drivers on preference for automatic or manual transmission vehicles in Ghana. In all, data was collected from 1260 drivers selected randomly through survey, in-depth interviews and six focus group discussions. The study indicated that manual transmission vehicles were more in Ghana with the automatic now gaining relative patronage. However, automatic transmission vehicles were preferred by females than males. The first three factors that determined preference for automatic transmission were shifting quality, easy to use and power (engine) performance. However, for manual transmission vehicles repairability (easily reparable), reliability and better fuel economy were the first three factors that determined driver's choice for such vehicles. The results further showed that most respondents believed that manual transmission vehicles had strong advantages over the automatic ones. The study concludes that more people prefer manual transmission vehicles than the automatic ones although the automatic ones are now gaining popularity.
Key words: Automatic transmission, Manual Transmission, Vehicles, Preference, Ghana

1. Introduction
Technological trends in the automobile industry have led to modification of most vehicle systems thus making its use very easy. One of such vehicle system is the transmission system. The manual transmission system, otherwise known as a "stick shift" or "standard transmission," was the first type of transmission available in vehicles. This system relies on the driver to disengage, change, and re-engages the transmission and takes more work to operate (www.autocomputerexchange.net). This manual transmission system was modified and replaced by the automatic system where gear change automatically executed as the vehicle moves.
Most of the vehicles being manufactured nowadays are using the automatic transmission system relative to the existing manual gear transmission. The automatic transmission system is made to achieve an improvement in vehicle safety, comfort, reliability and driving performance together with the reduction of fuel consumption and emissions in modern vehicles (Schoner, 2004). These have made the use of automatic geared vehicles easier. Automatic transmissions are of three types. The first type is based on a hydro transformer and planet gear, and the second type has a chained mechanism variation device with planet gear. The third type is special and it is equipped with double coupler and cylindrical gear provided by BMW or Mercedes (www.autocomputerexchange.net).
Vehicles with manual transmissions get about 10 percent better fuel mileages and more control in tough driving conditions than their automatic counterparts. In addition, manual transmission vehicles are less expensive, have low maintenance and repair cost, better fuel economy for city driving whiles automatic for fuel consumption advantage on highways but depends on driver characteristics.
In using the manual transmission vehicles, drivers have more control and less distraction. However, automatic transmission vehicles also keeps the drivers hands and feet available on the steering wheel and pedals respectively while driving and react to situations more quickly.
The manufacturing and use of vehicles with automatic transmission systems is on the increase in both developed and developing countries. However, vehicle owners are faced with the challenge of the type of vehicle to purchase as far as transmission type is concerned. The question is, if you are presented with the option of choosing between a vehicle with a manual and automatic transmission system, which one would you get? This paper, therefore, attempted to seek the views of drivers on preference for automatic or manual transmission vehicles in Ghana.

2. Methodology
2.1 Study Area
The study was conducted in three regional cities in Ghana where drivers were interviewed. These cities are the business hubs of the nation where there are a lot of transportation activities. There are many transport business organizations in these cities with new vehicles being imported often. This is because of the competition existing between these business organizations which results in technologically new vehicles being used to transport

passengers within the cities in Ghana. Vehicles such as Ford Wagon, Coaches, Toyota mini buses etc were the types of vehicle often used in these cities.

2.2 Data collection techniques

Data was collected through multi-approach techniques. This was done to integrate the strength and weakness of each technique. This is because no single data collection method has a complete advantage over the other and the various sources of data collection are highly complementary. This led to an increase in the validity and scope of the data collection techniques. It also increases the knowledge depth of the data collected. The techniques employed in this study are as follows:

2.2.1 Survey

Questionnaires were designed and administered to drivers who drove or (have been) driving both manual and automatic transmitted gear vehicles. The questionnaire contained both closed and opened ended questions to address the objective of the study. The questions were on general knowledge concerning vehicles with the two transmission systems, preference, advantages and disadvantages of each system and challenges.

2.2.2 In-Depth Interviews

Interviews were conducted for some respondents who did not have time to fill the questionnaires or unwilling to answer the questionnaire. Most of them were illiterate but have agreed to provide the responses verbally which were recorded on a tape

2.2.3 Focus Group Discussion

Six focus group discussions were conducted in all the three cities, two in each. The respondents were grouped according to gender; numbering 6-9 giving an average of 7 respondents. This provided a platform to get more understanding on issues concerning their choices of the types of transmission systems in the vehicles.

2.2.4 Pre-testing of questionnaire

The questionnaire was pre-tested in a city which was not part of the selected cities but had similar characteristics of the sample cities. This activity was carried out to remove any ambiguity a question in the questionnaire may pose. This testing was done to reveal unanticipated challenges with question wording. It helped the researchers to know whether the respondents understood the questions and could give useful answers. In addition, it was also done to determine the time spent on a questionnaire, financial requirements and feasibility of the data gathering exercise. After the pre-testing, the research instrument was revised appropriately.

2.4 Sampling and sampling procedure

Questionnaires were administered to 1260 drivers who drove (or were driving) both manual and automatic transmission vehicles. The respondents were selected randomly and included both genders. Both private and commercial vehicle drivers were the respondents. This included those who had driven or were driving vehicles equipped with automatic and manual transmission systems. This was because they would have enough knowledge concerning both vehicle types.

2.5 Data Analysis

The data was edited, coded and entered into a computer equipped with the Statistical Package for Social Scientists (SPSS) version 16. Data was categorized and tabulated accordingly in order to address the purpose of the study. A pie chart was constructed using Microsoft Excel for some result representation.

3. Results and Discussion

3.1 Demographic characteristics of respondents

Analysis of the demographic characteristics of respondents showed that more males (81.4%) were involved in the study than females (Table 1). This was because driving is a male dominated activity or profession especially for commercial purposes. The female respondents who were part of this study were private vehicle drivers. Most of the respondents were 31-35 years old. They were therefore within the recommended driving age of 18 years in Ghana. In addition, the respondents had varying driving experiences with most them driving between 1 to 5 years (47.5%). This implies that they may have enough knowledge concerning issues of vehicles. Respondents also possess different classes of driving licenses. In Ghana, before one qualified to drive, one needed to acquire a drive license which is subsequently upgraded. The class of license one had determined the type of vehicle he/she could drive. For instance Class B driving license holders could drive only saloon cars and 4 X 4 cross country vehicles, Class C holders drive goods carrying vehicles, buses and coaches, Class D holders drive graders, loaders, forklifts, tractors, bulldozers, dumpers and rollers whiles Class F holders drive goods carrying vehicles and safety buses /coaches and heavy articulated vehicles. The study showed that majority of the respondents was Class B driver's license holders (55.4%). This implies that most respondents drive Saloon cars and 4 X 4 cross country vehicles and it is most of these vehicles that are made of automatic transmission system.

Table 1: Demographic characteristics of respondents

Characteristics	*Frequency*	*Percentage (%)*
Gender		
Male	1026	
Female	234	81.4
		18.6
Age of respondents		
18-25	180	14.3
26-30	275	21.8
31-35	406	32.2
36-40	145	11.5
Above 40	254	20.2
Driving Experience (years)		
1-5		
6-10	598	47.5
Above 10	333	26.4
	329	26.1
Classes of Driving License		
B	698	55.4
C	328	26.1
D	121	9.6
E	66	5.2
F	47	3.7

The study further showed that 90% of the respondents were able to give their class of driving license off head whiles 10% of them had to refer to their driving licenses before being able to mention it to the researchers.

3.2 Preference for automatic or manual transmission vehicles

Out of the 1260 respondents, 61.4% (i.e. 774) owned their vehicles whiles 38.6% were driving other people's vehicles. 38.6% respondents were commercial vehicle drivers and driving was their profession. Most of the respondents who owned their vehicles had between 1 to 3 vehicles with 38% of them having manual transmissions (Table 2). This was not surprising since in developing countries such as Ghana, vehicles equipped with manual transmissions were very common. The automatic transmission system is relatively gaining patronage in the Ghana. This is because the importation of automatic transmission vehicles into Ghana has seen some increase.

Table 2: Number and types of vehicles owned by respondents

Number of vehicles owned	*Type of transmission system*	
	Automatic	Manual
1	360 (31.7)	432 (38)
2	144 (12.7)	162 (14.4)
3	36 (3.2)	0.0 (0.0)

Figures in parenthesis are percentages

All the respondents had driven both automatic and manual transmission vehicles before. However, 60% of them mentioned that they prefer manual transmission vehicles (Figure 1). This is because most respondents were used to driving manual transmission vehicles. During the Focus Group Discussion (FGD), it came to light that some respondents were of the view that automatic transmission vehicles were made for females. A male respondent said "*I don't like driving automatic vehicles because it is for women"*. In addition, some respondents also had the notion that people especially men who normally purchased automatic transmitted vehicles are lazy drivers. They belonged to the category of drivers who did not want to use all parts of the body in driving. According to a respondent, "*I consider men who purposely buy automatic vehicles as lazy since driving it can result in boredom*". Male FGD

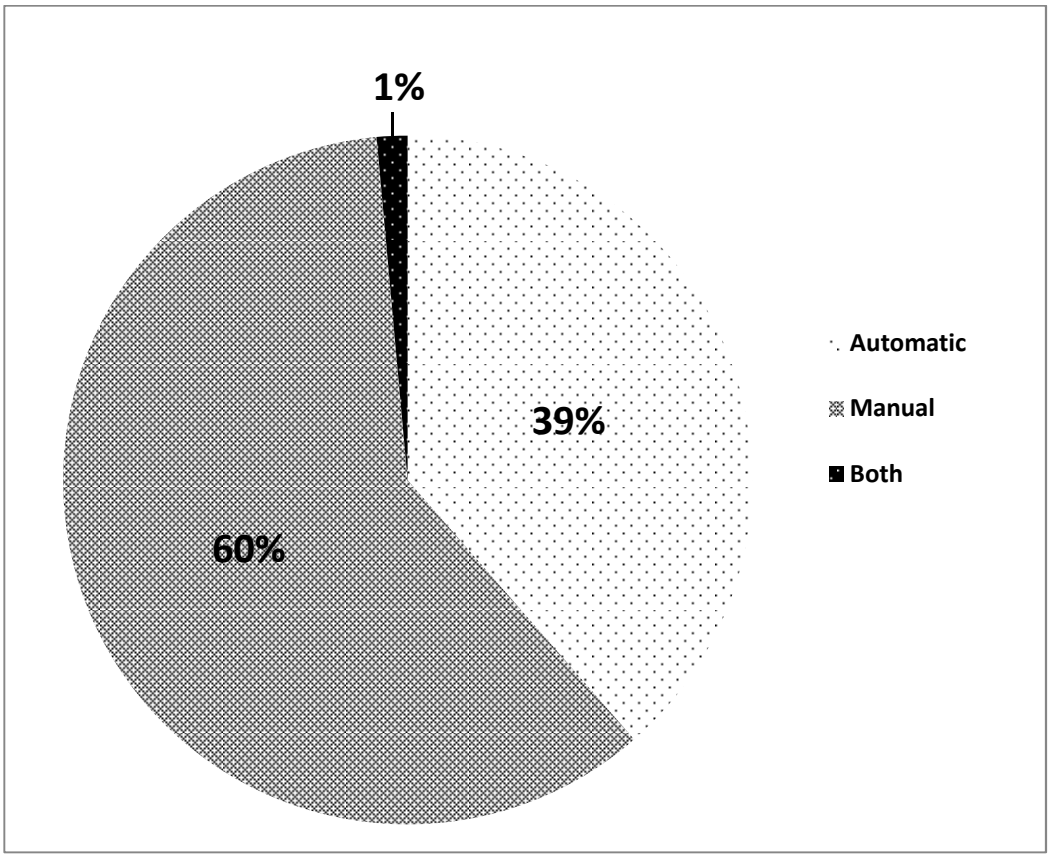

Figure 1: Responses concerning preference of the gear transmission

However, most female respondents prefer the automatic transmission vehicles to the manual ones. According to most of them, driving automatic transmission vehicles allowed them to focus only on the steering wheel control and hence could reduce accidents. In addition, most respondents mentioned that they derived excellent satisfaction (17.7%) from driving automatic vehicles (Table 3). Although excellent satisfaction, less fatigue and good comfort were derived from driving automatic transmitted vehicles, the cost of its maintenance is relatively high. Respondents mentioned that on the average, they serviced the automatic transmission system three times in year while doing so once for a vehicle with a manual transmission system. The main advantage of using a manual transmitting vehicle is it offers some savings. According to one respondent "*the lubricating oil for a manual transmission needs less frequent change than the automatic transmission fluid (ATF) in the automatic system"*. A report by Reed (2009) indicated that normally it is the clutch in the manual transmission system that breaks down and needed replacement which cost an average of 100 US dollars. Meanwhile an average cost of 300 US dollars is needed to repair an automatic transmission system if it breaks down.

Table 3: Satisfaction derived from using automatic and manual transmission vehicles

Level of satisfaction	*Number of responses (%)*	
	Automatic	Manual
Excellent	248 (19.7)	161(12.7)
Very Good	152 (12.0)	98 (7.6)
Good	108 (8.6)	134 (10.6)
Satisfactory	57 (4.5)	178 (14.1)
Poor	36 (2.8)	88 (6.9)

Respondents were requested to rate their degree of agreement against each factor whichwas being used by the researchers to determine their preference on a five-point Likert scale (1 = Strongly Disagree and 5 = Strongly Agree). The result showed that for the 12 preference determining factors, the means ranged from 2.4 to 3.8 for automatic vehicles whiles 2.3 to 3.5 for manual transmission vehicles. This implied that these factors could be some critical factors that some people consider when purchasing vehicles. Regarding automatic transmission

vehicles, the highest ranked factor was shifting quality (mean = 3.8). This factor was the most influential among the factors ranked (Table 4). This is obvious since the gears in automatic vehicles shift on their own (automatically) with increasing speed. This is the key reason why people purchased automatic vehicles. Because of the automatic gear shifting, it is very easy to be used (mean=3.7), better power efficiency (mean=3.5) and comfortable (mean =3.4). According to this study, these were the first four factors that influenced people in choosing automatic vehicles. This was also confirmed by most respondents during a focus group discussion. A female respondent said that" *I find it easier driving automatic vehicles, very comfortable and with less stress*". A similar study carried out by Gianluca et al., (2007) showed that the introduction of automatic transmission control represents one of the key elements for the improvement of vehicle safety, comfort, reliability and driving performance together with the reduction of fuel consumption and emissions in modern vehicles.

Table 4: Ratings of preference determining factors for automatic transmitted vehicles

Factors	***Mean Score***	***Rank***
Shifting quality	3.8	1
Easy to use	3.7	2
Power(engine) performance	3.5	3
Comfortability (comfort to control)	3.4	4
Safety	3.3	5
High Maintenance Cost	3.3	6
Driver's performance	3.2	7
Reparability(Easily reparable)	2.3	8
Easily breakdown	3.0	9
Reliability	2.7	10
High Emission	2.6	11
Fuel economy	2.4	12

The main preference determining factor for manual transmitted vehicles was repairability (mean = 3.5) of the system (Table 5). Manual gear box system is easily repairable in Ghana. Respondents mentioned that in case of breakdown it could easily be repaired relative to the automatic system. Reliability (mean = 3.3) and low – fuel consumption (mean = 3.1) were the other preference influencing factors for manual transmission vehicles. It came to light during a focus group discussion that most respondents were of the view that the manual transmission system was more reliable than the automatic one. According to them, such vehicles also have a better fuel economy. However, a report by Reed (2009) indicated that an automatic version of a car has a fuel economy advantage in the city; the manual version has the advantage on the highway. When the numbers are combined, they average out to be the same miles per gallon. A person's method of shifting gears can significantly alter their fuel economy (Reed, 2009). The fuel economy of vehicles depends on other factors especially the engine size. The least factor ranked was the shifting quality of gears for the manual transmission vehicles. This was the main factor which deters a lot of people from purchasing manual transmission vehicles. According to a respondent during the focus group discussion, *"I stopped driving manual vehicles because it is very tiresome since you need to be changing gears; but for automatic vehicles I don't think whiles I drive*". There is no clutch pedal and gear shift in an automatic transmission car. Once you put the transmission into drive, everything else is automatic

Table 5: Ratings of preference determining factors for manual transmitted vehicles

Factors	Mean Score	Rank
Repairability(Easily reparable)	3.5	1
Reliability	3.3	2
Fuel economy	3.1	3
Safety	3.0	4
Driver's performance	3.0	5
Comfortability (comfort in terms of control)	2.9	6
Power(engine) performance	2.8	7
Easily breakdown	2.8	8
High Emission	2.8	9
High Maintenance Cost	2.6	10
Easy to use	2.5	11
Shifting quality	2.3	12

3.4 General views of respondents concerning both manual and automatic transmission systems vehicles

Both transmission systems accomplish exactly the same function in vehicles but do it in totally different ways.

According to the study, respondents had various opinions concerning the two systems. Most of the respondents believed that manual transmission vehicles had strong advantages over the automatic ones. They stated that it was easier to build a strong manual transmission system than the automatic one. This was because a manual system has one clutch to operate, whereas an automatic system has a number of clutch packs that function in harmony with each other (Kuroiwa et al., 2004). Furthermore, the manual transmissions normally do not require active cooling, because not much power is dissipated as heat through the transmission. Most respondents mentioned that manual vehicles have better fuel economy than the automatic ones. This is because in the automatic transmission system, the torque convertor used to engage and disengage automatic gears, may lose power and reduce acceleration as well as fuel economy (Kuroiwa et al., 2004).

For instance a study by Green truck partnership (2004) revealed that the average fuel consumption of the vehicles fitted with Automated Manual Transmission (AMTs) was 1.90 km/L. This is compared with an average fuel consumption of 1.71 km/L for the vehicles fitted with conventional fully automatic transmissions. This indicated that the AMT system delivered an 11% improvement in fuel efficiency relative to the fully automatic transmission vehicles in the trial application (i.e. urban tipper).

Another key view of respondents was that manual transmission systems generally require less maintenance than automatic transmissions. An automatic transmission is made up of several components and a breakdown of even a single component can stall the car completely.

However, some proportion of the respondents also had strong attraction for the use of automatic vehicles especially the females. According to them, automatic vehicles are easier to use, especially for the inexperienced vehicle driver. Manual system requires better driving skills, whereas with an automatic, the clever system does it all on its own. This holds a greater advantage for new and inexperienced drivers and also helps during congested traffic situations where it becomes difficult to change gears every second. In addition, automatic transmission vehicles require less attention and concentration from the driver because the automatic gears start functioning as soon as the system feels the need of a gear change. For cars with manual gear shifts, the driver has to be more alert while driving and better coordinated. Automatic vehicles have better ability to control traction when approaching steep hills or engine braking during descents. Manual gears are difficult to operate on steep climbs.

The main limitation of this research was that responses from female respondents were not correlated.

4. Conclusion

Advancement in technologies has brought about changes and modifications in vehicle systems. One such system is the change from the conventional manual transmission to the automatic system. An individual choice to purchase any vehicle with such system depends on certain factors. The study concludes that individuals prefer automatic transmission vehicles based on these first three factors; shifting quality, easy to use and engine power performance. Meanwhile, the choice of manual transmitted vehicles also depends on these first three factors (i.e. repairability (easily repairable), reliability and better fuel economy). Majority of the respondents prefer manual transmission vehicles. However, most female drivers prefer the automatic transmitted vehicles because it is easy to be used by them. Each system has an advantage over the others as well as disadvantages.

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