

## The German Automobile Paradox

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*This study compares the performance and reliability of German vehicles sold in the US to those from the rest of the world. The examination uses Consumer Reports' vehicle road-test performance and predicted reliability from 1994 through 2012. Statistical analysis reveals a contradiction in the two automobile dimensions. The German automobiles had better road-test performance than automobiles from the rest of the world, but the German vehicles' predicted reliability was much worse.*

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Products emanating from a particular country often take on the general image of that country's products. In the marketing discipline literature, this is known as the country-of-origin (Pharr, 2005). Products from German companies generally have a positive quality reputation and German automobiles share in Germany's good reputation (Sohail, 2005). When people are asked to describe German automobiles, comments of reliable automobiles, better performance, excellent engineering, and prestigious are common (Lawrence & Prendergast, 1992). The German automobile manufacturers stress this image with their product positioning. Affordable German engineering is Volkswagen's position while Audi, Porsche, BMW, and Mercedes stress performance, excellent engineering as well as luxury.

This combination of engineering, performance, and luxury is a powerful marketing position on the world automobile market. For premium vehicles, BMW is the world's number one automobile manufacturer in sales volume followed by Audi and then Mercedes (Castonguay, 2012). In a close sales volume race in the United States, BMW beat out Mercedes for the top position in 2011. Both German brands exceeded the sales of the Japanese automobile Lexus, which was the number one premium brand for the previous decade (Dolan, Rauwald, & Schmidt, 2012). Although Volkswagen is not a premium brand, it does stress German engineering. Volkswagen has ambitions to increase its U.S. sales to 800,000 units by 2018 (Findlay, 2009). This would be an almost four-fold increase from 2009 when it had sales of 213,454 (Kurylko, 2010).

Automobile quality is also a strong marketing position for automobiles. Automobile quality was the most important consideration for 86 percent of U.S. automobile consumers responding to a survey (Cole & Flynn, 2009). Also, there is evidence that a quality product strategy leads to higher profits (Jacobson & Aaker, 1987).

Since German automobiles have an excellent reputation (Lawrence & Prendergast, 1992; Sohail, 2005), this study examined how German vehicles compared to the rest of the world on two dimensions: automobile road-test performance and automobile reliability. The source for data on vehicle performance and reliability was Consumer Reports. Every year, Consumer Reports surveys its readers and road tests purchased automobiles sold in the United States. They publish the results of their survey, road-test results, and make predictions on future performance quality. We used Consumer Reports' data from 1994 to 2012 to examine road-test performance and predicted reliability of German automobiles compared to automobiles from other countries.

### Literature Review

Historically, automobile researchers have extensively researched many areas of the industry. These areas include market share (Train & Winston, 2007), reliability and age effects on used car prices (Betts & Taran, 2004), price/quality relationships (Hogarty, 1975), product differentiation and price discrimination (Mertens & Ginsburgh, 1985), brand name influence (Sullivan, 1998), and recall consequences (Crafton, Hoffer, & Reilly, 1981; Bates, Holweg, Lewis, & Oliver, 2007).

A product's country-of-origin influences consumers' product quality assessments and is another major area of analysis. Since this study is focused on Germany, the country-of-origin literature can be particularly useful. Fortunately, country-of-origin pertaining to automobiles is extensively researched and the literature is reviewed in the next two sections.

### What Constitutes a German Vehicle?

The first step of this study was to define what automobile manufacturers were German. At first blush, this seems a simple task. Certainly, a German automobile is an automobile made in Germany by a German automobile manufacturer. When the facts of modern manufacturing and company ownership are reviewed, however, the situation becomes far more complex. Most people consider German manufacturers to be Audi, BMW, Mercedes,

Porsche, and Volkswagen. However, are the vehicles these manufacturers produce considered German even if they are made in another country? For example, BMW, Mercedes, and Volkswagen have vehicle assembly plants in the United States (Global Game, 2007; Young, 2011). Are these vehicles German or U.S.? In addition, Chrysler was owned by Daimler-Benz (Mercedes) from 1998 to 2007 (Rutberg, 2007; White, 2009). During this period was Chrysler a German or American automobile? The Mini is historically considered British but is now owned by BMW (White, 2012). The country-of-origin literature offers a response to these questions.

Country-of-origin is the collective beliefs consumers have about a particular country. Researchers found country-of-origin beliefs affect the evaluation of a product associated with a country (Hong & Wyer, 1989; Pharr, 2005). Pappu, Quester, and Cooksey (2007) found country-of-origin could influence brand equity. Research on country-of-origin is extensive (Nagashima, 1970; Hong & Wyer, 1990; Al-Sulaiti & Baker, 1998; Verlegh & Steenkamp, 1999; Gurhan-Canli & Maheswaran, 2000; Beverland & Lindgreen, 2002; Dinnie, 2002; Liefeld, 2004; Liu & Johnson, 2005; Pharr, 2005; Yasin, Noor, & Mohamad, 2007). Country-of-origin is composed of several concepts such as brand origin (Thakor, 1996), country-of-assembly (Tse & Lee, 1993; Inch & McBride, 1998; Chao, 2001), country-of-manufacture (Ulgado, 2002; Thakor & Lavack, 2003), country-of-parts (Inch & McBride, 1998; Chao, 2001), and country-of-design (Sauer, Young, & Unnava, 1991; Chao, 1993; Ahmed & d'Astous, 1995; Inch & McBride, 1998; Chao, 2001).

Many researchers found country-of-origin influences consumers' evaluations of automobiles (Han & Terpstra, 1988; Chao & Gupta, 1995; Haubl, 1996). Loeffler (2002) discovered complex products, including automobiles, are influenced more by country-of-origin beliefs. Since automobile evaluations are heavily swayed by their country-of-origin, this study uses country-of-origin as the means to classify a vehicle as German. Since there are many country-of-origin concepts, the appropriate concept for this study was determined next.

Brand origin is a brand's initial country of development, irrespective of where a product obtains parts, is designed, or is manufactured (Thakor, 1996). It is also known as country-of-corporate-ownership (Thakor & Lavack, 2003), country-of-brand-origin, and country-of-brand-ownership (Ulgado, 2002; Chen, 2004). Researchers found brand origin influences consumers' brand perceptions (Harris, Garner-Earl, Sprick, & Carroll, 1994; Leclerc, Schmitt, & Dube, 1994; Samiee, 1994; Chao, 2001; Thakor & Lavack, 2003). It is also more influential than country-of-manufacture (Ulgado, 2002; Chen, 2004) and country-of-parts or country-of-assembly (Thakor & Lavack, 2003).

Since many studies results indicate brand origin was more influential than other country-of-origin concepts, brand origin was used to classify automobiles as German. Consequently, the location of manufacturing, location of parts suppliers, and current brand ownership were not considered. For this study, the German automobile brands are Audi, BMW, Mercedes, Porsche, and Volkswagen.

### **German Country-of-Origin Reputation**

In general, producers from Germany enjoy an excellent country-of-origin image. Many studies document the quality reputation and customer preference of German products (Darling & Kraft, 1977; Cattin, Jolibert, & Lohnes, 1982; Leonidou, Hadilmarcou, Kaleka, & Stamenova, 1999). Hanzaee (2008) found Iranian consumers perceived German product technology as advanced. Sohail (2005) found German product quality highly rated among Malaysian consumers.

For vehicles in particular, Germany has an excellent country-of-origin reputation. In the study of Iranian consumers, Hanzaee (2008) found German automobiles were their first preference. Lawrence, Marr, and Prendergast (1992) researched New Zealander consumers and found they perceived German cars to be high on performance, engineering, and service. New Zealanders preferred country of origin for automobiles was Germany. In another study, German automobile components ranked higher in quality than Japanese automobile components (Karunaratna, Quester, & Johnson, 2004). In addition to finding German product quality was rated highly by Malaysian consumers, Sohail (2005) also found German automobiles had the highest rating among German products.

The excellent country-of-origin image for German vehicles has benefited German automobile manufacturers in their pricing. Thanasuta, Patoomsuwan, Chaimahawong, and Chiaravutthi (2009) studied price premiums Thai consumers were willing to pay for automobiles from different countries, and German automobiles ranked first. Roth and Romeo (1992) studied American, Irish, and Mexican students and found they would pay more for German automobiles. In a study of the German automobile market, Fetscherin and Toncar (2009) found a significant positive correlation between engine quality and price.

Given the literature evidence, German products have an excellent country-of-origin reputation. German

automobiles, in particular, have an outstanding reputation for performance and quality. With knowledge of the German automobile reputation, the next step was the data and methodology for examining the performance and quality of German vehicles.

### Data Source Considerations

For the data on vehicle performance and quality, the study used the publication Consumer Reports. The Consumer Union annually surveys automobile owners about their experiences with their vehicles and publishes this information in Consumer Reports. In 2012, for example, the Consumer Union received about 1,300,000 automobile evaluations. Consumer Reports does not accept advertising funding from companies; consequently, there is no perception of bias in the ratings. Because of the size of the survey and unbiased nature of the publication, Consumer Reports has proved to be a popular source of information for marketers researching many products (Riesz, 1978, 1979; Gerstner, 1985; Bodell, Kerton, & Schuster, 1986; Steenkamp, 1998; Montgomery & Wernerfelt, 1992; Faulds, Grunewald, & Johnson, 1995). Automobile industry researchers have also used Consumer Reports (Uri, 1986; Friedman, 1987; Arguea, Hsiao, & Taylor, 1994; Gupta & Lord, 1995; Yerger, 1996; Nichols, 1998; Sullivan, 1998; Apelbaum, Gerstner, & Naik, 2003).

**Table 1: Consumer Reports Vehicle Road-Test Scores (RTS)**

year	Non-German PR	Number of Non-German	German PR	Number of German	p-value signifinance
1994	3.57	112	3.25	4	0.562
1995	3.84	108	4.38	8	0.131
1996	3.69	131	4.29	7	0.132
1997	3.71	108	4.44	9	0.026
1998	3.70	109	4.71	7	0.006
1999	3.77	107	4.75	12	<.001
2000	3.88	115	4.79	14	<.001
2001	3.87	136	4.71	21	<.001
2002	3.85	134	4.79	19	<.001
2003	3.74	133	4.52	21	<.001
2004	3.91	160	4.75	28	<.001
2005	3.57	164	4.44	25	<.001
2006	3.57	191	4.42	19	<.001
2007	65.16	199	79.58	33	0.002
2008	66.08	222	80.09	34	<.001
2009	66.65	250	78.10	40	<.001
2010	69.25	241	77.35	46	<.001
2011	71.06	232	77.27	41	0.004
2012	72.31	230	78.40	43	<.001

**Table 2: Consumer Reports Vehicle Predicted-Reliability Scores (PR)**

year	Non-German PR	Number of Non-German	German PR	Number of German	p-value signifinance
1994	3.24	132	3.75	4	0.429
1995	3.26	96	4.00	5	<.001
1996	2.51	146	2.57	7	0.852
1997	2.55	135	2.40	10	0.628
1998	2.36	130	2.56	9	0.549
1999	3.13	117	3.10	10	0.927
2000	3.07	117	3.31	13	0.385
2001	3.03	138	2.74	23	0.203
2002	3.02	152	2.56	25	0.114
2003	3.00	157	1.94	17	0.001
2004	3.08	159	1.86	21	<.001
2005	3.23	163	1.81	27	<.001
2006	3.16	177	1.95	20	<.001
2007	3.24	154	2.08	13	0.002
2008	3.32	168	2.14	21	<.001
2009	3.31	200	2.58	33	0.002
2010	3.33	208	2.81	36	0.017
2011	3.43	185	2.64	33	<.001
2012	3.34	190	2.59	32	<.001

Data for the study was gathered from Consumer Reports' issues from 1994 through 2012. For the data on German car performance, the study used the Consumer Reports' road-test results. The Consumer Reports' scale was 1 to 5 with 1 being the worst rating and 5 being the best. In 2007, they changed the five point scale to a 100 point scale with a 1 being the worst rating and 100 being the best. Consumer Reports does not accept cars from manufacturers to test, and it buys the automobiles from dealerships just as a consumer would. It does this to prevent any perception of bias in their road test evaluations. For a measure of reliability, the study used Consumer Reports' predicted reliability assessments which also used the 1 to 5 scale. The predictions are made on past reliability reported by the owners of the automobile brand in the Consumer Union survey.

### **German and World Automobile Road Test and Predicted Reliability Comparisons**

To test for significant differences between non-German and German automobiles, a two-tailed t-test was used. The tested non-German and German automobile populations were much greater than 30 and normally distributed (Pagano, 1990). The significant difference criterion was set at .05 for the p-value. Table 1 above compares non-German automobiles' road-test results to German vehicles road-test results. Table 2 above compares non-German vehicles' predicted reliability results to German automobile predicted reliability results.

### **Discussion**

Mindful of the German product and automobile positive country-of-origin reputation, the comparison of non-German automobile road test and predicted reliability to German automobiles resulted in an unanticipated paradox. Table 1 above reveals that for each year from 1997 through 2012 the German automobiles outperformed their non-German counterparts on the road-test results at a significant level. Given the engineering and performance country-of-origin automobile reputations and positions of the German companies, this result was expected. The paradox comes when the predicted reliability results are analyzed. For each year from 2003 through 2012, non-German automobiles had a significantly better predicted reliability than the German automobiles. Given the positive country-of-origin view of German automobiles, this lower predicted reliability was not expected. The German automobiles did have a better predicted reliability in 1995; however, they have not been able to repeat that performance. Consequently, the paradox is that German automobiles have better road-test performance but worse predicted reliability than non-German automobiles.

### **Management Implications**

The study results show German vehicle manufacturers produce products that demonstrate a paradox of higher performance and lower reliability than the competition. The high performance is a valued asset for German automobiles and part of the marketing strategy for many of the German automobile brands. However, the lower German vehicle quality is a severe flaw for German automobile manufacturers and a major risk for their future success. The question facing the German automobile manufacturer is: Does the performance/reliability incongruity matter to the consumers of German automobiles?

An explanation for the performance/reliability inconsistency to consumers of German automobiles could be in the specific target markets for each German automobile manufacturer. There are different implications for each manufacturer depending on the manufacturer's marketing strategy. The bigger mass-market consumers of automobiles may be more concerned with reliability than performance. As stated in the introduction, quality is the most important consideration for 86 percent of U.S. automobile buyers (Cole & Flynn, 2009). Volkswagen wants to become a major company in the U.S. automobile mass market and has stated that it wants to increase sales in the U.S. to 800,000 units by 2018 (Findlay, 2009). To accomplish this goal, Volkswagen must appeal to the mass market's desire for reliable automobiles. Consequently, it needs to focus on producing quality automobiles. Volkswagen is aware of their vehicles' quality problems and is working on improving quality (Dolan, Rauwald, & Schmidt, 2012).

Given the recent market share success of German premium/performance automobiles (Dolan, Rauwald, & Schmidt, 2012), perhaps the performance/reliability paradox does not matter for their target segments. Ramsey (2011) reported sales of premium brands that followed BMW and Mercedes in technology, such as Acura and Infiniti, had fallen. Buyers of German vehicles such as Mercedes, BMW, Audi, and Porsche may be primarily motivated by the performance of the vehicle. These consumers may tolerate a temperamental automobile with periodic reliability problems to get a vehicle that performs at a high level. If this market segment wants performance first, for example, a technological innovation that improves the vehicle's performance would be welcome. Often an

innovation may show some problems after it is introduced that can be worked out over time to provide reliability. However, it could be the consumers motivated by superior performance would rather have the innovation immediately in spite of the problems that it may produce. For these manufacturers, a continued emphasis on the performance of their vehicles over reliability may be the key to their success.

Given the importance of vehicle quality, the overriding implication for management of German vehicle companies must be to bolster the reliability of their products. In the face of worldwide pursuit of quality vehicle manufacturing, the German vehicle manufacturers must capture higher reliability ratings while maintaining their lead in vehicle performance to expunge the paradox.

### Study Limitations

One study limitation could be with the reliability predictions of Consumer Reports. Consumer Reports makes these recommendations based on the results of the automobile owner survey sent to subscribers of the magazine. Consumer Reports main focus is to evaluate and rate all types of products. This focus could lead to a heightened emphasis on automobile problem areas by the subscribers. The Consumer Reports' subscribers may have a more critical focus on product flaws than the general population.

Another limitation is the time of the study. It covered the years of 1994 through 2012. Although this period gives a current picture of reliability and performance, a longer period could give a deeper understanding of reliability and performance of German automobiles.

Although our study was concerned with the collective results of German automobile road-test performance and predicted reliability, it could be the individual German manufacturer's results could vary from the collective German automobile results. Consequently, a closer examination the road tests and predicted reliability of each of the German automobile brands could add a greater understanding of the German automobile market.

### Future Research

One area of future investigation could be to research the reliability and performance of German vehicles based on specific variables included in reliability measures and performance instead of the merged data and interpretation based on the Consumer Reports editor perspective. Some variables might be considered more important than others based on the reader's viewpoint.

Another research possibility could be the use of another vehicle measurement from other organizations besides Consumer Reports. There are a number of organizations who show great interest in assessing vehicles in a variety of modes for their target markets. This data might offer further insights into the differences between German manufacturers products and the rest of the world's.

Another investigation would be to compare the individual German automobile manufacturer's reliability and performance compared to the world's auto makers. This isolation could reveal how firms may differentiate resource use and goals based on their individual target markets.

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