

EUROPEAN ECONOMIC INNOVATIONS – Postclassical Period

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Overview Just as the early modern centuries perpetuated myths about the ‘dark ages,’ they minimized the extent of innovation and technology in the long period from the Fall of Rome to the Renaissance. The fact was, that during the latter half of this period, western European cultures developed a number of significant life and economy improving innovations. We start with a few earlier innovations, then sample some later ones.

Earlier mediaeval innovations Innovations tend to arise as solutions to distinctive problems, not as systematic explorations of theory, like the hypotheses which generate major scientific developments. It is thus that we find the earlier mediaeval period addressing issues arising from agricultural practice, issues of domestic comfort, and architectural challenges. The innovative responses to these challenges were as various as the *heavy plough*, the *horse collar*--into which much time consuming practical experimentation was invested, and *horse shoes*, which were regularly applied by the 9th century; the *hypocaustic heating systems*, installed for example in the basements of monasteries, and which, though preceded by a long Roman tradition, were refurbished and activated to deal with the extreme cold of many early mediaeval dwellings and buildings; *the rib and barrel vaults* designed to carry the heavy weights of Romanesque architectural structures, and the elegance of which strikes us in the earliest churches of the mediaeval period, like Charlemagne’s Palatine Chapel, dating from 800 C.E.

Innovations of the later mediaeval period With the development of trade and the industries flowing into it, by the eleventh century C.E., the western European world found innovative ways of dealing with a wide range of challenges--agricultural, industrial, navigational, military, and of direct interest to personal comfort, like eyeglasses.

Agriculture By the later Middle Ages, the heavy plough was in widespread use, facilitating the deep turnover of soils, which, in places like Northern Europe, were often frozen, and required powerful *ploughshares* to prepare them. There was also fruitful experimentation in the planting of three field crops, with one field left fallow, so the soil could regenerate.

Industrial Stationary harbor cranes, while invented by the Greeks, were greatly strengthened and streamlined during the later Middle Ages, and could be employed to load and unload heavy maritime shipments in the major European ports.

Navigational Improvement in nautical compasses, and in the development of the stern-post rudder, added to the accuracy and safety of navigation.

Military Late mediaeval military movements profited from the development of neck-protecting helmets and full suits of plate armor. Gunpowder and cannons were brought to a new level of power by the 13th century.

Personal comfort By the 13th century, in Italy, eyeglasses were readily available to the wealthy, and brought that life enhancement many of us live by today. Mechanical clocks were in use in Europe by the 14th century.

Readings

White, Lynn, *Mediaeval Technology and Social Change*, Oxford, 1962.

Giles, Frances and Joseph, *Cathedral, Forge, and Waterwheel: Technology and Invention In the Middle Ages*, New York, 1994.

Discussion questions

Why was there relatively little innovation in the early centuries of the Middle Ages, then a major uptick in the twelfth century and after?

What were the major technical innovations required by the construction of the Gothic Cathedrals of the thirteenth and fourteenth centuries?

What will have been the consequences for human development of the invention of useable eyeglasses and then the printing press, in the Late Middle Ages and Early Modern periods?