ANALYSIS OF GENDER DIFFERENCES IN THE PERCEPTION OF REASONS OF FAILURE IN

AUTOMOBILE SECTOR

Sanjeev Kadam, Lecturer[1] Dr. C Babu, Director[2]

Abstract:

Every product or service necessarily passes through its life cycle. The life cycle involves five distinct stages: product development, introduction, growth, maturity and decline. However due to rapid technological changes, stiff competition and changing customer preferences, the length of product life cycle is getting shortened. In today's challenging world, even legendary brands struggle to stay in the mature stage for a long time.

Today Indian roads are clogged by many different makes and models of automobiles. One time favourites Ambassador and Fiat are sidelined by new entrants such as Maruti, Hyundai, Ford, Tata, and Volkswagen by their stiff competition, generational shifts or technological innovations either in product or processes. The same is true in two wheeler industry too. Failure or delay to adopt changes/innovations lead to downtimes and affect the production; which in turn affects the goodwill of the customer as well as profitability.

The study aims (i) to understand whether the respondents have shown the significant association in the ranking of the reasons of failures or not (ii) to check whether these reasons are influenced differently by the male & female respondents.

The initial survey was conducted with 121 respondents which include 64 male & 57 female respondents. This article use Kendall's coefficient of concordance (W) with Chi Square (χ^2) values with (N-1) degree of freedom to identify significant association in field survey data. The F-test is used to check the equality of variances of two normal populations to understand whether there is considerable difference between the male & female perception while ranking.

The findings signify that the respondents are applying essentially the same standard in ranking the reasons of failure & there are no significant differences in male & female perception in assessing the reasons of failures.

Keywords: Automobile, Change, Failure, Innovation, Product Life Cycle

[1] **Lecturer**, YMT College of Management, Navi Mumbai, Email: sckadam69@yahoo.co.in
[2] **Director** YMT College of Management, Navi Mumbai, Email: babuymt@yahoo.in

Products that hit the market from their respective manufacturers come out of gruelling tests and processes. Research indicates only one out of five projects becomes viable after careful examination of feasibility study. It may further be noted eighty percent of innovations fail at the ideation stage itself.

Every product or service necessarily passes through product life cycle. The life cycle refers to a period wherein product development commences; and introduction of product and subsequent market expansion takes place; followed by maturity and decline of both product sales and profit culminates towards the end. However due to rapid technological changes and changing customer preferences, the length of PLC varies for every product and service. Therefore during this period every organisation needs to introduce considerable changes in the manner that the product remains competitive in the market for longer period.

It is imperative to understand the causes of product success or failure. The PLC is lengthened by successful organisations through their innovative technologies, strong promotion or repositioning or simply out of box thinking strategies and subsequent executions. This mandates one to understand whole product's life cycle process in detail. There are many reputed brand names in today's business world, which are striving hard to retain their favourite position.

1.   Indian Automobile Industry

In India, the vehicle population is growing at rate of over 5% per annum and today the vehicle population is approximately 40 million. In 2010-11 over 17.9 million vehicles were manufactured and 2.3 million vehicles were exported by the Indian automobile manufactures. Out of this, two wheeler products lead with market share of 76% followed by passenger vehicles with 16.25% & commercial vehicles including three-wheelers with 7.75%.

In 1942, Hindustan Motors (HM) and in 1944 Premier Automobiles Ltd. (PAL) were established respectively to manufacture automobiles in India. However, it was PAL that produced the first car in India in 1946. Prior to 1991 liberalisation reforms, HM's Ambassador and PAL's Fiat Premier ruled Indian roads over three decades. It is very hard to believe the fact that Bajaj scooters aspirants had to wait anything between 10-12 years to take possession of their two preferred two wheelers in 70's and 80s.

Now the scenario is completely different. The pioneers of the car industry in India such as HM's Ambassador or PAL's Fiat Premier Padmini are way behind the competion. Today Indian roads are clogged by many different makes and models of automobiles. The new entrants such as Maruti, Hyundai, Ford, Tata, Volkswagen, etc have occupied the road and mind space. The same is true in two wheeler sector too. This is result of stiff competition, generational shifts or technological innovation either in product or processes. Failure or delay to adopt changes/innovations lead to downtimes and affect the production which in turn affects the goodwill of the customer as well as profitability.

The level of technology change in the automobile industry has been high. Though Indian automobiles are lagging behind euro norms, initiatives are being taken continuously to bring emission norms with euro standards and vehicular technology is being accordingly upgraded. Vehicle manufactures are also working towards bridging the gap between Euro standards and Indian emission norms.

2.   Literature Review

There are various product life cycle models available in the literature, each describing the phases of product life cycle differently. John Stark (2011) explains that there are five phases in product lifecycle. The product must be managed in all these phases to make sure that everything works well and that the product makes good money for the company.

In the early 1970s, SAPPHO-study (Scientific Activity Predictor from Patterns with Heuristic Origins), was carried out to understand the success factor of product (Rothwell et al. 1974, Rothwell, 1972).

Cooper (1980) concluded that viability is determined by three factors such as degree of uniqueness of product, innovator's understanding of future market developments & the firm's overall technological and manufacturing resources.

Maidique and Zirger's (1984) argue that success is the outcome of a wide range of firm and project related factors; a single magical factor does not exist.

Lack of financial resources is considered a predominant factor of failure (Rubenstein et al., 1976). Cooper (1983) reports firms spending only 1% of total sales on R&D generate one quarter of total sales with innovative products; firms spending at least 4% of total sales on R&D generate only 40% of total sales with innovative products. Link (1987) considers fierce competition as a main factor of failure.

Porter (1990) claims that innovation is triggered by factors including new technologies, new consumer needs, and introduction of new industry segment. In most industries the very survival of firms is increasingly dependent on their ability to rapidly develop and introduce innovative products and services (Cooper, 2001; Schilling & Hill, 1998). On an average more than organisation revenue comes from product & services that does not exist five years ago. (Griffin, 1997).

Folkes (1984) proposed an attribution theory framework for predicting consumer responses to product failure. When failure occurs, no matter how benign, its impact is felt which leads to customer dissatisfaction with the product. There is no way that manufacturer can completely avoid failures & the challenge to the manufacturer is to make decisions that achieve balance (Murthy & Rausand, 2008).

Fundamental structural changes are required in product as well as in organisations & production technologies and also that economic benefits involved are either uncertain or associated with risks (Westkamper et al. 2000).

Automakers who have successfully positioned themselves as stewards of the environment as "Innovators in the battle against climate change" have won market share and increased profits (Phyper & Maclean, 2009).

3. Objectives of the Study

The study aims:
i. To understand whether the respondents have shown the significant association in the ranking of the reasons of failures or not.
ii. To check whether these reasons are influenced differently by the male & female respondents.

4. Research Methodology

i. As our focus is to understand the perception of male & female respondents, we have collected primary data from the 121 consumers which include 64 male & 57 female respondents.
ii. Rank scale used in the survey is 1-10. Most important reason of failure is ranked as 1 & least important as 10.
iii. This study used Kendall's coefficient of concordance (W) with Chi Square (χ^2) values with (N-1) degree of freedom to identify significant association in field survey data.
iv. The F-test is used to check the equality of variances of two normal populations i.e. between male & female respondents, to understand whether there is considerable difference between the male & female perception while ranking.

5. Reasons of Failure

The major common reasons of failures of products are listed as follows. However there is no fixed order of reasons in any case as of now.

- Poor Performance/ Features
- Poor Innovation in Technology
- Higher Prices
- Generational Shifts/ Changed Customer Preferences
- Inappropriate Product Positioning
- Inadequate Promotional Efforts
- Poor Research & Development
- Increased Competition due to New Entrants
- Poor Product Availability/ Distribution
- Poor After Sales Relationships

6. Hypothesis

<u>1st Set of Hypothesis:</u>

      Null Hypothesis, H_0: Respondents are applying independent standard in ranking the reasons of failure.

      Alternate Hypothesis, H_1: Respondents are applying the same standard in ranking the reasons of failure.

<u>IInd Set of Hypothesis:</u>

      Null Hypothesis, H_0: There is no significant difference in perception of reasons of failure by male & female respondents.

      Alternate Hypothesis, H_1: There is significant difference in perception of reasons of failure by male & female respondents.

7. Findings & Analysis

The following table shows the percentage of male & female respondent perception of ranking of reasons of failure in 2-wheeler sector. The survey result shows that **poor innovation in technology, poor product performance/features & changed customer preferences/ generational shifts** are the major causes of failure of product/ services in this sector.

Table 1.1: *Percentage Ranking in Automobile (2-Wheeler)*

Sl No	Reasons of Failure	Rank →	Percentage										Rank Score	Mean
			1	2	3	4	5	6	7	8	9	10		
1	Poor Performance/ Features	M	15.63	9.38	14.06	17.19	14.06	10.94	4.69	6.25	6.25	1.56	279	4.36
		F	21.05	7.02	10.53	15.79	8.77	8.77	10.53	10.53	7.02	0.00	255	4.47
2	Innovation in Technology	M	14.06	12.50	15.63	12.50	12.50	6.25	7.81	7.81	3.13	7.81	294	4.59
		F	21.05	15.79	22.81	7.02	10.53	1.75	3.51	8.77	5.26	3.51	222	3.89
3	Higher Prices	M	12.50	20.31	18.75	17.19	6.25	12.50	4.69	1.56	4.69	1.56	248	3.88
		F	1.75	24.56	12.28	10.53	8.77	5.26	12.28	10.53	5.26	8.77	291	5.11
4	Generational Shifts/ Changed Customer Preferences	M	10.94	10.94	14.06	17.19	17.19	4.69	15.63	4.69	3.13	1.56	287	4.48
		F	21.05	14.04	12.28	8.77	21.05	5.26	8.77	3.51	5.26	0.00	225	3.95
5	Inappropriate Product Positioning	M	1.56	14.06	10.94	4.69	10.94	14.06	9.38	20.31	7.81	6.25	372	5.81
		F	5.26	1.75	10.53	8.77	17.54	21.05	3.51	10.53	12.28	8.77	340	5.96
6	Inadequate Promotional Efforts	M	10.94	10.94	9.38	6.25	9.38	10.94	9.38	14.06	10.94	7.81	354	5.53
		F	0.00	3.51	10.53	14.04	10.53	19.30	14.04	12.28	10.53	5.26	346	6.07
7	Poor Research & Development	M	7.81	12.50	4.69	10.94	9.38	14.06	10.94	9.38	10.94	9.38	362	5.66
		F	5.26	14.04	8.77	14.04	7.02	7.02	14.04	19.30	7.02	3.51	310	5.44
8	Increased Competition due to	M	9.38	10.94	18.75	0.00	6.25	9.38	10.94	14.06	3.13	17.19	361	5.64
		F	21.0	12.2	7.02	8.77	8.77	8.77	8.77	8.77	7.02	8.77	274	4.81

	New Entrants		5	8									
9	Poor Product Availability/ Distribution	M	6.25	9.38	9.38	12.50	7.81	18.75	12.50	7.81	9.38	6.25	353	5.52
		F	7.02	5.26	7.02	7.02	5.26	10.53	14.04	14.04	14.04	15.79	371	6.51
10	Poor After Sales Relationships	M	9.38	4.69	4.69	7.81	21.88	9.38	7.81	12.50	7.81	14.06	381	5.95
		F	8.77	3.51	1.75	8.77	12.28	12.28	14.04	5.26	10.53	22.81	373	6.54

The graphical representation gives us a comparative idea about the intensity of the reasons of failure in male & female consumers mind.

Fig. 1.1
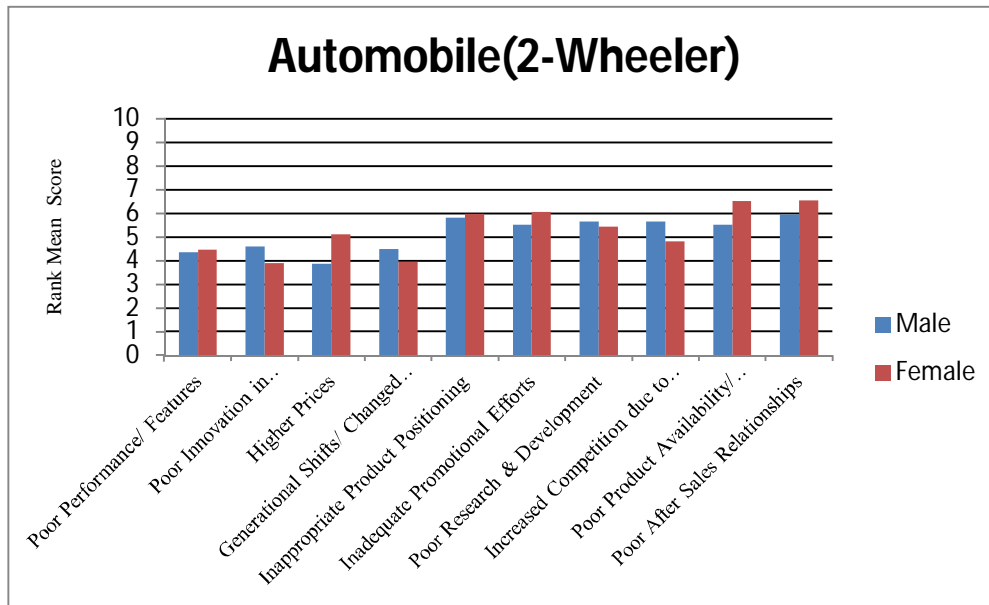
As there are 121 sets of rankings, Kendall's coefficient of concordance (W) will be used for judging significant agreement by different respondents as follows:

Table 1.2: *Rank Score -Automobile (2-Wheeler)*

Sl∴ No	Reasons of Failure (Objects)	Sum of Ranks (Rj)			$\left(Rj - \overline{Rj}\right)^2$
		Male	Female	Total	
1	Poor Performance/ Features	279	255	534	9177.64
2	Innovation in Technology	294	222	516	12950.44
3	Higher Prices	248	291	539	8244.64
4	Generational Shifts/ Changed Customer Preferences	287	225	512	13876.84
5	Inappropriate Product Positioning	372	340	712	6756.84
6	Inadequate Promotional Efforts	354	346	700	4928.04
7	Poor Research & Development	362	310	672	1780.84

8	Increased Competition due to New Entrants	361	274	635	27.04
9	Poor Product Availability/ Distribution	353	371	724	8873.64
10	Poor After Sales Relationships	381	373	754	15425.64
	N= 10; k = 121			**6298**	**82041.6**

Where

$$\overline{Rj} = \frac{\sum Rj}{N} = \frac{6298}{10} = 629.8$$

$$s = \sum \left(Rj - \overline{Rj}\right)^2 = 82041.6$$

$$W = \frac{s}{\frac{1}{12} k^2 (N^3 - N)} = \frac{82041.6}{\frac{1}{12}(121)^2 (10^3 - 10)} = 0.068$$

As N is larger than 7, we have to use Chi square (χ^2) value with (N-1) d.o.f. for judging W's significance at a given level.

$$\chi^2 = k(N-1) * W = 121(10-1) * 0.068 = 73.967$$

As calculated value of χ^2 i.e. 73.967 is considerably more than the tabled value of χ^2 i.e. 16.919 at 5 % level for (10-1) = 9 d.o.f., null hypothesis (H_0) is rejected & thus alternate hypothesis (H_1) is accepted.

The following table shows the percentage of male & female respondent perception of ranking of reasons of failure in 4-wheeler sector. The survey result shows that **poor innovation in technology, higher prices & poor product performance/features** are the major causes of failure of product/ services in this sector.

Table 1.3: *Percentage Ranking in Automobile (4-Wheeler)*

Sl No	Reasons of Failure	Rank →	Percentage										Rank Score	Mean
			1	2	3	4	5	6	7	8	9	10		
1	Poor Performance/ Features	M	14.06	9.38	17.19	14.06	12.50	15.63	9.38	4.69	3.13	0.00	274	4.28
		F	28.07	10.53	12.28	8.77	10.53	5.26	10.53	3.51	7.02	3.51	231	4.05
2	Innovation in Technology	M	18.75	20.31	14.06	10.94	14.06	6.25	1.56	4.69	4.69	4.69	250	3.91
		F	21.05	21.05	15.79	8.77	5.26	3.51	5.26	12.28	1.75	5.26	226	3.96
3	Higher Prices	M	18.75	15.63	12.50	12.50	14.06	3.13	7.81	7.81	1.56	6.25	269	4.20
		F	26.32	21.05	10.53	5.26	5.26	7.02	1.75	5.26	7.02	10.53	235	4.12
4	Generational Shifts/ Changed Customer Preferences	M	3.13	14.06	15.63	17.19	14.06	9.38	9.38	9.38	3.13	4.69	313	4.89
		F	14.04	8.77	5.26	12.28	26.32	8.77	10.53	7.02	3.51	3.51	272	4.77
5	Inappropriate	M	4.69	14.06	14.06	7.81	20.31	4.69	10.94	12.50	10.94	0.00	327	5.11

#	Factor		1	2	3	4	5	6	7	8	9	10	Total	Mean
	Product Positioning	F	1.75	12.28	7.02	12.28	15.79	12.28	12.28	5.26	10.53	10.53	329	5.77
6	Inadequate Promotional Efforts	M	4.69	6.25	9.38	10.94	10.94	21.88	12.50	7.81	7.81	7.81	367	5.73
		F	0.00	5.26	10.53	10.53	12.28	21.05	19.30	8.77	8.77	3.51	337	5.91
7	Poor Research & Development	M	3.13	10.94	7.81	12.50	7.81	18.75	9.38	10.94	14.06	4.69	369	5.77
		F	1.75	14.04	21.05	8.77	10.53	15.79	12.28	12.28	1.75	1.75	281	4.93
8	Increased Competition due to New Entrants	M	4.69	12.50	7.81	12.50	1.56	10.94	9.38	9.38	18.75	12.50	391	6.11
		F	10.53	8.77	17.54	10.53	10.53	3.51	10.53	17.54	3.51	7.02	292	5.12
9	Poor Product Availability/ Distribution	M	4.69	9.38	12.50	6.25	10.94	7.81	18.75	9.38	4.69	15.63	379	5.92
		F	3.51	10.53	5.26	8.77	7.02	5.26	5.26	15.79	21.05	17.54	382	6.70
10	Poor After Sales Relationships	M	7.81	12.50	10.94	6.25	4.69	7.81	14.06	9.38	9.38	17.19	378	5.91
		F	3.51	12.28	7.02	7.02	3.51	7.02	19.30	12.28	15.79	12.28	362	6.35

Fig. 1.2
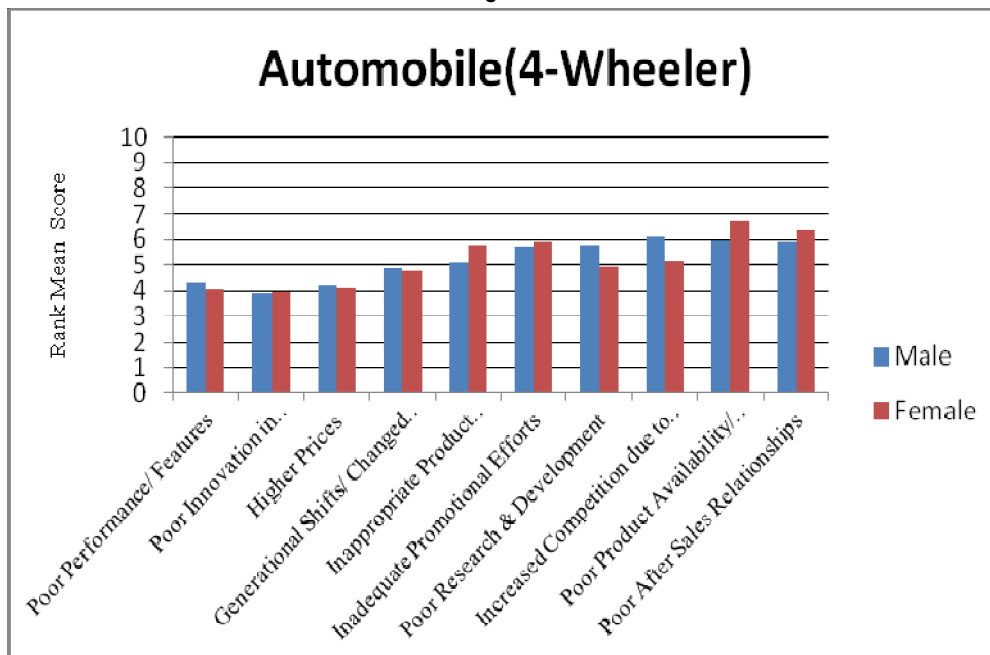
As there are 121 sets of rankings, Kendall's coefficient of concordance (W) will be used for judging significant agreement by different respondents as follows:

Table 1.4: Rank Score -*Automobile (2-Wheeler)*

Sl No	Reasons of Failure(Objects)	Sum of Ranks(Rj)			$(Rj-Rj^-)2$
		Male	Female	Total	
1	Poor Performance/ Features	274	231	505	14737.96
2	Innovation in Technology	250	226	476	22620.16
3	Higher Prices	269	235	504	14981.76
4	Generational Shifts/ Changed Customer Preferences	313	272	585	1713.96
5	Inappropriate Product Positioning	327	329	656	876.16
6	Inadequate Promotional Efforts	367	337	704	6021.76
7	Poor Research & Development	369	281	650	556.96
8	Increased Competition due to New Entrants	391	292	683	3203.56
9	Poor Product Availability/ Distribution	379	382	761	18117.16
10	Poor After Sales Relationships	378	362	740	12904.96
	N= 10; k = 121			6264	95734.4

Where

$$\overline{Rj} = \frac{\sum Rj}{N} = \frac{6264}{10} = 626.4$$

$$s = \sum \left(Rj - \overline{Rj}\right)^2 = 95734.4$$

$$W = \frac{s}{\frac{1}{12}k^2(N^3 - N)} = \frac{95734.4}{\frac{1}{12}(121)^2(10^3 - 10)} = 0.079$$

As N is larger than 7, we have to calculate Chi square ($\chi 2$) value with (N-1) d.o.f. for judging W's significance at a given level.

$$\chi^2 = k(N-1)*W = 121(10-1)*0.079 = 86.312$$

As tabled value of χ^2 at 5 % level for 10-1= 9 d.o.f. is 16.919 is considerably less than the calculated value of χ^2 i.e. 86.312, null hypothesis (H_0) is rejected & thus alternate hypothesis (H_1) is accepted.

When we want to test the equality of variances of two normal populations, we make use of F-test based on F-distribution. This hypothesis is tested on the basis of sample data and that test statistic F is found using $\sigma^2{}_{s_1}$ & $\sigma^2{}_{s_2}$ as stated below:

$$F = \frac{\sigma^2{}_{s_1}}{\sigma^2{}_{s_2}} \text{ where } \sigma^2{}_{s_1} = \frac{\sum\left(X_{1i} - \overline{X_1}\right)^2}{(n_1 - 1)} \text{ & } \sigma^2{}_{s_2} = \frac{\sum\left(X_{2i} - \overline{X_2}\right)^2}{(n_2 - 1)}$$

While calculating F, the greater variance out of $\sigma^2{}_{s_1}$ & $\sigma^2{}_{s_2}$ will always be taken as numerator.

Degrees of freedom for male respondents   = (n_1-1) = 64 – 1 = 63
Degrees of freedom for female respondents = (n_2-1) = 57 – 1 = 56
Table 1.5: '*F' Ratio for 2-Wheeler Automobile Sector*

Sl No	Reasons of Failure	MALE (N1=64)		FEMALE(N2=57)		'F' Cal	'F' Table (at 5%)	'F' Table (at 1%)
		Mean	σ2s1	Mean	σ2s2			
1	Poor Performance/ Features	4.36	6.01	4.47	7.00	1.16	1.53	1.84
2	Innovation in Technology	4.59	7.61	3.89	7.35	1.04	1.53	1.84
3	Higher Prices	3.88	5.16	5.11	7.74	1.50	1.53	1.84
4	Generational Shifts/ Changed Customer Preferences	4.48	5.27	3.95	5.76	1.09	1.53	1.84
5	Inappropriate Product Positioning	5.81	6.60	5.96	6.14	1.08	1.53	1.84
6	Inadequate Promotional Efforts	5.53	8.47	6.07	4.67	1.81	1.53	1.84
7	Poor Research & Development	5.66	7.88	5.44	6.89	1.14	1.53	1.84
8	Increased Competition due to New Entrants	5.64	9.57	4.81	9.52	1.01	1.53	1.84
9	Poor Product Availability/ Distribution	5.52	6.63	6.51	7.93	1.20	1.53	1.84
10	Poor After Sales Relationships	5.95	7.70	6.54	8.18	1.06	1.53	1.84

The table value of F-ratio for male respondents at 63 d.o.f. & for female respondents at 56 d.o.f. is around 1.53 at 5% level of significance & 1.84 at 1% level of significance.

Since the calculated value of F-ratio in all reasons of failure is less (except for inadequate promotional efforts) than the table value at 5% level of significance as well as in all cases at 1% level of significance, we accept null hypothesis (H0).

Table 1.6: *'F' Ratio for 4-Wheeler Automobile Sector*

Sl No	Reasons of Failure	MALE (N1=64)		FEMALE(N2=57)		'F' Cal	'F' Table (at 5%)	'F' Table (at 1%)
		Mean	σ2s1	Mean	σ2s2			
1	Poor Performance/ Features	4.28	4.94	4.05	8.05	1.63	1.53	1.84
2	Innovation in Technology	3.91	6.88	3.96	8.00	1.16	1.53	1.84
3	Higher Prices	4.20	7.38	4.12	10. 36	1.40	1.53	1.84
4	Generational Shifts/ Changed Customer Preferences	4.89	5.62	4.77	6.01	1.07	1.53	1.84
5	Inappropriate Product Positioning	5.11	6.10	5.77	6.72	1.10	1.53	1.84
6	Inadequate Promotional Efforts	5.73	5.97	5.91	4.30	1.39	1.53	1.84
7	Poor Research & Development	5.77	6.40	4.93	5.03	1.27	1.53	1.84
8	Increased Competition due to New Entrants	6.11	8.67	5.12	7.76	1.12	1.53	1.84
9	Poor Product Availability/ Distribution	5.92	7.75	6.70	8.50	1.10	1.53	1.84
10	Poor After Sales Relationships	5.91	9.48	6.35	7.88	1.20	1.53	1.84

Similarly, for 4-wheeler sector, table value of F-ratio for male respondents at 63 d.o.f. & for female respondents at 56 d.o.f. is around 1.53 at 5% level of significance & 1.84 at 1% level of significance.

Since the calculated value of F-ratio in all reasons of failure is less (except for poor performance/features) than the table value at 5% level of significance as well as in all cases at 1% level of significance, we accept null hypothesis (H0).

8. Limitations of the study

i. The inference of this study is limited as the analysis is done by considering the automobile sector as a whole.
ii. Also some of the respondents might have responded according to a particular product which may or may not be consistent or true with other products in that category.

9. Conclusion

i. In 2-wheeler sector, as calculated value of χ^2 i.e. 73.967 is considerably higher than the tabled value of χ^2 i.e. 16.919 at 5 % level for (10-1) = 9 d.o.f., null hypothesis (H0) is rejected & thus alternate hypothesis (H1) is accepted. **This**

infers that respondents are applying essentially the same standard in ranking the reasons of failure. The lowest value observed amongst Rj is 512, thus we can say that **generational shift/ customer changed preferences** is the most prominent reason for failure in two-wheeler automobile sector.

ii. In 4-wheeler sector, as calculated value of χ^2 i.e. 86.312 is considerably higher than the tabled value of χ^2 i.e. 16.919 at 5 % level for (10-1) = 9 d.o.f., null hypothesis (H_0) is rejected & thus alternate hypothesis (H_1) is accepted. **This infers that respondents are applying essentially the same standard in ranking the reasons of failure**. The lowest value observed amongst Rj is 476, thus we can say that **poor innovation in technology/product** is the most prominent reason of failure in four-wheeler automobile sector.

iii. **This reveals that there is significant agreement in the perception while ranking reasons of failure by different respondents in automobile sector.**

iv. In 2-wheeler sector, since the calculated values of F-ratio in all reasons of failure is less (except for inadequate promotional efforts) than the table value (F=1.53 at α= 0.05; F=1.84 at α= 0.01), null hypothesis (H_0) is accepted, we conclude that the samples have been drawn from two populations having the same variances.

v. Similarly, 4-wheeler sector, since the calculated values of F-ratio in all reasons of failure is less (except for poor performance/features) than the table value (F=1.53 at α= 0.05; F=1.84 at α= 0.01), null hypothesis (H_0) is accepted, we concludes that the samples have been drawn from two populations having the same variances.

vi. **This signifies that there is no difference in perception of reasons of failure by male & female respondents in automobile sector.**

10. References

1. Kadam & Bhosale (2012); *The last Option: Innovate or Die;* International Conference on Innovation: The Key to Growth; MGMIMSR, Navi Mumbai.
2. Kothari, C.R; *Research Methodology- Methods & Techniques;* New Age international; pp. 307
3. Paneerselvam, R; *Research Methodology;* PHI Learning Pvt Ltd. ; pp. 290
4. Mathew, Mary ; *An analysis of PLC orientation in PLM software tool vendors;* Journal of Technology Management for Growing Economies; pp. 99-112
5. Panne, Gerben Van Der, Cees Van Beers & Alfred Kleinknecht; *Success and Failure of Innovation: A Literature Review;* International Journal of Innovation Management Vol. 7, No. 3 (September 2003) pp.1–30
6. Wood, Laurie (1990); *The End of the Product Life Cycle? Education Says Goodbye to an Old Friend;* Journal of Marketing Management, pp. 145-155.
7. Goi, Chai Lee (2010); *Perception of Consumer on Marketing Mix: Male vs. Female*; International Conference on Business and Economics Research vol.1 (2011) IACSIT Press, Malaysia
8. Somasundaram, T. N. (1993), *Consumers Reaction to Product Failure: Impact of Product Involvement and Knowledge;* Advances in Consumer Research, Volume 20, pp 215-218.
9. Niemann, Jörg, Serge Tichkiewitch, & Engelbert Westkämper; *Design of Sustainable Product Life Cycles;* Springer, 2009.
10. Stark, John; *Product Lifecycle Management: 21st Century Paradigm for Product Realisation*; *2nd Ed*; Springer 2011.
11. Murthy, D.N.P, Marvin Rausand & Trond Osterås; *Product Reliability: Specification and Performance*; Springer, 2008.
12. www.siam.in
13. www.google.com
14. www.wikiepadea.com