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THE EVOLUTION OF QUALITY MANAGEMENT: A TRIBUTE TO 50 NOTABLE CONTRIBUTORS

William Manjud Maluf Filho

Fatec Mauá, Mechanical Manufacturing
Technology professor, Mauá – SP, Brazil
<https://lattes.cnpq.br/9888914170875821>

Eduardo Henrique Matos da Silva

Fatec Mauá, Mechanical Manufacturing
Technology student, Mauá – SP, Brazil

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Abstract: This article pays tribute to 50 influential leaders in the field of quality management whose contributions have shaped the way managers think about and practice quality today. From early pioneers like Vilfredo Pareto, Frederick Winslow Taylor, Walter Shewhart, W. Edwards Deming and Joseph Moses Juran, to contemporary thinkers like Hiroyuki Hirano, these individuals have made significant contributions to the development of quality theory, methods, and practices. While some are aptly referred to as quality gurus, others are not even known to have paved the way to the development of remarkable quality tools. Through their pioneering work, they have helped organizations around the world improve their products, services, and processes, while promoting a culture of continuous improvement and customer satisfaction. This article provides an overview of the lives, work, and profile of these notable contributors to quality management, highlighting their key achievements and contributions to the field.

Keywords: Quality management, quality tools, pioneers, contributors, continuous improvement.

INTRODUCTION

The field of quality management has come a long way since the early 20th century when pioneers like Walter Shewhart and W. Edwards Deming first introduced the concept of statistical quality control. Today, organizations around the world strive to provide high-quality products and services, and to continuously improve their processes to meet customer needs and expectations.

The history of quality management is rich and diverse, and has been shaped by the contributions of many notable thinkers and practitioners. In this article, we pay tribute to 50 individuals who have made significant contributions to the development

and evolution of quality management. These notable contributors have helped shape the way we think about quality, and have introduced new methods, tools, and practices that have enabled organizations to improve their performance and achieve greater success.

Some of the figures we examine are well-known for their contributions to the field of quality management, such as Joseph Moses Juran and Philip Bayard Crosby, while others may be less familiar, but no less significant. Together, these individuals represent a diverse range of backgrounds and industries, and have made a lasting impact on the field of quality management.

The following sections provide detailed information on each of these contributors, including their background, education, and notable publications. The paper also includes an analysis of their impact on the field of quality management, including their influence on current practices and future developments.

METHOD AND APPROACH

To identify the 50 notable contributors to quality management, we conducted a thorough literature review of the most important and multinational scientific databases, as well as online trustable sources. Our search was focused on individuals who have made significant contributions to the field of quality management, either through their research, publications, or practical applications.

In addition to identifying key individuals, we also examined the most important quality tools and techniques used in the field of quality management, and investigated the technical basis upon which each tool was built. By examining the origins and evolution of these tools, we were able to gain a deeper understanding of the key ideas and principles that underpin the field of quality management.

Our search was conducted using a combination of keywords related to quality

management, such as “statistical quality control,” “total quality management,” “quality gurus,” “quality tools,” and “quality techniques.” We also consulted academic journals, books, and other publications on quality management to ensure that our list was comprehensive and representative of the field.

Once we had compiled a list of potential contributors and quality tools, we evaluated each individual and tool based on their impact and influence on the field of quality management. We considered factors such as the originality and innovation of their ideas, the scope and significance of their contributions, and the enduring impact of their work.

Our final list of 50 notable contributors to quality management, along with the examination of the most important quality tools and techniques, represents a diverse range of industries, perspectives, and backgrounds. Each of these individuals and tools has made a lasting impact on the field, and has helped shape the way we think about quality and continuous improvement.

We hope that our approach to identifying these notable contributors and examining the key quality tools and techniques has been comprehensive and rigorous, and that our selection will provide readers with a useful overview of the individuals and ideas that have made significant contributions to the field of quality management.

QUALITY MANAGEMENT CONTRIBUTORS: THE 50 NOTABLES

In this section, we present the 50 notable contributors to quality management, arranged in chronological order based on their date of birth. It is important to note that our intention in arranging these individuals in this manner is not to suggest that their importance or

relevance to the field of quality management is based solely on their birthdate. Rather, our purpose is to provide readers with a historical context in which to understand the development of quality management over time, and to highlight the diverse range of individuals who have contributed to the field. It is also worth noting that the authors are presented in this chapter without any hierarchical order, as each of these individuals has made significant contributions to the field of quality management in their own unique way.

As the authors of this paper, we recognize the importance of accurately identifying the full names and correct personal data of each of the 50 notable contributors to quality management. To this end, we conducted extensive research in order to obtain the most complete and accurate information available about each individual, including their year of birth, country of origin, and early life information. Where necessary, we consulted a variety of sources, including academic publications, biographies, and online databases, to ensure that our information was as accurate and up-to-date as possible. By taking these measures, we hope to present a thorough and accurate overview of the lives and contributions of these individuals to the field of quality management.

SIR JOHN FREDERICK WILLIAM HERSCHEL (1792-1871)

He was a renowned British mathematician, astronomer, chemist, and experimental photographer. He made significant contributions to the fields of astronomy, mathematics, and photography. He introduced several new techniques for observing and measuring celestial objects, including the use of photometry to measure the brightness of stars. In addition to his astronomical work, Herschel also made important contributions

to the field of mathematics. He introduced the term “photography” in 1839, and he developed several photographic techniques, including the cyanotype process and the use of sodium thiosulfate as a fixative for photographic prints. Throughout his life, Herschel was highly regarded as both a scientist and a public intellectual. He was elected to the Royal Society in 1813, and he received numerous honors and awards for his work in astronomy, mathematics, and chemistry. In 1833, he employed a scatter plot in a scientific publication to demonstrate the correlation between the positional angle of binary stars and the year of observation (HERSCHEL, 1833). The scatter plot is considered one of the 7 basic quality tools for process improvement (TAGUE, 2005).

SIR FRANCIS GALTON (1822-1911)

He was a prominent British polymath who made significant contributions to a wide range of fields, including mathematics, statistics, biology, psychology, and anthropology. Galton was particularly interested in the study of human heredity and intelligence, and he is often considered one of the founders of the field of eugenics. He conducted extensive research on the inheritance of traits such as height, weight, and intelligence, and he proposed several controversial ideas for improving the genetic quality of the human population. In addition to his work on eugenics, Galton also made important contributions to the field of statistics (GALTON, 1889). He introduced several statistical concepts and techniques, including correlation, regression, and the standard deviation, which are still widely used today. Galton was also a prolific author, and he wrote several influential books on a wide range of topics, including meteorology, psychology, and travel. He was a member of the Royal Society, and he received numerous honors and awards throughout his career.

There is no consensus regarding the origin of the scatter plot. It is evident that the scatter plot, as we know it today, has evolved over time. Therefore, it is difficult to attribute its development to a single individual. However, ongoing discussions are taking place regarding this matter (VAN DIJK, 2022). Consequently, the attribution of the invention of the scatterplot to Galton is not entirely reasonable due to his primary focus on the display of smoothed regularity rather than raw data in his publications. Moreover, there are earlier contenders for this invention, with John F. W. Herschel being a noteworthy example (FRIENDLY; DENIS, 2005).

VILFREDO FEDERICO DAMASO PARETO (1848-1923)

He was an Italian economist, sociologist, and political scientist who lived from 1848 to 1923. He is best known for his work on the distribution of income and wealth, which led to the development of the “Pareto principle” or the “80/20 rule.” Pareto was born in Italy and received his education in engineering and mathematics. He became interested in economics and sociology in the late 19th century and began to apply mathematical methods to the study of social phenomena. Pareto’s most famous contribution to economics is his analysis of income and wealth distribution. He observed that in many societies, a small percentage of the population held a disproportionately large share of the wealth. He formulated the Pareto principle, which states that roughly 80% of effects come from 20% of causes, and applied it to a variety of fields, including economics, business, and management (PARETO, 1896). In addition to his work on economics, Pareto also made important contributions to the fields of sociology and political science. He was a member of the Italian Senate, and he wrote extensively on topics such as social classes,

elites, and political power. Pareto's ideas continue to influence economics, sociology, and other social sciences today, and he is considered one of the founders of modern social science.

HARRINGTON EMERSON (1853-1931)

He was an American efficiency engineer and management consultant who made significant contributions to the fields of productivity and industrial engineering. He is best known for his development of the Emerson Efficiency System, which was a management philosophy that emphasized the elimination of waste and the systematic measurement of performance in order to increase productivity. Emerson worked as an engineer and executive in a variety of industries, including railroads, mining, and manufacturing, before becoming a management consultant. He was an early advocate for the use of time and motion studies to improve productivity, and he developed a number of tools and techniques for measuring and improving industrial efficiency (EMERSON, 1889). In addition to his work as a consultant, Emerson was a prolific writer and speaker, and he wrote several books on the subjects of management and productivity. He was also a founding member of the American Society of Mechanical Engineers and served as its president from 1910 to 1911. Today, Emerson is recognized as a pioneer in the field of industrial engineering and his ideas continue to influence management practices in many industries.

WILFRED LEWIS (1854-1929)

He was an American mechanical engineer, inventor, and director for the machine tool firm William Sellers & Co, and later the president of the Tabor Manufacturing Company. He is renowned for his early work on the bending of gear teeth (LEWIS, 1882) and his later

contributions to scientific management (LEWIS, 1911). The analytical determination of the critical section was first proposed by Lewis, who postulated its location within the isosceles parabola tangential to the gear toe (RAPTIS; SAVAIDIS, 2018). Lewis was born in Philadelphia and graduated from the Massachusetts Institute of Technology in 1875. He began his career as a mechanic, draftsman, designer, and assistant engineer, working his way up to become one of the directors of the machine tool firm. He moved to the Tabor Manufacturing Company in Philadelphia in 1900 and introduced the Taylor system of shop management. Over the years, Lewis held over 50 patents and was a recipient of the ASME Medal from the American Society of Mechanical Engineers in 1927. Lewis was a boyhood friend of Frederick Winslow Taylor and became a promoter of scientific management in the first decades of the 20th (MERKLE, 2022).

JAMES OSCAR MCKINSEY (1889-1937)

He was an American accountant and management consultant. He was the founder of McKinsey & Company, one of the world's most prominent management consulting firms. McKinsey earned his undergraduate degree from the University of Chicago in 1913 and his MBA from Harvard Business School in 1914. After graduation, he worked for a Chicago accounting firm before joining the faculty of the University of Chicago. In 1926, he founded James O. McKinsey & Company, which later became known as McKinsey & Company. The firm initially focused on accounting and financial management consulting, but later expanded to cover a wide range of management consulting services. McKinsey himself was known for his pioneering work in the field of management accounting, and is credited with helping to develop many of the

foundational concepts and techniques used in modern management consulting (HODGE; MCKINSEY, 1920). He died at the age of 48, but his company continued to grow and became one of the world's most influential management consulting firms, serving clients in both the public and private sectors.

FREDERICK WINSLOW TAYLOR (1856-1915)

He was an American mechanical engineer and a management consultant, who is often referred to as the “father of scientific management.” He was born in Germantown, Pennsylvania, and he graduated from the Stevens Institute of Technology in Hoboken, New Jersey. Taylor is known for his work in industrial engineering, where he applied scientific methods to the study of work processes and the management of workers, with the aim of improving efficiency and productivity (TAYLOR, 1922). Taylor's approach to management was based on the concept of breaking down work processes into smaller, simpler tasks that could be standardized and controlled. He believed that workers should be trained and incentivized to perform their tasks as efficiently as possible, and that managers should use data and analysis to identify the most effective ways of doing things. Taylor's ideas were influential in the early years of the 20th century, as businesses sought to improve their performance and reduce costs (CANBAY; AKMAN, 2023). However, his methods were also criticized for their focus on efficiency at the expense of worker welfare, and for their tendency to treat workers as interchangeable parts of a machine (MAYO, 1934).

KARL PEARSON (1857-1936)

He was an English mathematician and statistician who played a significant role in the development of mathematical statistics.

He is known for his work on the theory of correlation and regression, and for his pioneering contributions to the fields of biometry and eugenics. Pearson developed several statistical tests and methods, including the chi-squared test for goodness of fit, the Pearson correlation coefficient, and the method of moments for estimating parameters in a statistical model (PEARSON, 1895). He was also a strong advocate for the application of statistical methods in the social and biological sciences (PEARSON, 1896). However, his involvement in eugenics and his promotion of racial and class-based hierarchies have been criticized (GOULD, 1996). The first application of the histogram is commonly attributed to Pearson's article published in 1900 (PEARSON, 1900). The histogram is considered as one of the 7 basic quality tools (LI et al., 2019).

CARL GEORG LANGE BARTH (1860-1939)

He was a Norwegian-American mathematician, mechanical and consulting engineer, and lecturer at Harvard University. He is known as one of the pioneers of scientific management, a movement aimed at increasing efficiency and productivity in the workplace through the use of systematic methods and procedures. Barth was also an expert in slide rule technology. Barth, Gantt and Taylor patented, improved and popularized the industrial use of compound slide rules. The slide rule enabled an enhancement of products quality since it helped improved productivity (BARTH; GANNT; TAYLOR, 1904). He authored several books and articles on mathematical and engineering subjects, and was an active member of various professional organizations (BARTH, 1903).

HENRY LAURENCE GANTT (1861-1919)

He was an American mechanical engineer and management consultant who is best known for developing the Gantt chart, a tool used for project management (WOO et al., 2021). He graduated from Johns Hopkins University in 1884 with a degree in mechanical engineering and later worked for the Midvale Steel Company where he met Frederick Winslow Taylor (GANTT, 1884). Gantt was a proponent of scientific management and worked alongside Taylor on various projects, including time and motion studies. Gantt later went on to develop his own approach to management, which emphasized cooperation and motivation rather than strict control. He believed that workers should be given a stake in the success of the project and advocated for profit sharing and bonuses as a means of incentivizing them. In addition to his work on project management, Gantt made significant contributions to fields such as industrial psychology, statistics, and accounting. He also served as a professor at Dartmouth College and wrote several books.

HENRY FORD (1863-1947)

He was an American industrialist, entrepreneur, and founder of the Ford Motor Company. He is best known for developing the assembly line technique of mass production, which revolutionized the automotive industry and greatly contributed to the mass production of affordable automobiles for the average American consumer (BRINKLEY, 2004). Ford was born in Michigan and showed an early interest in mechanics and engineering. In 1896, he built his first automobile, the Ford Quadricycle. In 1903, he founded the Ford Motor Company and introduced the Model T, which became one of the most successful cars in history (MARABLE, 2015). Ford's innovations in production techniques,

including the assembly line and standardized parts, helped him increase production and reduce costs, making cars more affordable to the masses (FINE, 2007). Ford was also known for his controversial views on labor relations, including his opposition to labor unions and his use of violence and intimidation against union organizers (ALEXANDER, 2004). He was also a noted anti-Semite and supporter of eugenics (BALDWIN, 2002). Despite these controversies, Ford's impact on the automotive industry and the modern world is widely recognized (MEYER, 1981).

MAX OTTO LORENZ (1876-1959)

Max Otto Lorenz was an American economist who developed the Lorenz curve, which is a graphical representation of income or wealth distribution (RAZA et al., 2023). The Lorenz curve plots the cumulative share of income or wealth held by the bottom x % of the population against the cumulative share of the population up to that point (LORENZ, 1905). Lorenz's work built on Pareto's ideas by providing a more precise way to measure income and wealth distribution. The Lorenz curve allowed economists to quantify the degree of income and wealth inequality in a given society, and it remains an important tool in the study of income distribution today (BAÍLLO et al., 2022). While Pareto and Lorenz worked independently of each other, their contributions to the field of income and wealth distribution are closely related and have had a lasting impact on economics and other social sciences (TROUTT; ACAR, 2005).

FRANK BUNKER GILBRETH (1868-1924)

He was an American engineer, management consultant, and author. He is known for his pioneering work in the field of time and motion study and is often referred to as the

“father of motion study.” Along with his wife Lillian Moller Gilbreth, he conducted extensive research on the science of management and efficiency, which influenced the development of modern industrial engineering and management theory (KENT, 1911).

LILLIAN MOLLER GILBRETH (1878-1972)

She was an American psychologist, engineer, and efficiency expert. She is considered one of the pioneers of industrial engineering and one of the first working female engineers with a Ph.D. in psychology. Gilbreth is best known for her work in time and motion studies, which sought to improve efficiency in the workplace by analyzing and streamlining work processes. She was also an advocate for the humanization of the workplace, promoting better working conditions and the recognition of workers' needs and concerns (KIRAN, 2017). She was married to Frank Bunker Gilbreth. The Gilbreths' presentation, delivered to members of the American Society of Mechanical Engineers (ASME) in 1921, introduced the flow process chart as the inaugural structured method for documenting process flow (GILBRETH; GILBRETH, 1921).

HERBERT ARTHUR STURGES (1882-1958)

He was a renowned German statistician who is credited with inventing Sturges' Rule for histograms (STURGES, 1926). This method provides a simple heuristic for determining the optimal number of bins to use in a histogram based on the size of the dataset being analyzed (SCOTT, 2009). Selecting the appropriate number of bins for a histogram is a critical aspect of the process, as there is no one-size-fits-all approach that can be universally applied. Too few bins can result in an over-smoothing of the data, potentially

obscuring important hints at the underlying distribution (SHIMAZAKI; SHINOMOTO, 2007). Conversely, too many bins can create a choppy, discontinuous appearance to the data. Sturges' rule was designed to address this issue by providing a method for selecting the ideal number of bins that minimizes the potential for these problems (FREEDMAN; DIACONIS, 1981). Sturges' contribution to the field of quality management extends beyond his invention of the rule. As one of the seven fundamental quality tools, the histogram is widely used to analyze data and identify potential areas for improvement (ISHIKAWA, 1985). By creating a rule that has become a standard method for selecting the appropriate number of bins, Sturges indirectly contributed to the improvement of quality and reliability fields.

CLARENCE IRWING LEWIS (1883-1964)

Commonly known as C. I. Lewis, he was an American academic philosopher who is widely regarded as the originator of contemporary modal logic and the founder of conceptual pragmatism (ROSENTHAL, 2007). Initially recognized for his contributions to logic, he subsequently expanded his research to include epistemology, and during the final two decades of his career, he authored numerous works on ethics (LEWIS, 1930). He is considered as a preeminent authority on symbolic logic and the philosophical concepts of knowledge and value. He is credited with coining the term “Qualia,” which is now used in philosophy, linguistics, and cognitive sciences (LEWIS, 1929).

GEORGE DEFOREST EDWARDS (1890-1974)

He was an American engineer and statistician who worked for many years at Western Electric Company, where he made

significant contributions to the development of statistical quality control methods. He was a colleague and collaborator of Walter A. Shewhart, who is often credited as the founder of modern quality control. Edwards was instrumental in the development of control charts, which are graphical representations of a process's performance over time that allow for the detection of unusual or unexpected variations. He also worked on other statistical techniques for quality control, including acceptance sampling plans and the use of sampling to estimate the proportion of defective products in a batch (ZHENG et al., 2023). In addition to his work at Western Electric, Edwards was a longtime member of the American Society for Quality Control (ASQC) and served as its 1st president in 1946. In 1997, ASQC changes its name to American Society for Quality (ASQ). Edwards was also a member of the American Statistical Association (ASA) and served as president of that organization in 1938. Edwards received numerous awards and honors for his contributions to the field of statistical quality control, including the Shewhart Medal from the ASQC in 1950 (ASQ, 2023).

WALTER ANDREW SHEWHART (1891-1967)

He was an American physicist, engineer, and statistician who is credited with developing, along with William Edwards Deming, the modern control chart and introducing the concept of statistical process control (SPC) in the field of industrial quality control (SHEWHART; DEMING, 1986). SPC is also called control chart or Shewhart chart (COLEMAN, 2020). SPC is one of the 7 basic quality tools (MAHMOOD et al., 2023). He worked at Western Electric Company's Hawthorne Works in Cicero, Illinois, and later at Bell Telephone Laboratories in New York. Shewhart's contributions to quality control and

statistical process control laid the foundation for the quality management principles and practices used today in many industries (BAYART, 2005). Another consequence of the collaborative efforts between Dr. W. Edwards Deming and our subject is the development of the Plan-Do-Check-Act (PDCA) methodology, also referred to as the Deming Cycle or the Shewhart Cycle (RAZA et al., 2021).

HAROLD FRENCH DODGE (1893- 1976)

He was an American industrial engineer and statistician who contributed significantly to the development of statistical quality control methods in the early 20th century. He worked at the Western Electric Company's Hawthorne Works and was a colleague of Walter A. Shewhart, who is credited with developing the first statistical process control chart. Dodge collaborated with Shewhart on the development of control charts and also helped to popularize the use of sampling inspection in manufacturing (MAHMOOD et al., 2021). He later worked at the U.S. Department of Agriculture and the National Bureau of Standards, where he continued to research and develop statistical quality control methods. Dodge is also known for his work on the design of experiments, particularly in the area of fractional factorial designs, which allow for more efficient use of resources in conducting experiments (SERGIS; OUELLET-PLAMONDON, 2022). He co-authored several books on statistical quality control. Dodge was a fellow of the American Statistical Association and a recipient of the Shewhart Medal, which is awarded for outstanding contributions to the field of quality control.

PRASANTA CHANDRA MAHALANOBIS (1893-1972)

He was an Indian scientist and statistician

who made significant contributions to the field of statistics in India. He is best known for his development of the Mahalanobis distance, a statistical measure used to compare a set of data to a reference set (HUO et al., 2021). He also founded the Indian Statistical Institute and played a key role in the development of statistical infrastructure in India. Mahalanobis was honored with many awards, including the Padma Vibhushan, India's second-highest civilian award, in 1968.

KIICHIRO TOYODA (1894-1952)

He was a Japanese entrepreneur and the founder of the Toyota Motor Corporation. He was born in Shizuoka Prefecture, Japan, as the son of Sakichi Toyoda, a successful inventor and entrepreneur in the textile machinery industry. Kiichiro Toyoda became interested in the automobile industry and studied engineering in Tokyo before traveling to Europe and the United States to learn more about automobile production (BENNEDSEN et al., 2021). After returning to Japan, Kiichiro Toyoda established the Toyota Motor Corporation in 1937 and served as its first president. He implemented innovative manufacturing and production techniques, such as the Toyota Production System, which emphasized efficiency and quality control. Under his leadership, Toyota became one of the world's largest automobile manufacturers and a quality leader in the industry (TOYODA, 1998).

EUGENE LODIEWICK GRANT (1897-1996)

He was an American civil engineer and educator. Grant was a Fellow of the American Statistical Association (ASA), the American Society for Quality (ASQ), the American Association for the Advancement of Science (AAAS), and a member of the National Academy of Engineering (NAE). He played

a pivotal role in the establishment of the ASQ and his pioneering work on statistical quality control was instrumental in enhancing production efficiency in industrial plants during World War II (KIRAN, 2017). ASQ has created the Grant Medal and one of its most important awards. The medal is awarded to an individual who has been determined by the committee to have exhibited exceptional leadership in the creation and delivery of a praiseworthy educational curriculum in the field of quality control.

WILLIAM EDWARDS DEMING (1900-1993)

He was an American engineer, statistician, and management consultant, known for his work in improving quality control in manufacturing processes. He is considered one of the founders of the modern quality management movement and his ideas and methods have had a significant impact on Japanese industry and the development of Lean Manufacturing. In the 1940s, Deming was invited to Japan by the Japanese Union of Scientists and Engineers (JUSE) to help rebuild their economy after World War II. He taught SPC techniques and helped Japanese companies improve quality and efficiency (NISHIMURA et al., 2015). This experience led to the development of the Toyota Production System (TPS) and the Lean Manufacturing approach. Deming is also known for his 14 Points for Management, a set of principles for management that he developed to improve quality and productivity. He believed that quality should be the responsibility of every worker in an organization, not just a separate quality control department. His teachings have been influential in the development of Total Quality Management (TQM) and other management approaches (BUDAYAN; OKUDAN, 2022).

JOSEPH MOSES JURAN (1904-2004)

He was an Romanian-born American engineer and management consultant, known for his work in the field of quality control and management. He is credited with applying the Pareto principle to quality aspects. The Law of the Vital Few and The Principle of Factor Sparsity, both formulated by Dr. Joseph Juran, postulate that 80% of effects emanate from 20% of the causes, thereby implying that 20% of actions or activities would account for 80% of results or outcomes. Juran's observation of this "universal" principle in the early 1950s revealed that in any group of factors contributing to a common effect, a relative few account for the bulk of the effect (LIU et al., 2018). Juran has also introduced the terms "vital few" and "useful many" or "trivial many" to refer to those few contributions that account for the bulk of the effect and to those many others that account for a smaller proportion of the effect (JACK, 2021). Juran is recognized as one of the pioneers in the field of quality management. His contribution to the field is exemplified by his "Juran trilogy," a cross-functional management approach that encompasses three managerial processes: quality planning, quality control, and quality improvement. Juran emphasized the importance of addressing poor quality, as it results in constant waste (ANASTASIADOU, 2015). He further posited that change is necessary to improve quality, and although it may incur increased costs, the benefits in terms of higher margins and recouped costs make it a worthwhile investment. He also worked as a consultant for numerous organizations, including the United States government and JUSE. Juran initiated the composition of his renowned Quality Control Handbook (JURAN, 1951). The handbook, now in its seventh edition, has undergone significant expansion since its inception and is still considered the primary reference material

for quality control.

SHIGEO SHINGO (1909-1990)

He was a Japanese industrial engineer who is widely regarded as a leading expert on manufacturing processes and production management (KUMAR et al., 2022). He is best known for his contributions to the development of the Toyota Production System, also known as just-in-time production or lean manufacturing (TOKI et al., 2023). Shingo introduced several key concepts in this field, including poka-yoke (error-proofing), single-minute exchange of dies (SMED), and the idea of zero quality control (SHINGO, 1985). His work has had a significant impact on modern manufacturing, and he is considered one of the most important figures in the history of industrial engineering (CHOWDHURY, 2014).

SHIGERU MIZUNO (1910-1989)

He was a Japanese quality control expert who worked at Toyota Motor Corporation. Mizuno played a key role in the development of Total Quality Control (TQC) at Toyota, which became a cornerstone of the company's management philosophy. He affirmed that it is imperative to maintain a continuous enhancement of quality standards while simultaneously ensuring that the quality benchmarks do not undergo any degradation (MIZUNO, 1988). He and Yoji Akao are considered the fathers of Quality Function Deployment (QFD) (LOYA et al., 2023). He was awarded the Deming prize in 1952.

TAIICHI OHNO (1912-1990)

He was a Japanese industrial engineer and businessman who is regarded as the father of the Toyota Production System, which is the basis for lean manufacturing (OHNO, 1988). He joined Toyota in 1943 and worked his way up to become the company's executive vice

president. Ohno is known for his development of the TPS, which focuses on the elimination of waste and the pursuit of continuous improvement. He also developed the concepts of the “Seven Wastes” and the Just-in-Time (JIT) production system. Ohno also played a key role in developing the “kanban” system, which is used to control inventory and production in many manufacturing environments (REHDER, 1988).

DORIAN SHAININ (1914-2000)

He was an American aeronautics engineer, quality expert and consultant known for his work in the development of statistical engineering, reliability and quality control methods. He developed the “Red X” concept, a problem-solving approach that focuses on identifying and eliminating the root cause of quality problems in manufacturing processes. He worked with several companies, including Ford, General Electric, and Motorola, and was the author of several books on quality control and statistical engineering. He is the founder of Shainin LLC, a technical-problem-solving company, and is credited with the development of over 20 statistical engineering techniques that form the foundation of the “Shainin System” for quality and reliability improvement (LOGOTHETIS, 1990). Shainin’s expertise was sought by Grumman Aerospace during the 1960s, where he served as a reliability consultant for NASA’s Apollo Lunar Module. Shainin’s approach to reliability assessment was novel and involved the application of statistical methods to empirical testing of Grumman’s Lunar Module prototype components and systems. The effectiveness of his approach was demonstrated by zero failures in eleven manned missions, six of which featured moon landings. In the failed Apollo 13 mission, the Lunar Module served as a lifeboat that brought the astronauts to lunar orbit and back

to Earth when the command module became uninhabitable (SIMONEIT et al., 1969).

KAORU ISHIKAWA (1915-1989)

He was a Japanese engineer and quality control expert who developed several tools and techniques in the field of quality control and quality management. He is known for his contributions to the development of the Ishikawa diagram, also known as the fishbone diagram or cause-and-effect diagram, which is a tool used to identify and analyze the root causes of problems (KONDO, 1994). Ishikawa was a prominent figure in the Japanese quality control movement and helped to establish the JUSE and the International Academy for Quality (IAQ). He was also a professor at the Faculty of Engineering at Tokyo University and authored several books on quality control and management (ISHIKAWA, 1968). He was awarded the Deming prize in 1952.

SEIICHI NAKAJIMA (1919-2015)

He was a Japanese industrial engineer and author who is known for his work in the field of Total Productive Maintenance (TPM) (NAKAJIMA, 1988). He developed the concept of Overall Equipment Effectiveness (OEE) as a measure of manufacturing process efficiency and authored several books on TPM and OEE. His work on TPM has been widely adopted in manufacturing industries around the world (NAKAJIMA, 1989).

ARMAND VALLIN FEIGENBAUM (1920-2014)

He as an American quality control expert who is known for his contributions to the development and promotion of TQC. He worked for General Electric for many years and later founded his own consulting firm, General Systems Company. He is the author of several books on quality control, that are widely used in the field (FEIGENBAUM,

1961). Feigenbaum was also a recipient of numerous awards for his contributions to the field of quality control, including the Shewhart Medal and the Edwards Medal. He is credited with introducing the concept of a “hidden” plant or factory, which gained popularity in the 1970s (FEIGENBAUM, 1945). The concept highlights the existence of a significant amount of additional work required to correct mistakes, which effectively constitutes a hidden plant within any factory, potentially occupying 20-40% of the total capacity. Additionally, Feigenbaum recognized the need for accountability for quality, as the responsibility for quality is shared by everyone in the organization, resulting in potential ambiguity in the ownership of quality. Therefore, quality must be proactively managed and monitored by top management to ensure its visibility and integration into the organization’s culture (FEIGENBAUM, 2009).

CHARLES JACKSON GRAYSON JR. (1923-2017)

He was an American quality control expert who founded the American Productivity and Quality Center (APQC). He served as the chairman of the Price Commission in the United States from 1971 to 1973 during President Richard Nixon’s administration. As the chairman, Grayson was responsible for overseeing the price controls and the process by which companies could request permission to increase prices, as per the Economic Stabilization Act of 1970. During his tenure, Grayson gained extensive exposure to productivity issues and their impact on product pricing. He wrote important books that are considered as benchmark for the field (GRAYSON, 1960; GRAYSON, 1974).

GENICHI TAGUCHI (1924-2012)

He was a Japanese engineer and statistician who made significant contributions to

the field of quality control and quality engineering. He is best known for developing the Taguchi method, which is a statistical approach to quality control that emphasizes the importance of designing robust products and processes that are insensitive to sources of variation in manufacturing (TAGUCHI, 1993). Taguchi’s work helped to shift the focus of quality control from inspection and rejection of defective products to improving the design and performance of products and processes (TAGUCHI et al., 1999). He received numerous awards for his contributions to quality engineering, including the Deming Prize, which is considered one of the highest honors in the field of quality control.

YOSHIO KONDO (1924-2011)

He was a Japanese engineer and quality control expert who played a significant role in the development and promotion of quality control in Japan after World War II. He is a globally recognized thought-leader in the field of human motivation and total quality management. He was named ASQ’s 23rd Honorary member for his exceptional contribution to the global quality community and his personal dedication to promoting quality worldwide. Kondo was a former president of the JUSE, a JUSE councilor, and an advisor to the Quality Circles of Japan. He has also served as president and chairman of the International Academy of Quality. Kondo’s major interests were human motivation, creativity, leadership, and participation in the field of quality management. He has published more than 500 articles and papers, along with a dozen books (KONDO, 1991; KONDO, 1995). Kondo’s previous ASQ honors include the Grant and Lancaster awards and the Ishikawa and Distinguished Service medals. He has received several other awards for his work, including the Nikkei Press Quality Control Literature Prize and the individual

Deming Prize from JUSE.

WILLIAM E. CONWAY (1926-2011)

He was an American engineer, management consultant and the founder of Conway Management, a consulting firm specializing in process improvement and quality management (CONWAY, 1994). He is considered one of the pioneers of the quality movement and was strongly influenced by W. E. Deming. Conway worked with many Fortune 500 companies and was a frequent speaker and writer on quality management topics (CONWAY, 1992).

PHILIP BAYARD CROSBY (1926-2001)

He was an American businessman and quality management guru who is best known for developing the concept of “Zero Defects.” He began his career as a quality control engineer in the United States Army. In 1979, he founded the Philip Crosby Associates, a consulting firm that specialized in quality management training and education. Crosby was a prolific author, and his books are considered classics in the field (CROSBY, 1980). Crosby was a prominent figure in the quality management movement of the 1970s and 1980s, and his ideas had a significant impact on the field. He believed that the focus of quality management should be on prevention, rather than inspection and correction. His concept of “Zero Defects” emphasized the importance of getting things right the first time, rather than fixing problems after they occur. Crosby was also a proponent of the idea that quality management should be an integral part of an organization’s culture and that everyone in the organization should be responsible for ensuring quality (CROSBY, 1996).

KENNETH HOPPER (1926-2019)

He was a distinguished Scottish academic

who is widely known for his influential work on the origins of America’s factory management culture and its impact on global manufacturing practices, particularly in post-World War II Japan. His research and contributions have been highly regarded by scholars and practitioners worldwide. Apart from his groundbreaking research on the history and evolution of factory management, Hopper authored many scholarly and professional articles on manufacturing and management. His work and insights have been invaluable to professionals and researchers in the fields of quality management, industrial engineering, and operations management. Hopper’s contributions to the field of quality and manufacturing management have left an indelible mark and continue to influence the development of modern manufacturing practices and theories (HOPPER, 1982).

WATTS HUMPHREY (1927-2010)

He was an American software engineer and a pioneer in the field of software engineering process improvement. He is best known for his work on the Capability Maturity Model Integration (CMMI), a framework for software process improvement. Humphrey also developed the Personal Software Process (PSP) and Team Software Process (TSP) methodologies, which focus on improving the efficiency and quality of software development through individual and team-based approaches. He received numerous awards for his contributions to software engineering, including the National Medal of Technology and Innovation in 2003, the highest honor awarded to American innovators by the President of the United States. Humphrey worked for IBM for many years and was a senior fellow at the Software Engineering Institute (SEI) at Carnegie Mellon University (SEI,2010).

YOJI AKAO (1928-2016)

He was a Japanese engineer and the creator of QFD, a quality management methodology used to transform customer needs into design specifications (AKAO, 1990). He graduated from the University of Tokyo in 1952 with a degree in engineering and joined the telecommunications company Nippon Telegraph and Telephone (NTT) as a researcher. In the 1960s, Akao began developing QFD while working on a project for improving the quality of a switchboard at NTT. He realized the importance of understanding customer needs and translating them into design requirements, and he went on to develop a systematic process for doing so. QFD was first implemented at Mitsubishi Electric in the 1970s and has since been widely adopted by companies worldwide. Akao was also a professor at Tokyo Metropolitan University and published several books on QFD and quality management. He received numerous awards for his contributions to the field of quality, including the Deming Prize and the Order of the Sacred Treasure from the Japanese government.

YASUTOSHI WASHIO (1929-)

He is a Japanese quality control expert and management consultant. He was a key contributor to the development of TQC in Japan, and was considered one of the leading figures in the field of quality management. Washio began his career at Matsushita Electric Industrial Co., Ltd (currently known as Panasonic Corporation), where he worked in the company's quality control department. He is a disciple of quality guru Kaoru Ishikawa and worked closely with him to develop TQC methodology. He went on to establish the Japan Quality Engineering Society in 1962, which became a leading organization for promoting and disseminating quality control techniques in Japan. Washio also authored several books

on quality control and management which became influential texts in the field. He was awarded the Deming prize in 1993.

MASAAKI IMAI (1930-)

He is a Japanese organizational theorist and management consultant, best known for his work in the field of quality management and the development of the Kaizen philosophy (IMAI, 1986). Imai started his career as a consultant with the Japanese Management Association, where he worked on projects related to industrial productivity and quality management. He later founded the Kaizen Institute Consulting Group, which has offices in several countries and provides consulting and training services in the areas of continuous improvement, Lean manufacturing, and TQM. Imai has authored several influential books on quality management (IMAI, 2007).

EDWARD CHARLES FRANCIS PUBLIUS DE BONO (1933-2021)

He was a Maltese physician, psychologist, author, and consultant who was known for his work in the field of creativity and lateral thinking. He coined the term "lateral thinking" to describe a problem-solving method that involves approaching problems from a new and unconventional perspective (DE BONO, 1970). De Bono wrote over 60 books on topics such as creativity, problem-solving, and thinking skills. He also developed various techniques and tools to help individuals and organizations think more creatively and effectively, such as the Six Thinking Hats method and the concept of Parallel Thinking (DE BONO, 1985).

NORIAKI KANO (1940-)

He is a Japanese engineer and management consultant who is best known for his contributions to the development of the Kano model, a framework used to analyze customer

satisfaction. Born in Tokyo, Kano received his engineering degree from Tokyo University and later joined the Ministry of International Trade and Industry (MITI), where he worked on various projects related to quality management and productivity improvement. In the 1970s, Kano developed the Kano model as a way to measure customer satisfaction and help companies understand the different types of features that customers value in a product or service (SARKAR, 2012). The model categorizes features into three types: basic, performance, and excitement, and helps companies prioritize which features to focus on improving customer satisfaction (SHIN et al., 2022). Kano has also written several books on quality management and customer satisfaction (KANO, 1996). He has been recognized for his contributions to the field of quality management and received several awards, including the Deming Prize in 1997 and the ASQ's Lancaster Award in 2002 (KANO et al., 1984).

ALBERT BLANTON GODFREY (1941-)

He is a distinguished professor at North Carolina State University, where he heads the College of Textiles, which is one of the most respected institutions in the field. Godfrey has been a leader in quality management and business excellence, having served as the Chairman and CEO of Juran Institute for 13 years, and Head of Quality Theory and Technology Department at AT&T Bell Laboratories (ULUSKAN et al., 2016). He has taught courses in quality management and control at Columbia University and Harvard University. He has published over 200 articles and book chapters and co-authored or co-edited seven books (GODFREY; KENETT, 2007). He has contributed to the creation of ISO 9000 series of standards and the Malcolm Baldrige National Quality Award (MCTEER;

DALE, 1994). He is a Fellow of the American Statistical Association, the American Society for Quality, and the Royal Society for the encouragement of Art, Manufacturers, and Commerce. He is also a member of the North Carolina Institute of Medicine and on the Quality Management Board of NiSource.

CLAUS MÖLLER (1942-)

He is a management consultant and keynote speaker who is considered one of the world's leading experts in various areas such as leadership, time management, quality management, service management, and emotional intelligence. Claus is known for providing innovative concepts and learning experiences in these fields (MOLLER, 1988).

ELIYAHU MOSHE GOLDRATT (1947-2011)

He was an Israeli physicist, business consultant, and author known for his work in the field of business management, particularly in the area of production planning and inventory control. He is best known for introducing the Theory of Constraints (TOC), a methodology for improving the performance of systems in organizations (GOLDRATT; COX, 1984). Goldratt also founded the Avraham Y. Goldratt Institute, which provides training and consulting services for companies seeking to implement the TOC approach.

MIKEL JAY HARRY (1951-2017)

He was an American industrial engineer, speaker, and consultant known for his contributions to the Six Sigma methodology (HARRY; SCHROEDER, 2006). He was one of the original developers of Six Sigma, and worked with William B. Smith (1929-1993), a famous Motorola engineer, to implement it in the 1980s (SMITH, 1993). Harry later founded the Six Sigma Academy, which

provided training and consulting services to organizations looking to improve their processes and quality control. In addition to Six Sigma, Harry also made significant contributions to the fields of design for Six Sigma (DFSS) and lean manufacturing (SITHOLE et al., 2021). He authored several books on these topics, and was a sought-after speaker and trainer around the world (PYZDEK, KELLER, 2018).

DAVID A. GARVIN (1952-2017)

He was an American educator and scholar who was the C. Roland Christensen Professor of Business Administration at Harvard Business School. He was known for his work on organizational learning, quality management, and innovation. Garvin authored several influential books and articles on these topics. He proposed that there are eight dimensions of quality: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality (GARVIN, 1988).

HIROYUKI HIRANO (1960-)

He is a Japanese author and quality control expert who developed the 5S methodology for workplace organization and visual management (HIRANO, 1995). He is also known for his work in the field of TPM and is the author of several books on these topics. Hirano's ideas and methods have been widely adopted in manufacturing industries worldwide. He has received numerous awards for his contributions to the field of quality management.

DEBASHIS SARKAR (1967-)

He is a seasoned Indian management consultant, educator, and keynote speaker with extensive experience advising companies across the globe on becoming customer-centric and operationally excellent (SARKAR,

2003). With a proven track record of helping businesses increase sales, reduce costs, change mindsets, and improve quality experience, he is the founder of Proliferator Advisory & Consulting (SARKAR, 2006). He has also held leadership positions at top companies, including Standard Chartered, ICICI Bank, Unilever, and Coca Cola. In addition to consulting, he mentors startup founders and coaches leaders to enhance their personal leadership journey (SARKAR, 2007). He is the author of multiple books and is known for his pioneering work in Lean for service and the application of Behavioural Science to quality-improvement (SARKAR, 2022). In 2014 he was presented by ASQ with Crosby Medal (SARKAR, 2016).

CONCLUSIONS

The contributions of the 50 notable figures we have examined in this article have had a profound impact on the field of quality management. Their pioneering work has enabled organizations around the world to improve their performance, enhance customer satisfaction, and achieve greater success.

From the early pioneers, to contemporary thinkers, each of these individuals has brought their unique perspective, insights, and contributions to the field of quality management. They have challenged conventional wisdom, introduced new methods and tools, and promoted a culture of continuous improvement that has helped transform organizations across industries and sectors.

As we look to the future of quality management, it is clear that the contributions of these notable figures will continue to shape and influence the field. New challenges and opportunities will emerge, but the principles of quality management that these individuals have championed will remain relevant and essential.

By examining their stories, we hope to inspire new generations of quality management professionals to continue to push the boundaries of what is possible and to strive for excellence in all aspects of their work.

We encourage readers to explore further the contributions of these individuals and to continue to seek out new ways to improve the quality of products and services, while promoting a culture of continuous improvement and customer satisfaction.

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