

Florence Duomo project (1420–1436): Learning best project management practice from history



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Abstract

This paper narrates the project management of the construction of the Florence Duomo by Filippo Brunelleschi in the fifteenth century. This was the most significant dome project in Europe in 1300 years, and possibly the most significant, innovative and complex project of the Renaissance era (Colombo and Lanzavecchia, 1997). It still stands as the largest brick dome ever built. In order to achieve what seemed technically impossible at the time, Brunelleschi researched and adapted the construction and project management of the Pantheon in Rome in the second century. The paper allows us in turn to learn both product and process innovation from this case study, both of which are essential to contemporary project management practice. The case is valuable in understanding key drivers of project management success, and illustrates the substantial potential for learning, and therefore knowledge transfer, from previous historical projects and experiences.

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1. Introduction

In the fourteenth century, Florence had become one of the leading cities of Europe. It had substantial wealth and a fast growing population. To accommodate this population for major religious ceremonies, to attract visitors, and to demonstrate the power of the city the construction of a major cathedral was undertaken. The body of the cathedral was completed in 1367. However, it had no dome or spire — it simply had a 42 meter wide hole in the chancel roof. The governing body, known as the Opera, had plans for a dome but lacked the expertise. For

50 years there was no progress until Brunelleschi, a master architect, was appointed in 1417. He undertook a complex project for which there was no contemporary experience. He thus had to go back to the closest equivalent he could find, the Pantheon in Rome, and sought to interpret, adapt and implement the knowledge involved for the construction of the Florence Duomo.

This paper commences by outlining the method of data collection used for this paper. It then discusses in theoretical terms the significance of knowledge transfer in project management, and the associated practical problems. It outlines the context and constraints of the Duomo project. It discusses how Brunelleschi researched and pitched for the project, illustrating some key practices from the Pantheon and the relevance of these to the Duomo. It then explains the innovative construction of the Duomo and the adoption of both construction and project management best practice. The paper concludes by advocating the significance of learning from historical projects in contemporary practice.

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2. Method

A qualitative review was conducted of known literature pertaining to both the Duomo construction (predominantly architectural), and the life of Brunelleschi. This included the digital archive of primary sources (Haines, 2009), and recent research through documentaries (PBS, 2009). Close attention was paid to the historiography (Grattan, 2008). An on-site visit was also conducted to the historic center of Florence, a living museum with insights into working life in medieval times, and to the:

- Duomo, which is perfectly preserved,
- adjoining on-site museums containing the actual project equipment, and
- nearby *Museo del Opera del Duomo* containing the project designs (paper) and models, Brunelleschi's tools and reconstructed workshop.

In addition, on-site visits were made to the Pantheon in Rome. This data was reinterpreted through a modern project management lens to guide in the discovery process so that today's practitioners would readily recognize the narrative. It became clear that Brunelleschi had gone beyond the contemporary views and thinking of the time to deliver the project. Further literature was collected related to knowledge management which is presented below.

3. Knowledge transfer in project management

Knowledge transfer has become a significant contemporary area of research. Organisations are facing issues associated with an aging workforce and how a transfer of their knowledge is made to less experienced generations (Pollack, 2012). An aging workforce has also been identified as a key concern in project management highlighting the importance of practitioner development (Crawford et al., 2006, p. 725). Furthermore, there is a challenge for practitioners, lacking prior experience, to utilize and apply new materials and technologies to complex project designs, and there is a challenge to project managers to manage and co-ordinate these practitioners.

Brokering or transferring knowledge in general, and in project management in particular, is not yet a grounded theme, and thus it is not used similarly by all scholars and practitioners (Holzmann, 2013). In their paper concerning social practices and the management of knowledge in project environments, Mike Bresnen et al. discuss how the context changes between projects in terms of technology (equipment and materials), organization (how people interact with the technology), and process (when the technology is used):

“There are particular complexities associated with transferring best practices or knowledge between projects as they can differ substantially from one another. Significant discontinuities in flows of personnel, materials and information are created, it becomes difficult to develop steady state routines that maximise the flow of knowledge and the capture of learning from one project to the next”.

[Bresnen et al. (2003)]

Differences in context across groups [projects] can lead to misunderstandings that do not allow a straightforward transfer of knowledge (Bechky, 2003). Furthermore, while it may be relatively easy to research product innovation from past projects, with a view to replication and adoption (as we can do for example with the Florence Duomo), it can be very difficult to understand the process innovation that was involved:

“...developing absorptive capacity for process innovation creates particular challenges, since project learning depends as much on transferring elements of the context and social processes which create the learning outcomes as on transferring the outcomes themselves. Thus, whereas the development of product innovations can be well recorded through design iterations and artifacts, process innovations are less likely to leave such a trail and more likely to generate tacit or informal procedural knowledge”.

[Bresnen et al. (2003)]

The problem of project management knowledge transfer where only the physical output is available to examine without experiential feedback is also one identified by Chou and Yang in their 2012 paper ‘Project Management Knowledge and Effects on Construction Project Outcomes: An Empirical Study’ (Chou and Yang, 2012). Bresnen et al. argue therefore that knowledge transfer (or ‘learning capture’ to use their term) involves matching your team's problem to a comparable successful experience:

“Learning capture then becomes more dependent on the identification of comparable problems/opportunities that the project team's experiences could be applied to, the representation of those experiences as stories of success or failure, and the incorporation of learning into new routines which can be applied elsewhere”.

[Bresnen et al. (2003)]

Szulanski (2000) suggested that knowledge transfer is a process of reconstruction rather than a mere act of transmission and reception. Hartley goes further in his paper *Management history: an umbrella model* (2006) arguing that a study of the past is essential to any contemporary process of change, creativity and collaboration, i.e., fundamental elements of project management:

“One reason organizations are losing their battles to become more efficient is that they do not understand the forces that historically shaped them, are currently shaping them, and will shape them in the future (Roth, 1993). Further to this point, noted scholar Moss-Kanter (1983) observes, ‘conceiving of a different future, change masters have to be historians as well...’”

and

“This apparent neglect of history seems contradictory, damaging even, in a current business environment that is being buffeted with struggles to foster organizational creativity and collaborative management.”

Knowledge transfer in project management involves product innovation, but, more importantly, process innovation. As Hartley

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