

# Have German Innovations Changed the World?

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*The world wouldn't be the same without specific innovations throughout the history of mankind. When thinking of the most valuable innovations until now everybody would instinctively say the car. This and many more helpful inventions were invented by German scientists. The purpose of this paper is to find out what these creations are and why there is such a huge number of them originally coming from Germany. Furthermore another aim of this paper is to get insight into the future obstacles that may occur for Germany regarding innovation. The survey includes 152 respondents attending the American College of Management and Technology in Dubrovnik, Croatia. The study found out that German products are among the best on the market because they are leading in quality. The respondents perceived that Germany plays such an important role in the history of innovation, based on the fact that Germany has a good economic infrastructure as well as a very well-developed educational system with a huge number of prominent research institutes. The final part of the paper provides some guidelines that might help Germany to maintain and strengthen its role in innovation in order to remain competitive in a global sense.*

## Introduction

According to Sylver (2006) the word innovation is very often used today. It's used by a wide range of people from different sectors of the economy and society. Every representative of a particular sector uses it differently. People associate it with something new and something good so every new product today is connected with the word innovation. It's almost impossible to introduce a new idea or product without emphasizing that it is innovative or connected to innovation in some way. The basic meaning of the word is just creating something that hasn't been there earlier.

The initiative "Partner für Innovation" (2012) mentions that another aspect of innovation a lot of forces have to be combined in order to implement a successful innovation. It takes luck, diligence, courage and a lot of other aspects in order to develop an innovation. According to Roper (2002) innovation is strongly linked to

exports and the economical wealth of a country. In other words, innovation is a crucial component for an economy to become successful.

According to the German Center for Research and Innovation (2012) the success story of innovations made in Germany started with the invention of the printing press by Johannes Gutenberg in 1440. Moreover, Nelson (1998) states that the printing press was an innovation that changed the world and it brought a lot of positive things with it. From then on people were able to print information and spread it quickly. This was not the case before, when people didn't get a lot of information and they were not able to read. At the same time this invention started another revolution. Martin Luther used the printing press to spread his idea. It helped Luther to push the Protestant Reformation and standardize the German language. People started to educate themselves and through the invention of the printing press books became cheaper and people could afford them more easily.

Throughout the history German ideas influenced today's world and different aspects of our society. Germany experienced a boom in innovation in the 19<sup>th</sup> century and in the beginning of the 20<sup>th</sup> century. It is important to note that Germany was the center of Europe regarding innovation. Many scientists introduced their innovations and became famous. After the Second World War Germany experienced a negative phase in the field of innovation. A lot of scientists left Germany because they were persecuted or they didn't want to support the Nazi regime. After that time it became stable again until the end of the Cold War, when both German states reunited. Germany had to connect two different approaches to innovation. Today Germany invests a lot of its budget in research and education. Through that, they try to improve their innovation approach and become the leader among its competition. According to OECD Science, Technology and Industry Outlook (2012) Germany has the EU's largest innovation system. It has traditionally been one of the OECD's top performers in

science, technology and innovation. Germany invests a big percentage of its GDP in research and development of future trends of innovation.

As "Deutsche Presse-Agentur" (2012) mentions the success story of the car started 125 years ago when Carl Benz registered his patent on January 29, 1886 in Berlin, Germany. This innovation changed western society significantly. The car is an indicator of personal wealth and it gives a sense of freedom to people's lives. People were able to move from one point to another more quickly. The economy experienced a big boom through this innovation. It was easier to transport things from one place to another place. Heavy transportation became easier and people started to explore more and were able to be mobile and fast.

In addition, Rankl & Effing (1997) highlight that the invention of the smart card was a huge advantage for the finance and banking sector. It helped to store data on a small chip card. Everything began in 1968 when German electrical engineers Helmuth Gröttrup and Jürgen Dethloff introduced the first chip card. Today every big financial institution uses this innovation. Chip cards are used everywhere today, in phones on bank cards and in a lot of other segments of our lives. The option to store personal data on such a small device revolutionized the world and especially the financial world.

According to Rojas (1997) the predecessor of today's computer is the Z1 invented by Konrad Zuse from 1939 - 1938. The initial usage of the Z1 was to calculate mathematical problems. Later on other scientists continued to improve the Z1 and today there are computers in every household. It's hard to imagine a life without computers today. They regulate our daily procedures at work or at school and even at home.

According to Breitschopf (2004) Germany is ranked after Japan and the United States regarding the research and development sector in their economies. Japan and the USA are taking over, Germany and other members of the European Union are taking the chance and are increasing their investment in research and development. They try to keep up with the competition from Eastern Asia. Japan is investing a lot in technology. However Germany recognized this trend and started to invest more in research and development in order to be up to date and not get run over by the competition. According to Wall Street Journal (2010) Germany ranks eighth out of 139 countries for innovation in the World Economic Forum's (WEF) "Global Competitiveness Report 2010-2011." According to the WEF, Germany is the international leader in terms of capacity for innovation, occupies fourth place for company spending on research and development, and secures sixth spot for quality of scientific research institutions.

According to the Economy Watch Content (2010) China and Japan always had a problem

with creativity. However in order to become more competitive on the global market their main focus is on education. Through education they try to overcome the deficiency of creativity. This is where Germany has a competitive advantage. Creativity was always a trait of German scientists. Solving everyday problems with their innovations became their obligation. China recognized this fact and is trying to close the gap in creativity.

Ward *et al.* (1995) highlight that Japan's economic growth can be traced back to its role after the Second World War. While the United States spent a huge amount of money on military action, Japan experienced a boom for its economy. While Germany was still destroyed after the Second World War, Japan and the United States didn't have to rebuild that much, unlike Germany which had to rebuild the whole infrastructure. Willis (2010) stated that Germany was the country with the highest amount of exported goods in the past. However China is the new leader in innovation and when it comes to exporting goods. This fact is connected to the technological boom coming from the Far East. Germany's economy is more based on manufacturing cars than on producing technological items. On the other side, China has a different focus for which there is a higher demand these days. According to Economy Watch Content (2010) Germany is one of the most successful countries in the EU when talking about economic wealth. The specific characteristics like a strong and productive work force helped them to increase economic wealth. Besides that Germans are known to be diligent and hard working. These traits helped to build a successful economic infrastructure. Managing their resources and working enthusiasm helped Germany to become an economic power throughout the years of the last century.

### Methods

A self-administered mail survey was constructed for collecting data in this research (Bourque & Fielder, 2003). Prior to posting the survey, the questionnaire was tested on a small sample of fellow students and distributed by email and facebook. The survey was anonymous in order to provide sincere and honest answers to the questions. A total of 152 respondents took part in this survey. The participants were alumni, juniors and seniors attending the American College of Management and Technology in Dubrovnik, Croatia. All the participants were asked to answer five multiple choice questions where they could pick one or more answer. The questionnaire was constructed to lead the respondents into thinking about their opinion why German products are among the best on the market, which of these inventions is the most valuable in the history of mankind and why Germany is playing such an important role in the history of innovation. The respondents were also asked to give their opinion about the fact why Germany seems to be losing its leading position in innovation at the beginning of the new century, as well as what should Germany do in

order to keep up with the competition (i.e. South Korea, Japan, China) regarding innovation.

### Results

Table 1 shows the general attitude of the respondents toward the quality of German products. A total of 66% of the participants stated that German products are among the best on the market because they are leading in quality whereas 27% stated that they have a long tradition in certain markets.

Table 1 Attitudes Towards German Products.

What do you think, why are German products among the best on the market?	Total (%)
Because they are focusing on quality	66
Because they have a long tradition in certain markets	27
Because most of the products were actually invented by German scientists	4
The competition is not able to produce similar patents	3

Table 2 shows the most valuable innovations in the history of mankind. A total of 25% participants stated that this is the invention of the car by Carl Benz whereas 19% stated that it is the computer invented by Konrad Zuse and the same number of participants stated that it is internet invented by the US Department of Defense.

Table 2 Perceptions of the Most Valuable Innovations in the History of Mankind.

Most valuable innovations	Total (%)
The printing press invented by Johannes Gutenberg	21
The computer invented by Konrad Zuse (invented the Z1, predecessor of the today's computer)	19
Car invented by Carl Benz	25
The x rays invented by Wilhelm Conrad Röntgen	16
Internet invented by the US Department of Defense	19

Table 3 shows students' perceptions on Germany's role in the history of innovation and points out the reasons why Germany plays such

an important role in the history of innovation. A total of 33% of the participants indicated that Germany has a strong economic infrastructure whereas 31% stated that Germany has a very well-developed educational system with over 300 prominent research institutes.

**Table 3 Perceptions of Germany's Role in the History of Innovation.**

<b>What do you think is the reason for Germany playing such an important role in the history of innovation?</b>	<b>Total (%)</b>
<i>The will of the people not to accept injustice, which resulted in lot of revolutions (e.g. Reformation of the church by Martin Luther)</i>	5
<i>The well-developed educational system (over 300 research institutes, e.g. Max-Planck Institute)</i>	31
<i>The central position in Europe (exchange of ideas was easier because of geographical advantages)</i>	17
<i>Creativity of the people and the ability to express their thoughts (Germany is known as the country of poets and thinkers)</i>	14
<i>Germany's strong economic infrastructure</i>	33

Table 4 shows the reasons why Germany lost its leadership role in the field of innovation. A total of 43% of the participants stated that globalization is the main cause why Germany is losing some of its power on the world market of innovation.

**Table 4 Perceptions of the Reasons Why Germany Lost Its Leading Position in Innovation.**

<b>What do you think, why did Germany lose its leading position in innovation?</b>	<b>Total (%)</b>
<i>Consequences of the Second World War (many scientists emigrated from Germany)</i>	16
<i>The Cold War and Germany's position during the Cold War (separation into Western Germany and DDR)</i>	10
<i>Boom and the technological evolution (Japan and South Korea focus their economy mainly on technology)</i>	31
<i>Globalization (moving industries to cheap labor countries)</i>	43

Table 5 indicates some of the possible solutions that could help Germany in order to keep up with the increasing competition coming mainly from South Korea, Japan, China in the field of innovation. A total of 41% of the participants stated that Germany should work together more with the European Union in order to maintain and improve their market positions and to stay globally competitive through creativity and innovation.

**Table 5 Perceptions of the Competition in the Field of Innovation.**

<b>In your opinion, what should Germany do in order to keep up with the competition (South Korea, Japan, China etc.) regarding innovation?</b>	<b>Total (%)</b>
<i>Move production lines to cheaper labor countries (save money and reinvest this money in even better research)</i>	20
<i>Try to attract skilled labor from overseas (e.g. computer engineers from India)</i>	21
<i>Try to involve the European Union into their research system (Germany alone is weak against the competition from overseas)</i>	41
<i>Continue like before (time will show that the German approach to innovation is the probably the best in the world)</i>	18

## Discussion

Nowadays innovation has taken a different path from the past. Earlier the whole innovation process took place in Europe, where Germany played a huge role, but today things have changed. The findings from the secondary research about the fact that today Germany isn't a leader in innovation any more were confirmed in the primary research. The interesting fact is that people still perceive Germans as innovators, which was also confirmed by the primary research. More than half of the respondents consider that German products are among the best in the world in terms of quality, while only a small percentage of respondents believe that the competition is not able to produce similar products. People still seem to perceive Germany as a country which produces high quality products and this might also be a reason why it is still perceived as innovator, although Japan, China and USA took its place.

In the research of what people perceive as the biggest invention of all times, the respondents' opinions were almost equally distributed among all innovations which were stated as possible answers. The participants perceived that the printing press by Johannes Gutenberg was the most valuable innovation, followed by invention of the car, internet and x rays. Once again, the thesis about German innovations in the past was confirmed. Most of the participants stated that Germany has played such a huge role in innovation because of its strong economic infrastructure and due to the well-developed educational system. All of that implies that something huge has changed, because Germany's economy today is in a good shape together with the education. On the question about why Germany lost its leading position, about half of the respondents stated that the reason lies in globalization and outsourcing to cheap labor countries, while a lot of the respondents think that it all happened because of the internet boom. Most of the respondents think that the solution to this issue lies in involvement of the European Union into German research systems, followed by attracting skilled labor from overseas. Germany also might move production lines to cheaper labor countries.

According to the findings from the secondary research Germany is ranked after Japan and USA in terms of the research and development sector in their economies, but if we compare these three countries, Germany should put much more effort into achieving competitive advantage position. Germany can follow the example from China which had issues with creativity, but it was resolved through huge investments in education. Finally, Germany is a very successful country with a huge potential that should be used properly and more efficiently if it wants to remain competitive in global terms.

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