

# The Descriptive Study of Gresik Cement's Product Quality (Survey on Gresik Cement's Users in Surabaya)

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## Abstract

Cement is a product that is needed in the construction of infrastructure and various kinds of buildings. The function of cement as an adhesive material in the building construction makes cement have a vital position for people. Therefore, cement producers must pay attention to the quality of cement produced to fulfill the cement supply in accordance with development needs, either quantity or quality. There are many cement producers and brands in the market, makes people have many choices of cement products that can be used. This study aims to examine the quality of Gresik cement on cement users in Rungkut District, Surabaya. The research method used is descriptive quantitative research. Data was collected by spreading questionnaire to 79 cement users who are construction workers in Rungkut District, Surabaya. These data is then processed by applying descriptive statistics supported by SPSS for Windows version 20.0 program. The results reveals that the quality of Gresik cement was categorized as good. The highest quality perceived by respondents is reliability, followed by conformance to specifications and product performance. Meanwhile, aspects that are perceived as lower by users are durability, aesthetics, and additional features.

## Keywords

Building Materials, Cement, Descriptive Studies, Portland Cement, Product Quality.

## 1. Introduction

Cement is a substance that can set and harden freely, and can bind other materials. Volcanic ash and crushed brick are added to the burnt limestone as a bonding agent to obtain a hydraulic binder hereinafter referred to as —cementum (Fatimah 2012). The main raw materials for producing cement are materials containing lime minerals (CaO), silica (SiO<sub>2</sub>), alumina (Al<sub>2</sub>O<sub>3</sub>), and iron oxide (Fe<sub>2</sub>O<sub>3</sub>) that obtained from various types of rocks and minerals containing these four oxide compounds. Such as limestone, clay, silica sand, and iron sand. The source of lime in cement is obtained from limestone, chalk, and marl. Clay and shale are sources of silica and alumina, while iron oxide is obtained from iron sand mining. (Syarif Hidayat and Ade Saeful M. 2009).

Product quality according to Kotler & Armstrong is the ability of a product to perform its functions, including overall durability, reliability, accuracy, ease of operation and product repair, as well as other product attributes. (Dr. M. Anang Firmansyah 2019). Consumers have different levels of product knowledge. This product knowledge is used by consumers to interpret new information and make purchasing decisions. (Peter 2013). The quality of each type of product has different aspects that are considered by consumers. (Dr. M. Anang Firmansyah 2019) quoting Tjiptono's opinion regarding aspects or dimensions of product quality, namely:

- 1) Performance, is the main operational characteristic of the purchased core product, for example, if it is related to cement, it is related to the properties and quality characteristics of cement, such as drying duration, compressive strength, etc.
- 2) Features, are secondary or complementary characteristics, such as fineness of cement powder, cement color, etc.
- 3) Reliability, is the testability of the product, for example a small probability of failure to use.
- 4) Conformance to specification, is the extent to which product characteristics meet predetermined standards.
- 5) Durability, which is related to how long the product can continue to be used, including including technical and economic life.
- 6) Aesthetics, is the attraction of products to the five senses including attractive physical, artistic models, colors, and so on.

The quality of cement products is determined by the raw materials, the combination of raw materials and the cement production process. As stated above that the main raw materials for cement include materials containing lime minerals (CaO), silica (SiO<sub>2</sub>), alumina (Al<sub>2</sub>O<sub>3</sub>), and iron oxide (Fe<sub>2</sub>O<sub>3</sub>) that obtained from various types of rocks and minerals containing these four oxide compounds. (Syarif Hidayat and Ade Saeful M. 2009). Meanwhile, the cement production process can be carried out dry or wet, where although the procedure is essentially the same, each manufacturer has a different set of equipment patterns. Therefore, the quality of cement circulating in the community is also different.

Attention to the quality of this cement product needs to be considered by producers, because it will have an impact on the results of the building or construction being built, which in turn will have an impact on user satisfaction. (Halin 2018). Technically and scientifically, the physical properties of cement are as a binder and hardening, compressive strength and heat of hydration. In addition, the properties of cement can also be seen through the determination of the dielectric constant, conductivity, resistivity of cement and others.

Cement as a material needed by almost all infrastructure development projects is an opportunity for new manufacturers to produce cement. This positive estimate will increase the demand for cement products in Indonesia. An Hui Conch is one of the new players who has started to enter the cement market in Indonesia, starting from North Sumatra, Java, Sulawesi, Kalimantan, Bali and Nusa Tenggara, as well as Maluku and Papua. Apart from Anhui Conch, some of the new players include Siam Cement, Jui Shin, and others.

The number of cement producers and brands of cement distributed in the community, makes people have many choices in choosing the cement product used. This study intends to examine the quality of Gresik cement on cement users in Surabaya. Semen Gresik is a cement produced by PT Semen Indonesia Group, and is the market leader of the cement industry in Indonesia. In 2017, Gresik's cement production capacity was 35.5 million tons.

Determination of product quality in this study uses product quality measures as used in research of Halin (2018) Bakhtiar (2017) because this research was conducted by asking the opinion of cement users. Kotler as quoted by Muhajir and Hasan (2018) that product quality is the overall characteristics of a product or service in its ability to satisfy stated/implicit needs. Meanwhile, the quality measures used in this study include performance (main function of the product), durability (product durability), conformance (product suitability), feature (product characteristics), reliability (product reliability), and aesthetic (product packaging and appearance).

## **2. Methodology**

This study applies a quantitative approach with a descriptive research design. The selection of this descriptive research design is based on the research objective, which is to describe the quality of cement products based on consumer opinions, namely users of Semen Gresik products. The Semen Gresik users that will be observed in this study are Semen Gresik users in Rungkut District, Surabaya. The users in question are builders who are directly related to cement mixing, so that these users really understand the questions posed in the questionnaire. Data from the Central Statistics Agency (BPS) notes that the number of construction workers in Indonesia in 2020 has reached 8.3 million workers. However, there are no exact figures regarding the number of construction workers in Surabaya. Regarding the number, because the number of Gresik cement users is not known for certain, the number of respondents selected as samples is determined based on the calculation of the minimum formulation. (Husein Umar 2019). Based on the calculation with the minimum formulation, the minimum sample size for this study was 68 respondents. Therefore, with a research sample of 79 respondents, they have met the minimum sample that has been determined.

This study did not examine the relationship between several variables, but only described one problem, so descriptive statistical analysis was used using the SPSS for Windows version 20.0 program. Descriptive statistical methods can be used to generate data descriptions in the form of frequency tables and cross tabulations (crosstab). By using the frequency table, it can be obtained an overview of the respondents' assessment of each item stated in the questionnaire. Meanwhile, by using cross tabulation, it can be seen a description of the respondents' assessment of each item stated in the questionnaire based on the characteristics of the respondents. In addition, by using cross tabulation, it can be continued by analyzing whether there is a dependence between the characteristics of the respondents on the respondents' assessment of each item stated in the questionnaire.

## **3. Result and Discussion**

### **3.1. Result**

Based on the results of a questionnaire submitted to construction workers via google form, obtained 79 builders who have used Semen Gresik as a material for building construction. The following is a profile of respondents based on age group and length of work.

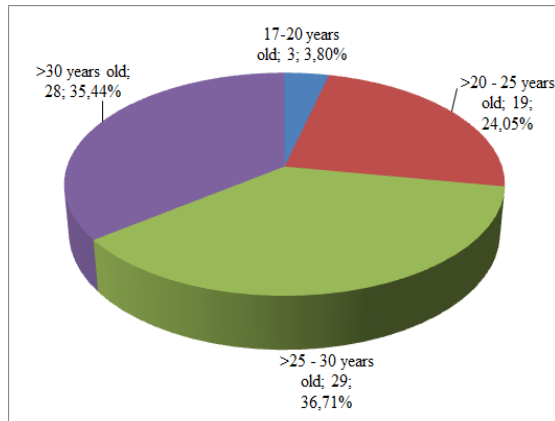


Figure 1. Respondents' Age Group (N= 79)

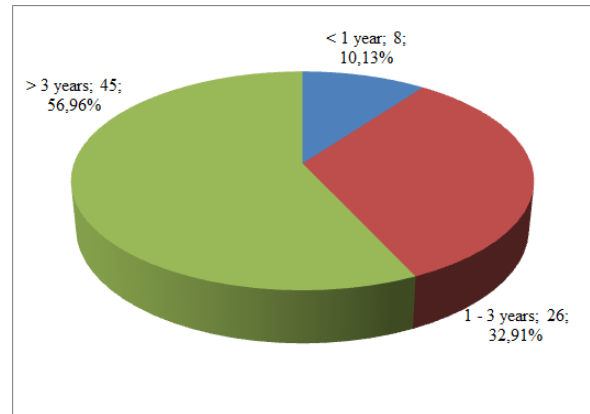


Figure 2. Respondents' Work Experience Group (N=79)

Figure 1 shows the profile of respondents by age group. The graph explains that the majority of construction workers who are respondents in the study are aged >25 – 30 years, which is 36.71% (29 people). Moreover, as many as 35.44% (28 people) aged > 30 years. In addition, as many as 24.05% (19 people) aged

>20-25 years, and only 3.80% (3 people) aged 17-20 years. Meanwhile, Graph 2 explains that the majority of construction workers who are respondents in this study have work experience as construction workers > 3 years, which is 56.96% (45 people). Furthermore, 32.91% (26 people) have worked as builders for 1 – 3 years. Meanwhile, there are only 10.13% (8 people) who work <1 year. Based on the description of the age group and the length of work of the respondents, it can be explained that the majority of research respondents are aged

>25-30 years and have worked as a construction worker for >3 years.

Furthermore, the research instrument testing was carried out through validity and reliability tests which were carried out to determine whether the research instrument was truly able to represent the research variables and was also reliable.

Table 1. Intrument Validity and Reliability Tests

| Items | 1st Validity Test |         |            | 2nd Validity Test |         |            | Cronbach's a |
|-------|-------------------|---------|------------|-------------------|---------|------------|--------------|
|       | r                 | p value | Conclusion | r                 | p value | Conclusion |              |
| X1    | 0,192             | 0,090   | Not Valid  |                   |         |            | 0,825        |
| X2    | 0,562             | 0,000   | Valid      | 0,561             | 0,000   | Valid      |              |
| X3    | 0,380             | 0,001   | Valid      | 0,360             | 0,001   | Valid      |              |
| X4    | 0,719             | 0,000   | Valid      | 0,716             | 0,000   | Valid      |              |
| X5    | 0,398             | 0,000   | Valid      | 0,400             | 0,000   | Valid      |              |
| X6    | 0,613             | 0,000   | Valid      | 0,635             | 0,000   | Valid      |              |
| X7    | 0,297             | 0,008   | Valid      | 0,273             | 0,015   | Valid      |              |
| X8    | 0,634             | 0,000   | Valid      | 0,639             | 0,000   | Valid      |              |
| X9    | 0,606             | 0,000   | Valid      | 0,613             | 0,000   | Valid      |              |
| X10   | 0,608             | 0,000   | Valid      | 0,601             | 0,000   | Valid      |              |
| X11   | 0,639             | 0,000   | Valid      | 0,659             | 0,000   | Valid      |              |
| X12   | 0,583             | 0,000   | Valid      | 0,591             | 0,000   | Valid      |              |
| X13   | 0,642             | 0,000   | Valid      | 0,643             | 0,000   | Valid      |              |
| X14   | 0,398             | 0,000   | Valid      | 0,383             | 0,000   | Valid      |              |
| X15   | 0,555             | 0,000   | Valid      | 0,555             | 0,000   | Valid      |              |

Note:

r = Pearson product moment correlation, which explains the correlation between the statement item scores and the total score

The research instrument testing was carried out in two stages, because in the first stage an invalid statement was found, namely a statement that had a Pearson product moment correlation value between item scores and a total score of 0.192 which was significant at 0.090. This significance value is greater than the set cut off value, which is 0.05. The invalid item is X1 which reads "Semen Gresik has good adhesion ability", so the X1 statement must be eliminated or cannot be used in the analysis. In the second stage of testing, without involving X1 items, it is known that the 14 items tested have a significant Pearson product moment correlation value at <0.05. Thus, it can be explained that all items measuring the quality of cement products are valid.

The reliability test was carried out on the fourteen items that were already valid. The results of the reliability test show that the resulting Cronbach's alpha value is 0.825. The amount of Cronbach's alpha is greater than the set cut off value, which is 0.6. Thus it can be explained that the research instrument is reliable.

After it was known that the instrument was valid and reliable, a quantitative descriptive analysis was carried out to answer the research objective, namely to provide an overview of the quality of cement products by applying a descriptive study. Therefore, in this section, descriptive statistics are presented for each component aspect in product quality, namely product performance, additional features, reliability, conformance to specifications, durability of cement products, and aesthetics. The descriptive statistics used are intended to present an overview of the quality of cement products including frequency distribution, mean (average), and histogram. If viewed from each aspect or component of the quality of cement products, it can be explained that:

1. Product Performance

The average score of the product performance aspect is 4.13 which can be said that the performance of the Semen Gresik product is considered good by the construction workers. The performance of cement products in this study consisted of three statements, namely X2, X3, and X4.

X2 : Semen Gresik dries faster when used in dough for building.

This item gets an average score of 3.94 which can be explained that the average respondent agrees that Semen Gresik dries faster when used in building dough.

X3 : Semen Gresik has a strong compressive strength.

This item gets an average score of 4.41 which can be explained that the average respondent agrees that Semen Gresik has a strong compressive power.

X4 : Buildings that use Semen Gresik are not easily cracked.

This item gets an average score of 4.04 which can be explained that the average respondent agrees that buildings using Semen Gresik are not easy to crack.

2. Product Features

The average score of the additional features or features of Semen Gresik is 3.98 which can be said that the additional features of Semen Gresik are considered good by construction workers. Additional features in this study consist of three statements, namely X5, X6, and X7.

X5 : Semen Gresik powder has an even fineness.

This item gets an average score of 4.19 which can be explained that the average respondent agrees that Semen Gresik powder has an even fineness.

X6 : Semen Gresik bag packaging is not easily torn.

This item gets an average score of 3.59 which can be explained that there are respondents who doubt that the Semen Gresik bag packaging is not easy to tear.

X7 : Semen Gresik bag packaging is not easily permeable to water.

This item gets an average score of 4.16 which can be explained that the average respondent agrees that the Semen Gresik bag packaging is not easily permeable to water.

3. Product Reliability

Product reliability in this study consists of one statement, namely X8 which reads "Buildings using Semen Gresik can be relied on for durability". This item gets an average score of 4.24 which can be explained that respondents agree that buildings using Semen Gresik can be relied on for durability. Thus, in terms of reliability, it can be explained that Semen Gresik has a good level of reliability.

4. Conformance to Specifications

The suitability of the product with the specifications in this study consists of one statement, namely X9 which reads "The quality of Semen Gresik is the same as described in the packaging bag". This item gets an average score of 4.16 which can be explained that the respondents agree that the quality of Semen Gresik is the same as that described in the packaging bag. Thus, in terms of conformity to specifications, it can be explained that Semen Gresik has a good level of conformity.

5. Durability

The average score of Semen Gresik durability is 3.94 which can be said that the Semen Gresik durability is considered good by construction workers. The product durability in this study consisted of three statements, namely X10, X11, and X12.

X10 : Semen Gresik is not easy to clot.

This item gets an average score of 3.91 which can be explained that respondents agree that Semen Gresik is not easy to clot.

X11 : Semen Gresik can be stored for a long time.

This item gets an average score of 3.73 which can be explained that the respondents agree that Semen Gresik can be stored for a long time.

X12 : Buildings that use Semen Gresik are not easily damaged.

This item got an average score of 4.18. It can be explained that respondents agree that buildings using Semen Gresik are not easily damaged.

## 6. Aesthetic

The average score of the aesthetic aspect of Gresik's cement products is 4.05 which can be said that the aesthetics of Gresik's cement products are considered good by construction workers. The product aesthetics in this study consist of three statements, namely X13, X14, and X15.

X13 : Buildings that use Semen Gresik have a smooth surface.

This item gets an average score of 4.05 which can be explained that the respondents agree that the building using Semen Gresik has a smooth surface.

X14: Semen Gresik can be used for dough that is used for designs with many curves.

This item gets an average score of 4.05 which can be explained that respondents agree that Semen Gresik can be used for dough that is used for designs with many curves.

X15: Semen Gresik bag packaging has an attractive appearance.

This item gets an average score of 4.04 which can be explained that the respondents agree that the Semen Gresik bag packaging has an attractive appearance.

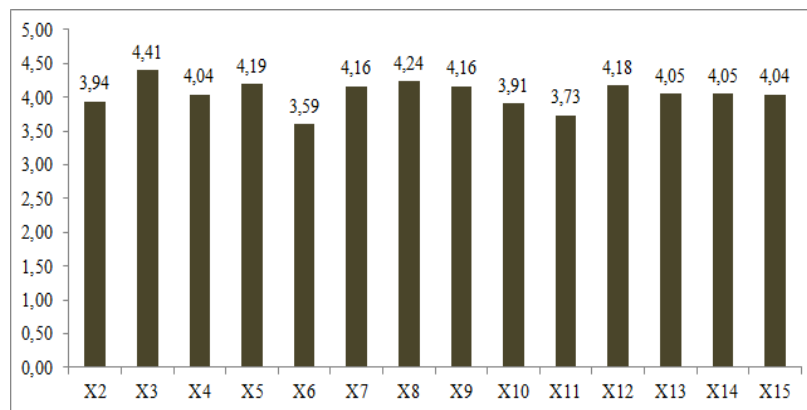


Figure 3. Product Quality Histogram (N= 79)

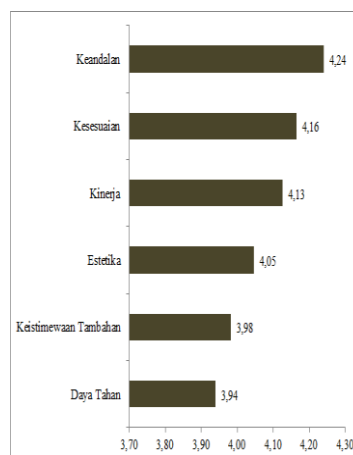


Figure 4. Product Quality Aspects (N= 79)

Figure 3. shows a histogram related to which items or statements are perceived by the respondents as the lowest and which ones are the highest. The statement that gets the highest average score is the statement X3 with an average score of 4.41. X3 represents the statement that 'Semen Gresik has a strong compressive power'. Furthermore, the second highest average score is item X8 of 4.24. X8 represents a statement that reads

'Buildings that use Semen Gresik can be relied on for their durability'. Meanwhile, the item or statement that gets the lowest average score is X6 with an average score of 3.59. X6 represents the statement that 'Semen Gresik bag packaging is not easy to tear'. Furthermore, the second highest average score is the X11 item at 3.73. X11 represents a statement that reads 'Semen Gresik can be stored for a long time'.

Figure 4. shows that among the aspects of Semen Gresik product quality observed in this study, the aspect that received the highest average rating score from the respondents was reliability, amounting to 4.24. This means that buildings using Semen Gresik have been recognized for their durability. Meanwhile, the lowest average score is endurance with a score of 3.94.



### 3.2. Discussion

The results showed that based on the results of the assessment of respondents who were builders who used Semen Gresik, they stated that the quality of Semen Gresik products was in a good category. The good quality of Semen Gresik can be seen from the quality of the building, reliable durability and compressive power of cement products. This is as explained by Elkatatny et al. (2020) that quality cement can be seen from the performance of cement, namely the compressive and tensile strength of cement, thickening time, density, drying, porosity, and permeability (absorption). This criterion is in accordance with the characteristics inherent in the quality of Semen Gresik, that Semen Gresik has the following advantages: higher initial compressive strength, faster drying, crack resistance, easier to use, smoother results, using selected raw materials, environmentally friendly products, national product, premium quality and famous. (Semen Gresik 2021)

Meanwhile, when viewed from the aspect of product quality, the very good quality aspect of cement products is the aspect of reliability, namely that the buildings produced by materials using Semen Gresik are very durable. This is because Semen Gresik can be used in special buildings as well as for general construction. Specific buildings intended for example precast concrete, prestressed concrete, concrete panels, concrete bricks/paving. While the general construction of which is for the use of concrete work, masonry, plastering, acian, gutters, and wall fences. The durability of the building using Semen Gresik is also supported by the use of selected raw materials, so as to strengthen the construction of the building.

Semen Gresik has also gone through the process of testing the ISO 14001 Management System and has been proven to be an environmentally friendly product (Semen Gresik 2021). In addition, the quality in terms of product conformity with the specifications and performance of cement products is also quite good. This can be seen from the description of the product specifications delivered in the packaging with the suitability for use. Based on the results of document searches regarding Semen Gresik products, it can be seen that product specifications are presented in packaging.

Thus, the results of this study which show that the quality of Semen Gresik is good based on respondents' perceptions, are also supported by the fact on the ground that Semen Gresik is a cement that has the advantages described above. However, there are factors that need to be considered by Semen Gresik producers related to durability, additional characteristics, and aesthetics, because there are statements in it that are rated low by cement users. This has an impact on the overall cement quality assessment. As explained by Kotler & Armstrong (Dr. M. Anang Firmansyah 2019) that product quality is the ability of a product to perform its functions, including overall durability, reliability, accuracy, ease of operation and product repair, as well as other product attributes. Where consumers have different levels of product knowledge. This product knowledge is used by consumers to interpret new information and make purchasing decisions (Peter 2013).

### 4. Conclusion

Based on the results of the study using the descriptive study above, it can be concluded that the quality of Semen Gresik products according to Semen Gresik users in Surabaya can be categorized as good. Where the most prominent aspect of quality support is reliability, then followed by conformance to specifications, and product performance. Meanwhile, aspects that are perceived as low by users are durability, aesthetics, and additional features. Whereas, the recommendation in this study are as follows:

1. For producer, they should pay attention to the quality of cement products, especially those related to reliability, product performance, and product conformity with specifications. Because this will have an impact on user confidence to continue using Semen Gresik products.
2. For manufacturers, they also need to pay attention to and improve aspects of durability, aesthetics, and additional features, especially in the use of cement bags that are not easy to tear and are waterproof. Thus, the packaging can maintain product quality such as not immediately clumping when stored for a certain period of time. This of course also depends on the production process and the use of raw materials for cement production.
3. For future researchers, this research can be used as a reference for further research by developing research methods or expanding the range of research objects, research subjects, and expanding the survey area of research locations in order to obtain wider results.

### References

- Bakhtiar, M. Ulfi. 2017. "Pengaruh Kualitas Produk Dan Kualitas Layanan Terhadaployalitas Pelanggan Semen Gresik Di Kecamatan Gampengrejo,Kabupaten Kediri." *Jurnal Revitalisasi Jurnal Ilmu Manajemen* 6(4).
- Dr. M. Anang Firmansyah, SE. 2019. "Pemasaran Produk Dan Merek (Planning & Strategy)." CV. Penerbit Qiara Media. Retrieved January 7, 2022 ([https://www.researchgate.net/profile/Muhammad-Firmansyah-4/publication/334964919\\_Buku\\_Pemasaran\\_Produk\\_dan\\_Merek/links/5d47e1a04585153e593cff86/Buku-Pemasaran-Produk-dan-Merek.pdf](https://www.researchgate.net/profile/Muhammad-Firmansyah-4/publication/334964919_Buku_Pemasaran_Produk_dan_Merek/links/5d47e1a04585153e593cff86/Buku-Pemasaran-Produk-dan-Merek.pdf)).

- Elkhatny, Salaheldin, Rahul Gajbhiye, Anas Ahmed, and Ahmed Abdulhamid Mahmoud. 2020. "Enhancing the Cement Quality Using Polypropylene Fiber." *Journal of Petroleum Exploration and Production Technology* 10(3):1097–1107. doi: 10.1007/S13202-019-00804-4/TABLES/5.
- Halin, Hamid. 2018. "Pengaruh Kualitas Produk Terhadap Kepuasan Pelanggan Semen Baturaja Di Palembang Pada Pt Semen Baturaja (Persero) Tbk." *Jurnal Ecoment Global : Kajian Bisnis Dan Manajemen* 3(2):79–94. doi: 10.35908/JEG.V3I2.477.
- Husein Umar. 2019. "Metode Penelitian Manajemen Perusahaan: Langkah Cepat Dan Tepat Dalam Menyusun Skripsi Dan Disertasi/Prof. Dr. Husein Umar, BSt, SE, MM, MBA | OPAC Perpustakaan Nasional Republik Indonesia." Jakarta: Gramedia Pustaka Utama. Retrieved January 7, 2022 (<https://opac.perpusnas.go.id/DetailOpac.aspx?id=1193015>).
- Muhajir, Muhajir, and Sabri Hasan. 2018. "Analisis Pengaruh Kinerja Saluran Distribusi, Orientasi Pasar, Dan Kualitas Produk Terhadap Kinerja Pemasaran (Studi Pada Wilayah Distribusi PT. Semen Tonasa Di Kota Makassar)." *PARADOKS : Jurnal Ilmu Ekonomi* 1(1):56–65.
- Peter, J. Paul, author. 2013. "Perilaku Konsumen Dan Strategi Pemasaran."
- Semen Gresik. 2021. "Produk Dan Keunggulan." Retrieved January 7, 2022 (<https://semengresik.sig.id/id/pages/produk-keunggulan>).
- Syarif Hidayat, and Ade Saeful M. 2009. "Semen : Jenis & Aplikasinya / Penulis, Syarif Hidayat ; Penyunting, Ade Saeful M. | OPAC Perpustakaan Nasional RI." Jakarta : Kawan Pustaka. Retrieved January 7, 2022 (<https://opac.perpusnas.go.id/DetailOpac.aspx?id=704893>).

### **Biography / Biographies (Optional)**

**Felly Febianto** was born on February 14, 1997 in Surabaya, Indonesia, and is the second of two children. The author studied at SDN Banyu Urip III Surabaya (203-2009), SMP Negeri 43 Surabaya (2009-2012), and SMK Negeri 5 Surabaya (2012-2016). The author has completed his education (S-1) by taking the Civil Engineering Study Program, Faculty of Engineering, Narotama University, Surabaya.

**Koespiadi** is an academic and practitioner who is mostly involved in education and construction. The author completed his education (S-1) at the Ten November Institute of Technology (1991), and his 2nd degree (S-2) at the university of 17 August 1945 Surabaya (2005). Currently serves as Dean of the Faculty of Engineering, Narotama University Surabaya, and actively teaches at Narotama University since 2002 until now with a concentration on Steel Construction, Concrete Construction, Concrete Structure.