How many built all the churches?
Was the Master Mason busy?
Adapted from *Avista Forum,* 2002
William Wallace, *Michelangelo, God's architect,* Princeton, 2019, 191-3

I have wondered for a while if it would be possible to estimate the proportion of the population involved in the construction of churches at the height of the building boom of the twelfth century, quite apart from all the other efforts being made on castles, city walls, domestic housing, palaces etc.

I doubt if there is any way to make a truly valid comparison between our costs and those of the twelfth century, though the following argument may make a worthwhile contribution. It is based on the idea that if we were a) to calculate the cost of a great church built today we could estimate how many men would have to be employed to construct it, and b) find a way to work out the amount of building work under way, then we could c) estimate the total workforce occupied in church-building at that time. Approximate as this would be, it could provide a starting point for further discussion.

In my article on the economics of medieval building I created an artificial unit to use as a measure of value.[1] This was defined so that four of them would be enough to construct a small aisle bay, with a wall on one side, piers, paving and vault.

Using this definition, a small church like Cerseuil would have 'cost' 77 work units, and a major one much more. The cathedral of Chartres needed a total of 5,650 units for the rebuilding after 1194, plus 700 for the western section and towers, or 6,350 altogether. To provide a modern equivalent I estimate that in 2003 dollars Australian, Chartres would have cost $470 million.[2] This included stained glass and sculpture.

We can therefore estimate that the value of the work units used in chapter 40 would be about $83,000, in current Australian dollars, and that altogether over a century 124,000 units were spent on church construction.[3]

Would the modern cost of Chartres and the unit-costs of the twelfth century give a meaningful estimate of the number of men employed in the trade in 1200. The more direct method of using known (if later) medieval rates of pay has not worked as we can seldom determine the numbers of men employed in each place.

From the "Funding" study, the total units spent on churches in the Paris Basin between 1190 and 1200 - the decade with the largest quantity of work under way - was 26,680. At $83,000 per unit this would have been the 2003 equivalent to $2.2 billion for the decade, or $220 million per year.

In less active periods, especially before 1120 and after 1240, these figures would have been reduced to one third or less.[4] In our terms this is not a particularly extravagant figure, though we should not forget the enormous differences in population, societal wealth and fiduciary skills. Though there is no accurate way to establish a meaningful labour rate that could be used to equate medieval working numbers with ours, there is a way to extract some useful information.

In "Funding" I estimated that at Chartres the height of construction activity occurred just after 1200, with about $20 million being spent each year. This was about 10% of the mount spent in the Paris Basin that year.

Using average Australian wage rates, including holidays and insurance, this sum would have engaged 340 men altogether on the cathedral. It would have included those on the site, those at the quarry face, the carters, wood cutters in the forest, any skilled carvers and sculptors in the site shops and those laying the stonework. It would have included apprentices and carters and smithies.

If ten percent of the labour force was being employed at Chartres, then there would have been some 3,400 labourers, masons, sculptors, and carpenters working throughout the Paris Basin in 1200. In fact, the number could have been greater, as these calculations assume all were in full-time employment, which would be unlikely in a society which diverted any available manpower into the harvests.

With these workers were those that supplied them for their nourishment, clothes, and so on. If we use today's ratio of five to one, this means that over 17,000 were in some way dependant on the building industry.

To include the full population affected by the building trade, we should extend this further. Taking an average family of 4 to 4.5 people, perhaps 70,000 men, women and children were in some way or another supported by work on churches.

Let's make a wild stab here, and suggest that full total of churches, cathedrals and abbeys still visible represents one third of what was being built in 1200. After all, over the centuries much has been rebuilt, most conventual buildings destroyed, along with most cloisters, episcopal palaces, and many churches of all sizes. I estimate that at its peak religious building could have involved close on 200,000 people.

Fossier and Fourquin have attempted to estimate the population of France.[5] Their best estimates were close to12 million for the whole of medieval France in 1328, and maybe 9 million in 1200. From these sources the fertile lands and cities of the Paris Basin may have supported a quarter of these people – a little over 2 million.

Taken together, these figures suggest that in the busiest times about ten percent of the population was in some way or another involved in religious construction.

In a non-industrial period without the organizational infrastructure, the sophisticated lending procedures and highly competitive workforce that we can employ, and especially in the medieval period when most people were involved in full-time farming, to divert such numbers and resources into church construction may have affected the economic balance of the community. Contentious as most questions on medieval economics are - from plague, climate change, war and over-population – it is not improbable that the imbalances caused by such large numbers may have helped to precipitate the sharp decline in building activity apparent in later decades, and especially after 1240.

Was the Master Mason busy?

A building is far more complicated than its depiction in a drawing. There is little relationship between a drawing and actual construction. It is one thing to add a line to the drawing and quite a different undertaking to raise a stone at the building site. The drawing does not predict the stresses placed on the stone, and so engineering requirements complicate design.

On a daily basis every master was confronted by problems of labour and logistics and engineering. Here is a short list of what he could be expected to deal with: How many blocks of stone are needed today; who would make and deliver the templates to the men at the quarry and to the men on site; how many stone carvers should be employed; how much blocking-in should take place in the quarries and how much on site; who could be trusted to oversee both the carving and transport operations; how many carts would be needed to bring the material from the quarry to the building site; is there a way to speed up the delivery operations; how manage in the mud and rain; how much would it cost; did we have a man to receive each load so precious stones would not be dumped anywhere; are there thieves and bandits on the roads; where would the stone be stored until the masons were ready; what would we do with the detritus from stone and timber; how much finishing should be done before the stone was lifted into place; what equipment and skilled labour was available to complete an urgent task; where would the imagiers work and what tools would they need; should the existing forge be expanded for sharpening tools; do we repair the bridge from the quarry; how many barrows or donkeys do we need today; should the blocks be moved by cart or on rollers; are the hoists and cranes functioning smoothly; will the rope be strong enough to lift a one-ton block; are the ropes long enough; is there enough rope in storage and is it protected from the weather; how much material could be transported to the upper levels of the site on the available cranes, or were more needed; how much animal shit will be deposited around the working site and should someone be directed to clean it on a daily or weekly basis; should straw be laid down if the site was too slippery or muddy and where will it be stored; where would the workmen be accommodated; who would clean and care for them and provide their meals; who could talk to the priests about the disruptions from noise while the scaffolding is being erected; provide enough room for the hoist as well as the workers to manoeuvre the stones into position; who could deliver the timber for scaffolding and who is skilled enough to design and erect it; is there time to dismantle and move the scaffolding and to a different section; once the block is raised is there a secure platform for it and all the materials waiting to be placed; how much if any carpentry will happen after the vaults are complete; how much damage could be incurred while manoeuvring heavy stones into position; how many people may have been damaged and their hands squashed this week; what procedure should be followed when someone is hurt; how should stability be ensured; should kilns be built on site to save time and money for mortar; is there enough room for mixing and storing the mortar; how much water would be required and how soon; will the water supply provide enough for the whole work or will we need additional water carriers to bring water to the site; will townsfolk object to the smell of burning wood or the smell of cut stone or the smell of the horses or the smell and behaviour of the labourers; how many overseers will be required to coordinate these operations; who will be hired as site master; who will be hired to direct the foreman in charge of the individual workers; are there enough labourers; is the wage good enough to attract the best men; who among the workers has specialised skills; were there enough individuals able to work on the upper stories and balance over the void of the rising curving vaults; how many men could be counted on for the long term; what's the pay scale for labour stability; who controls the constant investment of funds and who is in charge of bookkeeping; who checks the purchase of substandard material; who could be relied on to deal with corruption; should the men be provided with meals, and should this include the men at the highest construction levels; who was there on site through the night to prevent theft; with the unpredictable weather …..

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[1]   James, "Funding".
[2]   "38 What price the cathedrals".
[3]   "40 Funding", Table 40-3.
[4]   This is apparent in the numbers of capitals illustrated for the decade after 1240: James, *Ark of God*.
[5]   Fossier, *Peuplement de la France,* 59-99; and Fourquin, "Population".