

Evolution of Commodity Science in Central Europe with special consideration to the development in Austria and Germany and new European Perspectives*

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1 Introduction

Commodity Science is placed between natural and social sciences. Scientific research on commodities was first focused on food and raw materials from organic and inorganic environment, and later switched over to technology and economy. During this development technology and sciences of materials and goods separated, the former became settled at technical universities, the latter at economic universities. In the last century commodity science in some universities mainly was reduced to its economic aspects and vanished when it associated with marketing or other microeconomic specialisations.

During the past three decades public consciousness was attracted by environmental subjects, what meant a new approach towards natural sciences, especially under the paradigm of sustainable development: ecology, protection from threats to human health caused by products and techniques and recently socio-economic dimensions enriched the discipline.

2 Origins of Commodity Science

Herbals and pharmacopoeia written by medieval monks in monasteries may be regarded as early roots for commodity science, describing carefully pharmaceutical drugs, their healing and toxic effects and falsifications. They included advice on health effects of goods of everyday life (e.g. when to prefer clothing material from cotton, linen or wool, how to treat these textiles)¹. Later this early branch of commodity science focused more and more on food. Modern codices, e.g. for food, might be interpreted as successors of these early books of commodity.

By the development of commerce the description of commodities and their quality became more and more interesting for merchants. This is evidenced by the book written between the 9th to 12th century by the *Arab Ali ad Dimišqui* on considering the beauty of commerce and the knowledge of good and bad commodities and their falsifications caused by cheating². One of the oldest books on commodities in Europe dates back to the 14th century and is *Francesco Balducci Pegolottis* "Prattica

¹ ARANO, Luisa Cogliati (Hg): Tacuinum Sanitatis, Reprint, München 1976

² [http://www.muellerscience.com/WIRTSCHAFT/Geschichte/Lit.oekonomischeSchriften\(2440v-1850\).htm](http://www.muellerscience.com/WIRTSCHAFT/Geschichte/Lit.oekonomischeSchriften(2440v-1850).htm)

della mercatura“ (1335) describing commodities traded with China, dimensions, weights and commercial pathways³.

After the discovery of America new commodities like exotic food came to Europe. Special regard was given to luxury goods and products affecting health.

It was the aim of traditional commodity science to inform producers, merchants, market controllers and consumers of the origin, components and characteristics of commodities traded on the markets. Centres for commodity science developed first in towns with commerce and trade, fairs, and handicrafts.

3 Encyclopaedic Phase

In an encyclopaedic phase (18th century) commodity sciences' researchers tried to document the complete knowledge of their period. They worked product oriented. With developing technology details and the description of all known inventions was added. Comprehensiveness of commodity knowledge seemed to be a realistic those days. Up to this time numerous techno-economic encyclopaedias were published and culminated during the 18th century witnessing how closely real economy was linked to business activities⁴.

Günther Ludovici wrote a complete encyclopedia for merchants "Eröffnete Akademie der Kaufleute" or "Vollständiges Kaufmannslexikon" (1752 - 56 Leipzig) in five volumes. In the last volume he used the term „Waarenkunde“. He separated his work into a general and a special section and maintained to reflect the entire knowledge on commodities and commodity⁵.

In 1804 *Johann Michael Leuchs* published his work on "Trading systems". He developed commodity science on an economic basis, taking into account the requirements of trade and commercial interest. He distinguished commodities according to their functions and effects for use. This view was revived at the end of the 20th century, when consumer research was enforced⁶. *Johann Carl Leuchs*, his son, developed a theory on the storage and maintenance of all objects (Nürnberg 1820)⁷.



Johann Beckmann (1739 – 1811)⁸ is acknowledged as the „founder“ of Commodity Science and Technology“ in the German speaking world. He was a scholar with interdisciplinary qualification, who had studied several sciences reaching from theology, natural sciences to economics. He was professor at the University of Göttingen and corresponded with the German poet and scholar *Johann Wolfgang Goethe* (1749 – 1832). Among his important scientific works for Commodity Science were

³ Encyclopædia Britannica. 2008. Encyclopædia. Britannica Online. 28 Nov. 2008.

<http://www.britannica.com/EBchecked/topic/448783/Francesco-Balducci-Pegolotti>.

⁴ KÜNITZ, Georg: Ökonomisch – technologische Enzyklopädie. *Originalausgabe*: Oeconomische Encyclopädie oder allgemeines System der Land-, Haus- und Staats-Wirthschaft : in alphabetischer Ordnung. Bd. 1 - 242. Berlin : Pauli, 1773-1858. <http://www.kruenitz1.uni-trier.de/biblio/toel1880.htm>. 28. November 2008

⁵ LUDOVICI, Carl Günther: Eröffnete Akademie der Kaufleute oder vollständiges Kaufmanns-Lexicon. 2., verm. u. verb.. Aufl., Bd. 1 - 5, Leipzig: Breitkopf, 1767-1768.

⁶ LEUCHS, Johann Michael: System des Handels, Nürnberg 1804

⁷ LEUCHS, Johann Carl: Lehre der Aufbewahrung und Erhaltung aller Körper, Nürnberg 1820

⁸ Foto: <http://www.johann-beckmann-gesellschaft.de/jb-technologie.html>

- “Vorbereitung zur Waarenkunde - oder zur Kenntnis der vornehmsten ausländischen Waaren” (2 Bde., Göttingen, 1793 - 1800) which was an introduction to commodity science, referring to the knowledge of the most luxury foreign goods.
- “Anleitung zur Technologie” (Göttingen, 1777) or “Zur Kenntniss der Handwerke, Fabriken und Manufakturen” including technological guidelines.
- “Beyträge zur Geschichte der Erfindungen” (five volumes, Leipzig 1780 - 1805) representing a systematic documentation on handicrafts and manufacturing of the time.

4 Empirical Phase⁹

The 19th and beginning 20th century was the most prosperous time for commodity science, accompanied by the progress of natural sciences. Commodity knowledge was largely derived from experiments and material testing.

In the course of the Industrial Revolution technology had separated from economics and became an own discipline – namely engineering. Commodity science developed towards a commercial discipline. Scientific specialisation took place in particular fields like those of raw materials and technology. The new natural sciences and techniques like microscopy were introduced into school education, technology and commodity science became integrated parts in commercial school curricula. As knowledge exploded rapidly, books were no longer encyclopaedic but had the character of study literature. The books for students and studying assigned the commodities of their time to the realms of minerals, plants and animals. This shows us, however, how simple the world of commodities was as compared to today’s, where we have some hundred thousands of synthetic and partly xenobiotic substances circulating in human society and environment.

Scientific collections (herbaria, models of plants, mushrooms, drugs and spices, textile fibres and food, goods from overseas) were established. There was a quest for natural classification systems of these objects. Simulating the natural science based attempts of classification was the ambition of classifying commodities in hierarchical order by using general terms and sub terms (binomial nomenclature). Such systems have been created by Carl Linné (1707 – 1778) for botany and zoology in dichotomous (branched) order and are based on morphological structures. Inspired by microscopy and morphology material testing became important for commodity science. But, unlike in natural systems these investigations could not provide the criteria for a classification system in commodity science and finally these attempts failed. At last, in our days, pragmatic classification systems like the NACE code became accepted for application in economy, statistics etc.

⁹ Hölzl, J: Geschichte der Waarenkunde in Österreich. Schriftenreihe des Institutes für Technologie und Warenwirtschaftslehre der Wirtschaftsuniversität Wien, Bd. 5/1982



At the end of the turn from 19th to 20th century the focus was on organic raw materials. In 1873 *Julius Ritter von Wiesner (1838 – 1916)*¹⁰ wrote a book "Die Rohstoffe des Pflanzenreiches"¹¹ (1873) dealing with the technical important raw materials derived from plants. The outstanding character of this work is reflected by the fact that the 5th edition appeared nearly one century later in 1962. Wiesner was against the expansion of commodity science and the integration of new products. These should be left to specialists, he claimed.

It is remarkable that in 1965 Hölzl and Bancher¹² edited a concise book on the formation and characteristics of organic resources which based the knowledge of organic natural raw materials on cytology, physiology and morphology of the cells. Maybe this was an attempt to reinforce the link between natural science and economic interests when new topics in commodity science had already established.

Today these two works are nevertheless interesting because we are discussing the substitution of mineral based raw materials by materials produced from renewables e.g. the production of biodegradables.

5 Consumer Research and Environment

In the course of the 20th and on the turn to the 21st century new topics evolved in commodity science and technology. The rapid development of technology and industry had scattered the field of commodity science and technology on the one hand, but on the other hand had outlined the importance of issues like questions of quality, customer satisfaction and at last environment. Between the two World Wars important changes were initiated and mainly perpetuated till today:

Commodity Science drew back from natural science – commodities were interpreted as central phenomena of economy and a manifestation of technology¹³.

A rapid industrial development, especially in the chemical and electronic industries, inspired by military inventions (dual use goods) took place.

An explosion of the number of kinds and the quantities of produced and exchanged goods, produced by newly emerging techniques, could be observed in shrinking intervals of time.

Micro economics and its sub disciplines (marketing and advertising) competed with commodity science, which lost importance in capitalist systems. Under the influence of the Anglo-American interpretation of legal compliance, policy switched from command and control towards voluntary approaches. Public interest of controlling products by state owned institutions, which had close

¹⁰ WIESNER, Julius: Die Rohstoffe des Pflanzenreiches. Leipzig, Berlin, 1914

¹¹ (Foto: <http://openlibrary.org/details/dierohstoffedesp03wies>)

¹² HÖLZL, Josef. u. BANCHER, Engelbert: Bau und Eigenschaften der organischen Naturstoffe. Wien, 1965

¹³ GRÜNSTEIDL, Edmund: Warenkunde und Technologie. In: 50 Jahre Hochschule für Welthandel in Wien, S. 119 - 128

connections to commodity science community, vanished. Quality management systems, intended first for military structures, advanced into nearly all compartments of civil economic life – for commodity science this meant in the long run a replacement of classic quality testing by quality management systems, and attracted the attention of researchers from Commodity Science and Technology.

In the 70ties consumer research and commodity testing (Warentest) had been among the leading topics of commodity science, human needs and health had been of concern on international meetings. When in the 80ies and 90ies environmental limits became more and more obvious, environment was already an important issue in commodity science and technology: questions of energy supply from renewable sources, use of renewables for materials, waste collection, recycling were among the first environmental subjects considered in those days. Quality management on process and product level was enriched by environmental management systems and management of occupational health and safety. On product level quality labelling was amended by environmental aspects and characterized by the certification with ecolabels of manifold kinds and reliability. Recognising the importance of these topics and paying scientific attention to them Commodity Science and Technology proved to be very up to date in the sustainability scientific scenery. Thus it was anticipating modern environmental policy on EU level.

In the 1970ties EU environmental policy had focused on end-of-pipe-technologies (e.g. filter technologies “catching” the environmental pollution at the end of the production process), demanding to observe thresholds for emissions („command & control“ policy). Problems were often transferred from one environmental sphere into another (from water to soil for instance by depositing the sludge from polluted water). Waste had been deposited, before it was discovered that it could deliver valuable materials. During the following period of globalisation control measures by public authorities were reduced in favour of volunteer adherence to standards and rules, which guaranteed that legal targets were obeyed to. This should encourage enterprises to continuous environmental improvement, a strategy which certainly induced much progress in sustainable production patterns but consumption was identified to be responsible for further environmental degradation. One - for commodity science and technology very interesting - consequence of this perception was the change of the focus of environmental endeavours: in 2000 the Greenbook of Integrated Product Policy (IPP)¹⁴ was published. From now on the entire environmental policy was concentrated on products and their life cycles. The overall target is the improvement of the environmental performance of products and services within a life-cycle context. Ecodesign, ecolabelling and consumer information are among the tools of this policy. These topics were not actually new for commodity science and technology but they needed to be treated on the basis advanced framework.

6 Information based phase

Based on the possibilities of communication, of networking, of collecting and managing information new developments on the turn from the 20th to the 21th century offer further chances for the development of commodity science and technology:

- E-commerce makes it necessary to describe the characteristics of products in a way that the consumer gets the technical information, which he requires for buying a product by internet. He shall also get enough description on the shape and design of the product to imagine well what he buys.

¹⁴ Green Paper on Integrated Product Policy. KOM/2001/0068 endg

- Ethic consumption refers to the social conditions under which a product is made, including occupational health risks caused by technologies and materials.
- Legislative framework for environmental safety and health of products and technologies demands more responsibility from producers and consumers.
- Calculation of life cycles and environmental impacts of products requires a deep insight into production processes and materials and in the behaviour of consumers.
- Product Innovation and ecodesign are intended to develop “green” products. Environmental and health risks must be foreseen and minimized by the choice of technologies and materials.
- Reporting schemes collecting characteristics and risks of materials and commodities are dedicated to facilitate trade between enterprises (e.g. safety data sheets), market surveillance and to ensure consumers’ safety. Most important are REACH -Registration, Evaluation and Authorisation of Chemicals¹⁵, RAPEX - Rapid Alert System for non-food consumer products¹⁶ and RASFF - Rapid Alert System for food and feed¹⁷.

Commodity Science and Technology bears many traditional roots of these initiatives and should endeavor to integrate further the new developments into its knowledge base. It should as well contribute to their progress and reasonable implementation. On university level this would imply to influence curricula for business students in order to integrate real economy in their qualification and to avoid problems caused by insufficient knowledge of interdependencies between economic, natural and social systems.

7 Conclusion

We can observe the development from a relatively small basis of goods (few groups of goods in few quantities) at the beginning of modern time to a tremendous amount of goods of different kinds and quality today.

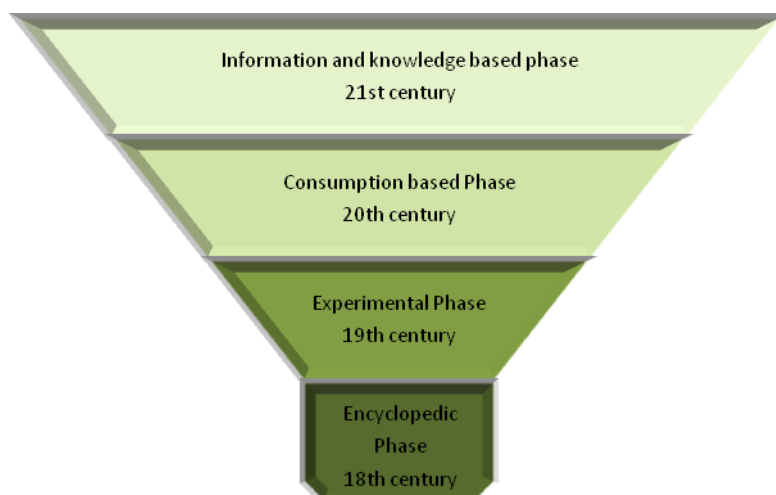


Fig. 1 : Evolution of Commodity Science and Technology (source: by the author)

Starting with mere description of natural products and manmade commodities, commodity science developed from an encyclopaedic phase up to the 18th century, to an empirical phase in the 19th century of investigating and testing commodities. In the 20th century consumer orientation and

¹⁵ http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm 28 Nov. 2008.

¹⁶ http://ec.europa.eu/consumers/safety/rapex/index_en.htm 28 Nov. 2008.

¹⁷ http://ec.europa.eu/food/food/index_en.htm 28 Nov. 2008.

fitness for use became important subjects, before in the 21th century investigation of products' impacts on health and environment was focused and supported by information based technologies. This contribution considers initiatives and instruments within the EUs Strategy of Integrated Product Policy as an important starting point to adjust commodity science to modern demands of society and science.

** This paper was published in the proceedings on the 60th Anniversary of the Commodity Science Department Conference with entitled " Traditions and Perspectives", University of Economics Varna, Bulgaria, 2009*