

COMMODITY SCIENCE AS A PREDECESSOR OF QUALITY MANAGEMENT SCIENCES

Juozas Ruževičius*

Vilnius University, Lithuania

Abstract. *In this study, the evolution, content, trends and perspective of commodity science as a predecessor of quality management sciences and as an education subject are analyzed. The new models of the interface of commodity science with other disciplines, of the coverage of contemporary quality sciences and of quality management development stages are presented. Also, analysed are the aspects of quality experts' and quality managers' formation at Lithuanian universities, business schools and colleges. The article was written using scientific, normative and legal literature, systemising the good practices of Western universities, commodity and quality related international organisations and the results of author's systematic researches of commodity and services quality problems. The author formulates the insights for the future development of commodity science and quality management as a subject of science and education.*

Keywords: *commodity science, quality management, global quality management, quality manager, attractive quality.*

Introduction

Quality is a concept which cannot be measured on a time scale. Man's understanding of quality goes far back into prehistory, perhaps even a million years before the first tools were made. For a long time, quality assessment hinged predominantly on the quality of consumer products – their composition, attributes, distinguishing features, and so on. The rapid development of product manufacture and foreign trade led to the founding of one of the first disciplines in applied management and commercial sciences in the 16th century – *commodity science* (Pričinauskas, 1982; Waginger, 2006). Quality was always the main subject in commodity science. Eventually, this subject expanded until it encompassed not only consumer products but also materials, raw materials, business equipment, intellectual property, standardisation, certification, certain aspects of a product's environmental and ecological quality, the protection of consumer's rights, the politics of consumerism and quality, etc. The integration of the world's economy and the resultant growth in competition has made quality one of the most important factors in an organisation's survival and success.

* Faculty of Economics, Vilnius University, Sauletekio Ave. 9-II, Vilnius LT-10222, Lithuania;
e-mail: juozas.ruzevicius@ef.vu.lt

The *aim* of this study was to highlight the chronology and development trends of commodity science and quality management sciences, to reveal their content changes, and to prepare new models of the interface of commodity science with other disciplines, of the coverage of contemporary quality sciences and of quality management development stages. *Methodology*: this article was written using systematic analysis of scientific, normative and legal literature, systemising the good management and teaching practices of Western universities, commodity and quality related international organisations and the results of author's systematic researches on the problems of commodities and services quality.

Historical and chronologic background of commodity science and quality management development

The concept of quality reaches beyond the frame of time. The human perception of quality is hiding in the remote past, possibly dating back a million years when the first tools were made (Deming, 2000; Juran, 1995; Shewhart, 1989). The first and main objects of studying quality for a long while were incorporated into the quality of consumed goods – their composition, characteristics, exclusive features, etc. The robustly developing commodity manufacturing and foreign trading has postulated the emergence of an independent applied science and study discipline – commodity science (Italian: *Merceologia*, German: *Warenwissenschaft, Warenkunde, Warenlehre*, French: *La science des marchandises*, Lithuanian: *Prekių mokslas*, Russian: *Товароведение*) in the 16th century. The dawn of each science breaks only then, when department of the specific scientific branch is established in a higher education institution as well as systematic studies are launched in this field. Hence we may conclude that commodity science is a predecessor of the quality management sciences. The first commodity science department was established in the University of Padua (Italy) in 1549 (Pričinauskas, 1982; Waginger, 2006). Ultimately, at the 20th century the necessity for information exchange upsurged in this field between scientific parties and learning institutions, furthermore, internationally. National and international institutions of this field appeared. The first commodity science society in the world was established in Japan in 1935. The International Association of Commodity Science and Technology (IGWT) was established in Vienna (Austria) in 1976 (German: *International Gesellschaft für Warenwissenschaften und Technologie*). The following stages can be portioned in commodity science and quality management development (Arauz et al., 2009; Deming, 2000; Fisher, 2009; Juran, 1995; Koziol, 2006; N.N. (1996); Ruževičius, 19-23; Shewhart (1989); Todorut, 2010; Waginger, 2006):

- about 1 000 000 years B.C. – no quality control; however, the first tools were produced;
- about 300 000 years B.C. – simple rudiments of quality control;



FIG. 1. J. Beckmann's book "Introduction to Commodity Sciences"

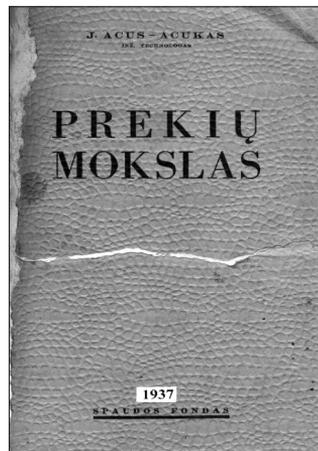


FIG. 2. The first Lithuanian commodity science textbook ("Prekių mokslas")

- about 8000 years B.C. – first methods of part matching and precision;
- about 1760 years B.C. – rudiments of zero defects concept (quotation from the Codex of Babylonian King Hammurabi: "...If a brewer makes poor quality beer he has to be drowned in the barrel of that unqualitative beer..."); "...If a builder builds poor quality house and due to this reason the owner of the house is injured or killed, the builder of the building has to be hurt or killed in the same way...");
- 1549 – basic scientific quality studies; the first commodity science (Italian: *Merco-logia*) department (of vegetative and animal pharmaceutical products) in the world was established at the University of Padua (Italy) [9];
- 1575 – publication of the first Eastern Europe an commodity science textbook ("Commodities Book", Russia);
- 1787 – foundation of part and component interchangeability implementation;
- 1793 – Johann Beckmann's textbook "Vorbereitung zur Warenkunde" ("Introduction to Commodity Sciences") published (see Fig. 1);
- since 1840 – foundation of implementation of simple part precision tolerance;
- 1865 – ITU – the International Telecommunication Union (the first international organization in the field of quality and standardization) was established;
- since 1870 – implementation of complex part precision tolerance;
- 1906 – IEC – the International Electrotechnical Commission / Commission Electrotechnique Internationale was established;
- since 1910 – start of quality inspection implementation (as a tool to discard low quality production);
- since 1924 – introduction of quality control implementation (quality is ensured via written specifications, standards, measures, graphical quality management methods);

- 1927 – release of the first Eastern Europe quality scientific journal (“Стандарты и качество” – “Standards and Quality”, Russia);
- since 1930 – start of quality assurance implementation;
- since 1931 – introduction of statistical quality management methods;
- 1934 – beginning of commodity science studies in Lithuania (commodity science is taught at the Klaipėda Commerce Institute);
- 1935 – Nihon Shohin Gakkai / Japan Society for Commodity Science (the first commodity science society in the world) is established;
- 1937 – the first Lithuanian commodity science textbook was published (author J. Acus-Acukas, (Fig. 2);
- 1940 – start of systematic commodity quality studies in Lithuania (Commodity Science Department was established at Vilnius University);
- 1946 – the ISO – International Organization for Standardization / Organisation Internationale de Normalisation – was established;
- since 1950 – final establishment of the quality management doctrine (this development stage encompasses the tools of two previous stages (1924–1931), statistical and other quality management methods, quality systems, models and tools to satisfy consumer needs and to reach an adequate confidence level);
- 1951 – E. Deming (quality) Prize was established;
- 1956 – the EOQ (European Organization for Quality) was established;
- 1959 – the Austrian Society of Commodity Science and Technology (ÖGWT – Österreichische Gesellschaft für Warenwissenschaft und Technologie) was established;
- 1959 – the scientific periodical “Rivista di merceologia, tecnologia e qualità” (“Journal of Commodity Science, Technology and Quality”) was established;
- 1959 – the first quality management system model is implemented (USA Defense Department Quality Management Program MIL–Q–9858);
- 1961 – CEN – Comité Européen de Normalization (European Committee for Standardization) was established;
- since 1961 – the Zero defects concept pervasion;
- 1963 – the Codex Alimentarius Commission was established (food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme);
- 1965 – the periodical commodity science journal “Warenkundliche Berichte” was established;
- 1972 – the commodity science periodical “Journal Forum Ware” was established;
- 1973 – CENELEC (Comité Européen de Normalization Electrotechnique / European Committee for Electrotechnical Standardization) was established;
- 1976 – IGWT (International Association of Commodity Science and Technology

- Internationale Gesellschaft für Warenwissenschaft und Technologie) was established;
- 1979 – the first quality management system model targeted towards the civilian sector (Great Britain standard BS 5750);
 - since 1980 – the full doctrine of the Total Quality Management (TQM) was established;
 - since 1987 – the international quality management system model (ISO 9001: 1987; presently the 2008 revision of this model is valid);
 - 1987 – the MBQA (Malcolm Baldrige Quality Award) was established;
 - 1988 – the ETSI (European Telecommunication Standards Institute) was established;
 - 1988 – the EFQM (European Foundation for Quality Management) was established;
 - 1991 – the EFQM Excellence Model was established;
 - 1992 – the EFQM Excellence Award was established;
 - 1994 – LPMD (Lithuanian Society of Commodity Science, Lithuanian: *Lietuvos prekių mokslo draugija*) was established (with a kind help of IGWT, ÖGWT and DGWT);
 - 1998 – the Lithuanian Quality Award (Nacionalinis kokybės prizas) was established;
 - 1990–2000 – the Total Quality Environmental Management (TQEM) doctrine formation;
 - since 1995 to 2005 – expansion of the scope of quality management in the aspects of social quality, business consummation, living quality, partnership, economic management quality, sustainable development, etc.;
 - 2003 – the scientific international e-periodical “Journal Forum Ware International” was established;
 - 2003 – the European Universities Network for Total Quality Management (EUN. TQM) was established;
 - 2004 – the scientific periodical “Polish Journal of Commodity Science” („*Towaroznawcze Problemy Jakosci*“) was established;
 - 2006 – the scientific journal “*Commodities and Markets*” („*Товару і Ринку*“) was established;
 - since 2001 till nowadays – attractive quality, emotional quality and quality value orientations (*national, world religions, bodies of government, market participants, consumers*), ethics in food production and trade, and expansion of quality culture systematic studies;
 - 2008 – introduction of the concept and certification model *QualEthique* (integrating quality and environmental management, social responsibility, ethic and aesthetics);

- since 2010 – start of effective managing for *sustainable success* of an organization (ISO 9004: 2010. Managing for the sustained success of an organization – a quality management approach; etc.);
- 2010 – European Academy for Quality Sciences is established;
- since 2000 till nowadays – formation of Sustainability, Excellence and Global Quality Management (GQM) new quality concepts.

Quality was always the main object in commodity science. Nevertheless, the object of this applied science and teaching discipline has expanded over time; besides consumer goods, it also incorporated material, installations of business enterprises, intellectual products, standardization, certification, some environmental quality and eco-friendly commodity aspects, the quality of consumer rights protection, consumer and quality politics, etc. Innovations in product technology, construction, composition, and the range in stock, as well as the globalisation of trade in recent decades necessitated the creation

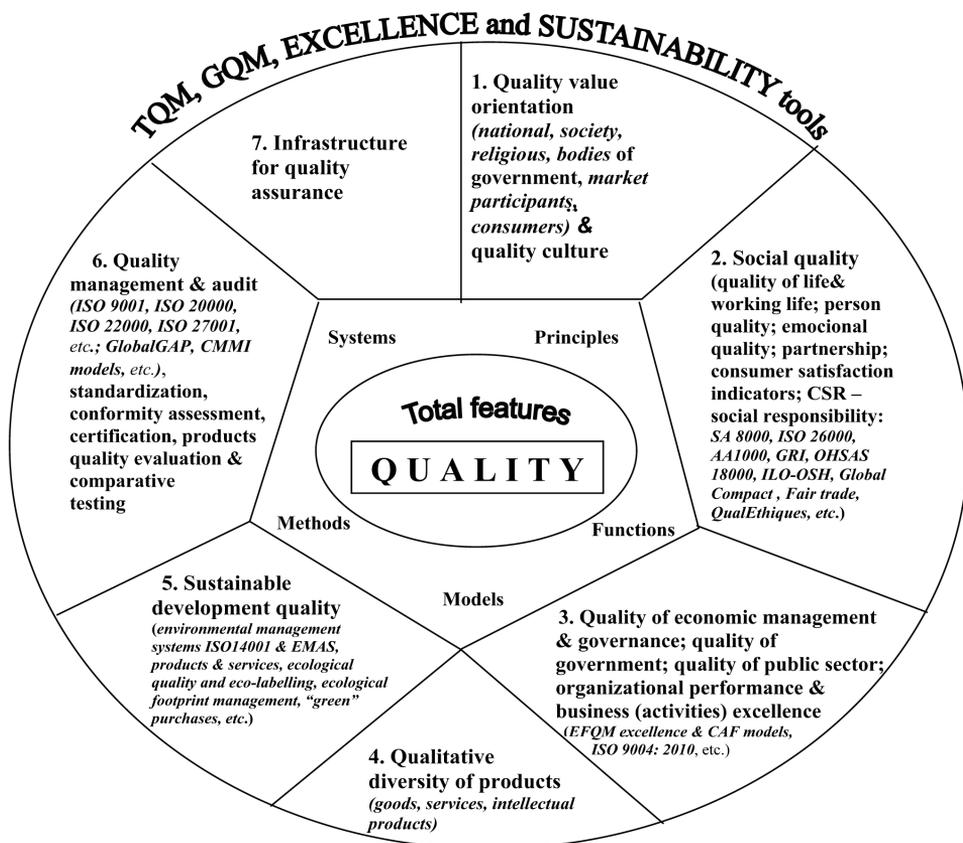


FIG. 3. The coverage of contemporary quality sciences

Source: developed by the author using [18–24].

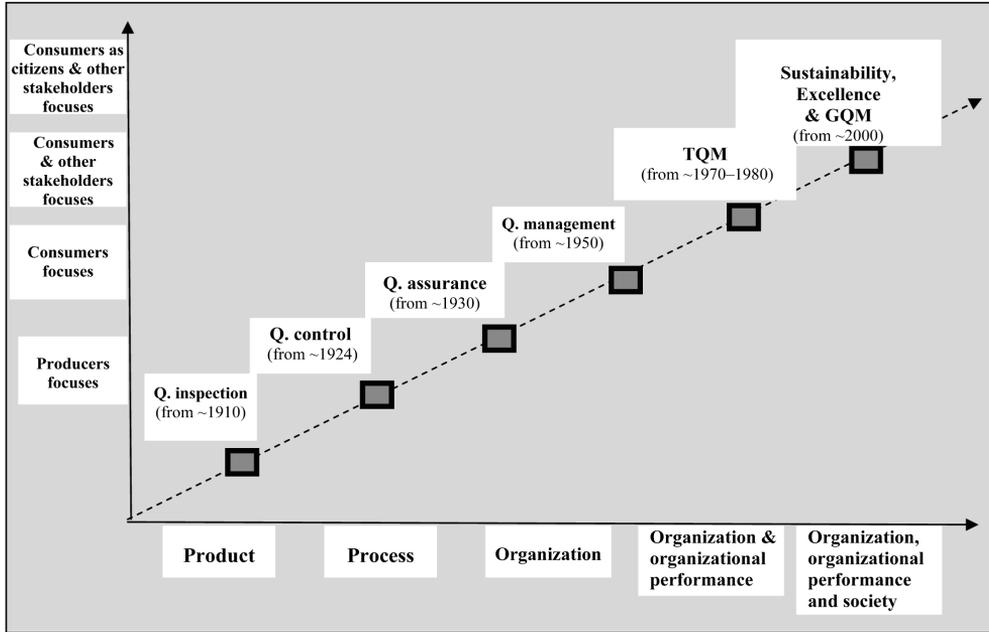


FIG. 4. Quality management development stages, trends and its main focus and context changes

Source: designed by the author, using [3–8; 19-21].

of a system where product quality and safety could be guaranteed on a worldwide scale. This became impossible to achieve using the methods and means of classical commodity science alone. Gradually, commodity science branched off into independent areas of study – qualitology, quality management, product and environmental management, qualimetry, quality culture, total quality management (TQM), design of quality, security and environmental management systems (ISO 9001, EMAS, ISO 14000, HACCP, ISO 22000, GMP, GDP, OHSAS 18000, ISO 27001, and others – see Fig. 3), quality auditing, standardization, intellectual products quality, sustainable development, etc. The coverage of contemporary quality sciences is shown in Fig. 3. Quality management development stages, trends and its main focus and context changes are presented Fig. 4.

The development of quality, commodity science, and quality management concepts covers a very long time. During this period, the core quality objects have changed significantly – from the quality of primitive working tools to the quality of commodities, then to that of services, processes and organizations organizational performance, etc. The same trend could be noted in the field of quality management coverage. In the old approach, the quality management field covers the products and services and organization activities. In the contemporary approach, the quality management field covers the old objects and many new area – social quality, quality of economics, business excellence, sustainable development quality, intellectual products quality, etc. The focus of

quality management also changed – from producer to consumer as citizen and other stakeholders' main focus. The mentioned global economic and social changes have determined need of new quality management tools as well as their systematic development and implementation (from basic quality inspection and control tools to sophisticated TQM, Global Quality Management (GQM), excellence and sustainability methods and models (see Figs. 2 and 3).

In the scientific literature and business practice today we can find the rudiments of the global quality management (GQM) doctrine – the newest possible trend of quality management science development; e.g., business enterprises use GlobalGAP (Global Good Agriculture Practice) certification, Global QMS (Quality Management Systems), BRC (British Retail Consortium) Global standards, Global Total Quality Management, Total Quality Environmental management (TQEM), etc. (Kim, 2007; Todorut, 2010; etc.). As the global competition intensifies and becomes the new business reality, companies face difficult challenges in every aspect of corporate management. In particular, quality management or TQM must be examined anew when markets and manufacturing operations become global. In the global world, characterized by transformations in the business environment by crisis and external pressures, it is necessary for TQM to move to GQM, which permits a better adaptability to the global business environment (Kim, 2007; Todorut, 2010). To be successful in knowledge society, companies will need to implement new strategies and new tools to create simultaneously economic, social and environmental values. TQM philosophy must be rethought and recreated in the context of the new global transformation to make the switch to GQM. Global quality management is an emerging area of practice but, despite frequent references to the term, it has not yet been systematically defined and researched. In the author's opinion, the GQM conception needs to be consolidated and developed.

Commodity science and quality management development at Vilnius University

The Commodity Science Department, a predecessor of the Quality Management Department, was established at Vilnius University (VU) in 1940. Docent Jonas Acus-Acukas was a pioneer of commodity science in Lithuania. He organized a commodity science seminar at the Vytautas Magnus University in 1938, which laid the grounds for the establishment of the department. J. Acus-Acukas was Head of VU Commodity Science Department during the period 1940–1950. He published the high coverage book “Commodity Science” in 1937, which was the main Lithuanian food and not food commodity textbook for over a decade (see Fig. 2). His next textbook “Fundamentals of Commodity Science”, published in 1947, analyzed the theoretical, methodical and practical issues of commodity science. Docent J. Acus-Acukas created an original anthropometric foot measurement methodology. During the period 1951–1961, the department was headed

by docent, PhD in technical sciences Petras Mačiulis. He published the book “Food Product Quality and Their Composition Measurement” in 1960; in it, he analyzed the newest quality measurement questions. P. Mačiulis created recipes of Lithuanian bread, studied the quality of other products.

PhD docent Juozas Pričinauskas, an intellectual and a bright personality, was Head of the Department of Commodity Science during 1961–1978. He is deservedly called the Patriarch of the Lithuanian commodity science. J. Pričinauskas made a great contribution to consolidating the staff of the department towards productive scientific and pedagogical work. During the years he was in the office, the learning resources of the department were greatly enlarged, the publication of methodological teaching literature notably increased. J. Pričinauskas prepared a plethora of methodological publications, afterwards refocused on the fundamental work; he started the commodity terms’ dictionary and dedicated many years to this task. His “Russian–Lithuanian Commodities Dictionary” was released in 1996 and “Lithuanian–English–German–French–Russian Dictionary of Garments” in 2002.

Docent (today professor) Gediminas Beržinskas, PhD in technological sciences, headed the department in 1978–1988. The scientific work of the department was concentrated on the research of commodity quality consumptive characteristics, the methods of determining quality indicators; the technological innovations were shaped and implemented. Substantial results were attained in studying polymer quality and their thermo-oxidation (docent, PhD in chemistry Raimondas Baltėnas), textile improvement technologies (docent, PhD in technological sciences Juozas Libonas) and processes related to dispersive structure food quality and product technology (docent G. Beržinskas). A theory based on the speed gradient was elaborated and enabled a more precise construction of technological machinery and calculation methods for their processes. G. Beržinskas is the author of over 80 scientific publications and of thirteen inventions. Recently he has been investigating human quality valuation, theoretical and methodological executive personality cultivation issues. He published the valuable monograph “Elevator Ethics. Moral Doctrines for Leaders, Teachers, Educators, and Executives” in 2008.

The head of Commodity Science (later – Quality Management) Department for 16 years (1988–2004) was professor Juozas Ruževičius – the graduate of this department, PhD in technical sciences. Significant social and economic changes in Lithuania in 1989–1991 have demanded fundamental transformations of the department. The department started collaboration with the IGWT, DGWT and ÖGWT, several foreign universities, with quality management, commodity science and other institutions, the European quality management foundation (EFQM); a collaboration contract was signed with the University of Turin. This ensured the conformity of the content and nomenclature of the disciplines taught at the department with Lithuanian economic needs and their agreement with programmes of foreign universities.

The Commodity Science Department integrated the disciplines of the Technology Department in 1994–1995. Adolfas Kaziliūnas, habilitated PhD in technology sciences, was invited to the department; he intensively investigates commodity quality and the total quality management methodology and practice. He is the author of 38 inventions and has more than a hundred scientific publications. In 1999–2000, prof. A. Kaziliūnas was awarded international quality manager and quality auditor certificates recognized in the European Union. The scientific pedagogical personnel gained qualifications during this period. Two department teachers (doc. G. Beržinskas and doc. A. Žebrauskas) defended their habilitated PhD dissertations and became professors. A. Žebrauskas elaborated a mono-dispersive polystyrene latex technology used by the Kaunas Bacterial Preparation Company for rheumatoid arthritis diagnostics. The medicine was used in the country and exported abroad. Another field of his research was conductive layers on the surface of plastic. For these achievements A. Žebrauskas was awarded the Silver Medal of the National Achievements Exhibition and the “Eureka” prize for the Lithuanian most effective invention of year – a conductive copper sulphide substratum used for metallization of plastics. The invention is used by Lithuanian, Latvian and Russian companies. A. Žebrauskas defended the habilitation work “Copper sulphide production processes on polymeric materials” in 1996. Prof. A. Žebrauskas is the author of six inventions and was awarded the Inventors’ Badge. He is the author of over 70 scientific and methodological publications.

On the basis of teachers’ foreign internships and contacts with colleagues from Western universities, teaching of the modern discipline Total Quality Management (TQM) was implemented for the first time at the Commodity Science Department and in Lithuania (N.N., 1996; Makijovaitė, 1998; Ruževičius, 1995, 2005). The author of this article defines the contemporary TQM as follows:

TQM is a science the management art and the practice of creating value and strength for the sustained development and success of an organization and society.

Today, Vilnius University quality and commodities scientists are members of the European Universities Network for Total Quality Management (EUN.TQM), based at the EFQM (Brussels). Prof. J. Ruževičius is elected as the member of European Academy for Quality Sciences in 2010.

Commodity science as a teaching discipline at Lithuanian higher education institutions

Recently, commodity science has been taught for Commerce students of Vilnius University, other universities and colleges of Lithuania. Until 1995, the commodity expertise programme (with deep technical and technological training) was effectuated at Vilnius University. Presently, in our country the product management specialty is taught; the students have a commodity science course – fundamentals of commodity science. Consequently, presently the commodity science discipline taught at Lithuanian higher education institutions can be described as *one of the fundamental disciplines of commerce; the*

main object is commodity assortment, quality, commodity economics management and commodity identification peculiarities.

The interface of commodity science with the other disciplines taught at the Vilnius University is shown in Fig. 5. Commodity science (as a commercial science discipline and a system of practical instruments) and businessmen (commodity experts, product managers) of whichever commodity group analyze the main questions:

1. Needs for a particular commodity or commodity group (commodity intention, targeted consumer groups, required commodity quality level and class, etc.).
2. The quality of anticipated commodity production.
3. Structure, qualities, eco-friendliness, hygienic qualities, influence on the safety of expected material.
4. Technological peculiarities of production and their possible influence on quality, product sustainability, quality guaranties, etc.
5. Commodity quality, its control and valuation possibilities, commodity exploitation and storage warranty periods.
6. Commodity quality certificates (their necessity), certificate seals.
7. Commodity classification (grouping), the variety and management of assortment, commodity coding systems, etc.
8. Mandatory and optional properties of commodity marking, the use and display of hazardous components (e.g., GMO, food supplements – E211, etc.), safety and commodity manipulation marks, packaging, transit and storage (storage term, conditions).
9. Correspondence of commodity quality (raw material, supplements, residuals of hazardous technologies, marking, safety and product realization) to EU and national regulations.

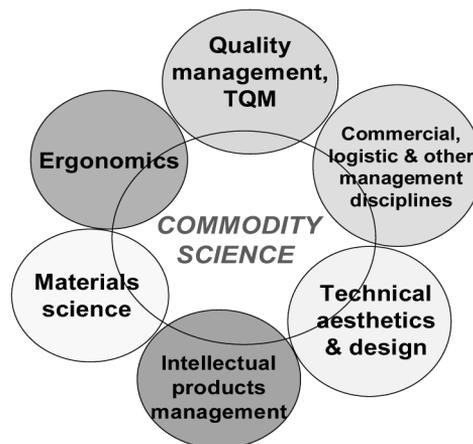


FIG. 5. **Interface of commodity science with other disciplines**

Source: designed by the author.

10. Correspondence of commodity manufacturing conditions and composition to religious legal-ethical requirements (for instance, *Halal* – Islamic food, *Kosher* – Jewish food, etc.).
11. Consumer rights in the fields of commodity quality and assortment (returning and exchange peculiarities for defected and good commodities, insuring warranty conditions, etc).

Thus, the, main issues in commerce regarding commodity science are product quality and assortment, peculiarities of their insurance and management. The main tasks for businessmen's (product managers') practical activities in the field of commodity quality and assortment management are as follows:

Stage I: in the system **Commodity production** → **commerce sphere** (processes of receiving commodities at the commercial organizations):

1. Commodity production quality monitoring.
2. Evaluation of the value and quality level of received commodities.
3. Preparing new (or express) commodity quality monitoring and inspection methods.

Stage II: **Commerce sphere:**

1. Ensuring commodity quality and product appearance.
2. Ensuring an effective demonstration of commodity positive and exclusive features.
3. Formation of rational assortment, best suited for the needs of main consumer groups in the region.
4. Preparation of proposals concerning optimal product storage conditions.

Stage III: **Commerce sphere** → **Consumption** (selling processes):

1. Monitoring commodity quality when selling to the consumer.
2. Informing the consumer about new commodity features, functions.
3. Demonstrating the control of technically complex commodities, warning the consumer about the risks and safety requirements.

Stage IV: **Consumption** → **Commerce sphere** (feedback):

1. Analysis of the consumers' new needs and the new consumer group need.
2. Warranties (commodities return and exchange, etc.).
3. The research of consumer opinions, requests concerning commodity quality, assortment and maintenance quality monitoring, analysis and correction actions.

Stage V: **Commerce sphere** → **Production:**

1. Transfer of consumer requirements (their changes), complaints, requests.
2. Propositions to producers (suppliers), *what, how much and how* should be changed in the product to better suit consumer needs.

3. Participation in the improvement and preparation of standards and legal acts concerning commodity quality, assortment and consumer rights.
4. Participation in the improvement and preparation of commodity identification and coding systems.

4. Trends and tendencies of modern commodity science and quality management content development

We foster the idea that commodity science is part of human culture, and its fundamentals may be of paramount importance for the growth, development and perfection of a person (Kozioł, Koziołowa, 1995, 2006; Ruževičius Beržinskas, 1995). Basic knowledge in the field greatly replenishes the art of living and is no less important than such fundamentals as communication, economics, etc. Frankly speaking, customary commodity science in Lithuania (we guess in many countries also) was a purely descriptive and superficial discipline in the wake of the technological progress and has remained neutral in regard of the world's humanistic tradition (Beržinskas, 2008). It is evident that a superficial study of the immense variety of wares has no sense. We presume the humanistic approach to be more promising.

If we were asked what the term “production” means, we ought to answer that there are four outcomes of human activities: services, commodities, intellectual (human intellect) products and culture. It would be of interest to scan the global turnover of these kinds of production. The proportion of the above four “outcomes” is, presumably, 1 : 2 : 5 : 10 (Beržinskas, 2008). The first two indices are common in statistics, yet another two could be just anticipation, because until now statistics are mute. We may presume that this century ought to be a domain of tertiary economics, and here we may see an inception of quaternary economics. Some departments of commodity science in universities (including Vilnius University) renounced their title. Qualitology (or quality management, sustainable development, sustained commodity science, etc.) can be chosen as perhaps more perspective, progressive and close to university education. This change looks more promising and highly plausible in Lithuania. There are tangible possibilities to comprise not only the quality assortment of commodities, but also the quality of services, intellectual products, life or working life, culture, different activities of organizations, etc. There are possibilities to envisage the quality of a social being and of a human. The quality of a person (or of an organization's leader) as a whole can be called culture. The span of man's culture includes relations with commodities, their production, distribution, usage and utilization.

We suppose there is one promising additional quality to get with commodity science. It is hidden in sticking to essentials of cultural growth, expansion and development. In this case, commodity science becomes an implement for cultural soaring. One of the attractive eventualities to shape commodity science is to call it commodity culture. Sustainable development can encourage a wider application of *sustainable trade* and *fair*

trade principles and standards on a world-wide scale. Compliance with these standards and ethics in food production is validated by a suitable certification and labelling system which encompasses the use of natural resources and energy, the formation of hazardous waste, and social responsibility and justice (Nucci, 1996; Ruževičius, 2010; Waginger, 2006). *This is one of the most promising ways of the modern sustained commodity science development.*

A possible way of the further development of contemporary commodity science is a the systematic study of the new aspects of goods, intellectual products and services, such as attractive quality, emotional quality of products and services. Over the course of history, the definition of quality has evolved and changed. A. Shewhart (1989) was one of the pioneers in the industrial society, concerned with the introduction and development of quality management. Similarly to Aristotle (38–322 B.C.), he viewed quality from two related perspectives –its objective and subjective sides. The first perspective views quality as an objective reality independent of the existence of man. In contrast, the subjective side of quality considers what one thinks, feels, and senses as a result of the objective reality (Lofgren, Wittel, 2005). Inspired by Herzberg’s motivation-hygiene theory, Professor N. Kano (2001) and his coworkers developed the theory of attractive quality. The theory is intended to help one better understand how customers evaluate and perceive quality attributes. The theory of attractive quality explains how the relationship between the degree of sufficiency and customer satisfaction with the quality attribute can be classified into five categories of perceived quality:

- 1) attractive quality;
- 2) must-be quality;
- 3) reverse quality;
- 4) one-dimensional quality; and
- 5) indifferent quality.

The theory of attractive quality predicts that quality attributes are dynamic, i.e. over time an attribute will change from being a satisfier into a dissatisfier (Kano, 2001). The importance of attractive quality methodology can be confirmed by the fact that the editorial board of the international scientific periodical “The Total Quality Management Journal” is preparing in 2010 a special issue dedicated to attractive quality. With this special issue, the editorial board wants to encourage research by quality management (and commodity science) scientists on the theories of attractive quality and on the neighbouring fields. In our opinion, the theory of attractive quality “wants” to be complemented with the methodology of the emotional quality evaluation and assessment.

Quality value orientations is a new trend of modern commodity science and contemporary quality management. Quality value orientations (national, societal, religious, governmental, of market participants, consumers) and quality culture are rather important in the global economical collaboration and trade, as well as in the international com-

munication – on the business, scientific or personal level. Quality value orientations are manifested in different aspects – customer preferences, the use of different management methods and systems, product and service consumption, assortment, business lunch traditions, etc. For example, in South Korea, white, grey and black cars prevail, while in Europe the colour palette is much wider. Another example: EU countries differ not only in the total use of alcohol products, but also by the sort of prefixed alcohol. German and Lithuanian consumers' yearly alcohol use is the same – about 10 l per capita, converted to absolute alcohol (in Malta and Sweden only 5 l). However, the use of strong alcohol drinks converted to absolute alcohol differs: a German citizen drinks only 1.9 l, while in Lithuania this index is about 6.3 l. The biggest amount of wine is used by French and Italian citizens – approximately 50 l per capita yearly. Meanwhile this index in Lithuania, Latvia and Estonia is ten times lower – about 5 l. The proportions of coffee, tea, black or white chocolate consumption in different countries also vary. The influence of national and cultural peculiarities on quality value orientations is easily comprehensible for some enterprise leaders who implement a management system. While preparing the system for a certification audit, it is necessary to pay attention (what often happens in practice!) to the national-cultural (and religious) peculiarities of the future auditor and his certification organization, because requirements to the system, processes, documentation and other quality aspects rather different depending on the “nature” of the auditor, although the international certificate is the same. Quality value orientations and parts of the quality culture (see first quality subsystem and models (Fig. 3) are not yet revealed enough by the science of management.

For many years economic scientists have been trying to reveal the dependence of the level of countries' economical development on the dominant religion. Religion and quality – is there any connection? Are there any differences between members of various religion groups in management concepts, entrepreneur and employee behaviour, consumer preferences, quality methods and their effectiveness? The fact that religion unavoidably influences society, lifestyle, culture and the economy is not arguable. Definitely, there is – I can tell so with reference to my consultative job experience in different countries, experience in communication with my colleagues – Islamic, Catholic, Protestant, Buddhist, Judaist and atheist scientists. The fact that religion unavoidably influences society, lifestyle, culture and the economy is not arguable. However, this relation in various quality spheres is seen more intuitively and there is no compelling scientific quantitative data proving a relation between religion and quality, value orientation differences in world religions in the area of quality. In my opinion, the scientific gap mentioned above exists because no separate systematic scientific study regarding the relation between quality and religion is yet done. We have to accept the fact that separate aspects of this issue were observed rather widely by J. P. Adler, as well as by Azzi-Ehrenberg, R. McCleary, R. Barro and several other scientists (McCleary, Barro, 2006, etc). However, the question

how to change the relation between religion and the economy is still under discussion. Max Weber is the first scientist to emphasize the influence of religion on the countries' economic growth in his work "Protestantism Ethics and Capitalism Spirit" (1905). Some scientists deny the causality between economic growth and religion, however, others find it. R. McCleary and R. Barro see a dual relation between religion and the economy, meanwhile L. Iannaccone finds a triple relation (McCleary, Barro, 2006, etc.).

However, there is a sphere where the relation between religion and quality is more than obvious – it is religious-ethnic quality, hygiene and ethic and certification control regulation of the Islamic products *Halal*, of Jewish products *Kosher*, etc. Unfortunately, the majority of European quality management and certification textbooks and manuals do not baselessly include products religious-ethnic, quality and certification aspects. Quality sciences and quality academics must always be pioneers in innovations of management tools for business practice and society. This sort of certification can be directed to both products and their manufacturers.

Today this quality field is very important for all Europe countries business development. The Arabic word *Halal* is related to food and means "authorized by Islam". World's turnover of the food corresponding to Halal quality is impressive – more than 630 billion (!) dollars yearly, or 16% of the world food market. The world turnover of all Halal products (food, cosmetics, perfume, hygiene stuff, etc.) exceeds 1000 billion dollars yearly (Riaz, Chaydry, 2004). In France, the yearly Halal product market is about 4 billion Euros, and every year this number grows by 15%.

The religious-ethnic quality regulation includes the following spheres and products:

- activities of enterprises manufacturing products and of enterprises of the whole support chain of those products;
- terms of growing, selecting and killing animals;
- requirements to the personnel;
- hygienic requirements;
- religious requirements;
- accreditation of certifying organizations;
- quality of food and ingredients;
- quality of perfume-cosmetic products and their ingredients (see Fig. 4b);
- quality of self-hygiene products;
- quality of drugs and medicaments and their ingredients;
- quality of other products.

Our analysis shows that religious-ethnic requirements considering hygiene and product safety are mostly compatible with the corresponding "elite" requirements. The importance of the Halal product business is proved by the well-known international organization for the quality and ethics of agricultural products and food standardization "Codex Alimentarius" belonging to World Health Organization (WHO) and Food and

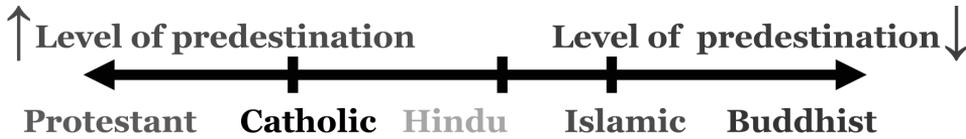


FIG. 6. Religion and quality – is there any relationship? Level of Predestination
 ("Sketch" of author's exploratory study)

(Source: Designed by the author using [13]).

Agriculture Organization (FAO) since 1997, which dedicates part of their developments to Islamic and Jewish products mentioned above. Unfortunately, the specific quality and certification requirements of Halal and Kosher products are little known by the majority of European businessmen; this fact, in our opinion, has a negative impact on the development and competitiveness of this business niche. Several Lithuanian companies already manufacture and export Kosher (veal, strong alcohol drinks) and Halal (milk powder, starch, flour products, etc.) products. In some restaurants of Vilnius, the capital of Lithuania, it is possible to taste various meals corresponding to specific and subtle world religions' quality requirements. The Halal product certification infrastructure development and the expanding manufacture of these products in Kazakhstan can stimulate export as well as the internal consumption of such products.

There are several statements following from our previous studies in search of a relation among quality, religion and business. In Azzi-Ehrenberg's model, religiosity is more or less concerned with the hope of salvation. The more time people devote to religious activities, the higher is the probability they will get to heaven after death: more prayers now – more enjoyment and afterlife consumption. Busy people pray less and consume more now (McCleary, Barro, 2006). In highly predestined countries, people devote less time to religious matters and spend more time on economic activities (e. g., Protestants). In contrast, Buddhists spend more time on praying to earn a higher probability of salvation (Fig. 6).

Interrelations between world religions and quality as well as the influence of national cultures and religion on the efficiency of modern quality management methods demand more profound scientific researches.

5. Communication of the ideas of quality

The vitality the ideas of quality as well as the effectiveness of the tools of quality strongly depend on two major factors – the way of communication to both public and business sector institutions and the level of awareness of organizations' executives, managers and society members in general.

Higher education institutions play an important role here as well. The oldest universities in Europe at all times were treated as cradles of innovations, new ideas and values. It is important to highlight that the values and activities of modern higher education institutions, affected by the present-day environmental conditions related with modern economy,

globalisation and internalization of science and studies, should cover quality management, environment protection, social responsibility and other spheres of sustainability and excellence. That is why it is advisable for universities and colleges to form social responsibility and sustainability development strategies, including involvement of different resources, sparing and frugal culture, or development of an institutional quality, environmental protection and sustainability management system. These practices have been adopted by several universities in Germany and in Scandinavian countries. To be a pioneer in this sphere is an affair of honour for every university as well as one of their modern missions.

The application of quality, sustainability and excellence policy could raise students' awareness in management, sustainable development, social responsibility not only from theoretical manuals but also from practical university activities, if the range of the higher institutions' functions could be broadened by the mentioned innovative areas. Therefore, after graduation from universities or colleges, the gained experience and knowledge could be disseminated broader. The spread of one's own positive experience and best practices is not only a principle of total quality management, but also one of the most important objectives of a higher institution's mission. Such practices would benefit a university or a college not only materially, educationally, or culturally, but it would also improve the image of European higher institutions among the global academic community, business professionals and society.

Worth noting is also the significant insight of the quality guru B. P. Crosby: *“Quality is the result of a carefully constructed cultural environment. It has to be the fabric of the organization, not part of the fabric”*.

Conclusions

The development of quality, commodity science, and quality management concepts covers a very long period of time difficult to imagine – approximately one million years. During this period, the core objects of quality have changed significantly – from the quality of primitive working tools to commodities, then the quality of services, processes and organizations, organizational performance, etc. The same trend could be noted in the field of quality management coverage. In the old approach, the quality management field covers products and services and organization activities. In the contemporary approach, the quality management field covers the old objects and many new areas such as social quality (i.e. quality of life and working life, studies, persons, corporate social responsibility, etc.), quality of economics, business excellence, sustainable development quality, intellectual products (i.e. brands, know-how, industrial design, etc.), etc. The target of quality management also changed – from the producer to the consumer as citizens and other stakeholders. The mentioned global economic and social changes have determined the need of the new quality management tools as well as their systematic development

and implementation (from basic quality inspection and control tools to sophisticated TQM, GQM, excellence and sustainability methods and models).

Commodity science is the oldest discipline in applied management and commercial sciences. It was developed in the 16th century. The contemporary commodity science is one of the fundamental disciplines of commerce; its main object is commodity assortment, quality, commodity economics management and commodity identification peculiarities. Innovations in product technology, construction, composition, and the range in stock, as well as the globalisation of trade in recent decades necessitated creating a system which could guarantee product quality and safety on a worldwide scale. It became impossible to achieve this goal by using the methods and means of classical commodity science alone. Gradually, commodity science branched off into independent areas of study, such as qualityology, quality management, product and environmental management, qualimetry, quality culture, total quality management, design of quality, security and environmental management systems, quality auditing, standardization, quality of intellectual products, sustainable development, etc.

Author gives the following possible commodity science and quality management development insights to quality scientists, consultants and practitioners:

- development of a rigorous methodology of the calculation of QMSs and other management systems' design, implementation and maintenance costs and their effectiveness;
- evaluation of the standardization, QMSs, environmental management systems and eco-labeling tools efficiency and influence on a company's value added and a country's gross domestic product;
- evaluation of the real and the comparable values of management system certificates delivered by different conformity assessment institutions;
- studies of the influence of national cultures and world's religions on the effectiveness of modern quality management methods;
- quality of a state government and public sector;
- quality of working life (including academics' life);
- quality management in specific activities (religious organizations, political parties, force structures, legal activities, etc.);
- development of the methodology for evaluating the value and quality of intellectual products (trade marks and brands, industrial design, know-how, products with certificates of geographical origin, copyright and neighbouring products, etc.);
- ecological footprint conception development and its communication to the businessmen, employees of governmental institutions and to society;
- studies of the emotional and attractive quality content, evaluation and measurement;
- global quality management (GQM): conception, theory, methodology consolidation and development.

REFERENCES

- Arauz, R., Matmuo, H., Suzuki, H. (2009). Measuring changes in quality management: an empirical analysis of Japanese manufacturing companies. *Total Quality Management & Business Excellence*. Vol. 20, No. 12, pp. 1337–1374.
- Beržinskas, G. (2008). Elevator ethics. Moral doctrines for leaders, teachers, educators, and executive. Vilnius: Vilnius University Press. 452 p.
- Deming, W. E. (2000). *The New Economics for Industry, Government and Education* (2nd edition). MIT Press: Cambridge. 463 p.
- Fisher, N. I., Nair, V. N. (2009). Quality management and quality practice: perspectives on their history and their future. *Applied Stochastic Models in Business and Industry*. Vol. 25, pp. 1–28.
- Hahn, G. J., Doganaksoy, N. (2008). *The Role of Statistics in Business and Industry*. Wiley: Hoboken, 2008. 325 p.
- Juran, J. M. (1995). *A History of Managing for Quality*. ASQC Quality Press: Milwaukee. 299 p.
- Kano, N. (2001). Life cycle and creation of attractive quality. 4th International QMOD Conference Proceedings. Linkopings University, pp. 1–12.
- Kim, K. Y., Chang, D. R. (2007). Global quality management: a research fFocus. *Decision Sciences*, Vol. 26, Issues 5, pp. 561–568.
- Kozioł, J., Koziołowa, A. (1995). New trends in commodity science. Proceedings of 10th IGWT Symposium. Beijing, pp. 654–659.
- Kozioł, J., Koziołowa, A. (2006). Commodity science and ethics in food production and trade. *Interferențe economice*, Vol. 20, pp. 78–83.
- Lofgren, M., Wittel, L. (2005). Kano's theory of attractive quality and packaging. *Quality Management Journal*, Vol. 12, No. 3, pp. 7–20.
- Makijovaitė, R., Ruževičius, J. (1998). Problems and perspectives of TQM implementation in Lithuanian education institutions. In *Qualité totale et enseignement supérieur*. Université de Toulon-Var et Université de Verona, pp. 139–144.
- McCleary, R. M., Barro, R. J. (2006). Religion and economy. *Journal of Economic Perspectives*. Vol. 20, No. 2, pp. 49–72.
- N.N. (1996). *Total Quality Management at European Universities and Business Schools*. Rotterdam: EFQM. 110 p.
- Nucci, R. (1996). Il momento del Quality Manager. *Largo consume*, Vol. 2, pp. 128–130.
- Riaz, M. N., Chaudry, M. M. (2004). *Halal Food Production*. London: CRC Press. 420 p.
- Ruževičius J. (1995). Vergleichende Warentests und die Möglichkeiten ihrer Anwendung in Litauen. *Forum Ware*. Vol. 1–4, pp. 64–65.
- Ruževičius, J. (2005). Quo vadis, qualitologia? *Economics. Research Papers*. Vol. 72, pp. 50–65.
- Ruževičius, J. (2007). *Management de la Qualité*. Vilnius: Édition de l'Université de Vilnius. 235 p.
- Ruževičius, J. (2010). Globalizarea oi calitatea. *Calitatea – Acces la Succes*, Vol. 1–2, pp. 5–14
- Ruževičius, J., Beržinskas, G. (1995). Commodity science in the 21st century. Proceedings of 10th International IGWT Symposium. Beijing, pp. 727–728.
- Ruževičius, J., Makijovaitė, R. (1998). Total quality management: philosophy, methods, models. *Forum Ware*, Vol. 1–4, pp. 58–65.
- Ruževičius, J., Wager, E. (2007). Eco-labelling in Austria and Lithuania: a comparative study. *Engineering Economics*, Vol. 4, pp. 96–102.
- Shewhart, W. A. (1989). *Les fondements de la maîtrise de la qualité*. Paris: Economica. 331 p.
- Todorut, A. V. (2010). The way towards Global Quality Management – GQM. *Qualitatea – Acces la Succes*. Vol. 5, pp. 28–31.
- Wager, E. (2006). The history of the International Society of Commodity Science and Technology. In IGWT, p. 1–2, <http://www.wu.ac.at/itnp/igwt> (accessed 15.05.2010).