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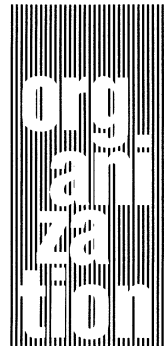
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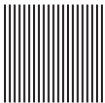
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Work Organization in the Middle Kingdom, Ancient Egypt

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Abstract. *This paper examines original documents from the Middle Kingdom in ancient Egypt (2050–1780 BC), containing material on various practices relating to the organization of work and labour discipline in state projects. The paper explores the roles of accounting and administrative practices in rendering possible the form and functioning of work organization and labour discipline during that historical era. Historical evidence so far removed from the present is clearly open to a variety of readings. Although acknowledging this, the paper argues that, through the compilation of rosters and name lists, the setting of work targets, regular reporting on performance, the application of sanctions against recalcitrant individuals and the determination and distribution of differential wages, accounting and administrative practices established a regime of control that traced workers' presence and absence at precise temporal points and spatial locations and monitored their achievements. The evidence points to a very strong role for both accounting and administrative practices, lending greater credence to the view that the 'visible' hand of administration played a crucial role in the civilization of ancient Egypt.* **Key words.** *accounting; administration; ancient Egypt; control; labour discipline; work organization*



Introduction

'Work and workers needed to be organized so as to achieve a desired level of production and delivery of goods and services. While laborers of all



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sorts were subject to a certain amount of violent coercion, that is not a sufficient explanation of the general successful discipline of labor, nor is the likely correct notion that workers obliged to perform *corvée* labor on major royal projects, such as pyramid-building, were, at least, in part, motivated by religious devotion (i.e., to the monarchy).' (Kadish, 1996: 439)

Although state coercion and religious devotion may have played a part in promoting work discipline in ancient Egypt, the above quote suggests that work organization practices were a more significant factor. Evidence on work organization during the Old Kingdom (2700–2181 BC) is very sparse. As Eyre (1987: 7) has noted, 'The building workforces have left little more than occasional masons' marks on blocks of stone to witness their organization.' The picture that emerges is one in which the organization of labour was effected through division into a hierarchy of groups of differing sizes (e.g. crews, divisions and phyles; see below) entrusted to perform specified tasks under the supervision of higher officials, in return for subsistence rations or 'wages'. Wages were paid in kind (e.g. bread, beer). Most workmen were recruited on a temporary basis for some specific tasks, such as mining expeditions, but there is evidence that permanent craftsmen were employed for skilled quarrying and building. The building of state projects, such as the Great Pyramids of Giza, required the organization of a large labour force over a considerable period of time (possibly reaching 20 years in the case of Cheops' Pyramid). Work materials, such as massive granite stones, were transported using boats, donkeys and oxen. However, as Eyre (1987: 9–10) has suggested for that era, 'Questions of timing and planning, of work organisation and control on site, of recruitment, and of housing and payment of the workforce are largely subjects for conjecture.'

In contrast to the sparse evidence from the Old Kingdom, much more evidence has survived from the Middle Kingdom (2050–1780 BC), which was characterized by an unprecedented emphasis upon precision, administrative detail and control. Historical records so far removed from the present, such as those analysed here, are naturally open to a number of interpretations—for example religious, ceremonial and functional—not all of them necessarily mutually exclusive. My focus in this paper is on the administrative roles that are likely to have been played by these documents. My inspection of the complete translations of numerous original documents reveals the presence of four dimensions of work organization: (i) physical organization of labour, (ii) monitoring and control of workers' attendance, assigning tasks and determining work targets, (iii) reporting on tasks performed, and (iv) calculating and distributing wages. These four dimensions were identified on the basis of clusters of themes that I found to be common in numerous sources, inescapably influenced by my own understanding and reading of the documents. Although not exhaustive, these four dimensions cover some



of the most crucial aspects of work organization even by contemporary standards (see below).

There is considerable scope for accounting to underpin and mediate each of the dimensions identified above.¹ The compilation of rosters, name lists and work groups can be organized in a manner that renders them amenable to accounting calculation and clear delineation of accountability. In allocating work duties, accounting can become central to the determination of work targets and definition of the locus of specific responsibilities. This could be followed by the development of appropriate accounting techniques that would trace out and report on actual achievements, compare these achievements against predetermined work targets and specify the extent to which performance exceeds or falls below expectations. It should be noted at the outset that, given the premodern nature of the material examined here, we should not expect a system of accountability that conjoins both precise time worked out and output achieved, as one would expect to be the case in contemporary organizations, because such a combination of time and physical output has its genesis in the 19th century AD (Hoskin and Macve, 1986). Rather, the evidence examined here points to a control system that sought to ensure that a particular task was completed but without obsessive concern with time targets. Accounting can also play a potentially powerful role in determining wage levels for personnel performing specific tasks and occupying different levels of the hierarchy. In the absence of a currency with universal value, accounting can define value equivalence across a range of products to make payment in kind acceptable. As shown below, accounting practices were called upon by the ancient Egyptian administrators to attend to the roles identified above and to make possible the functioning of a centralized bureaucracy.

The aim of the paper is to explore the interaction between accounting and administrative practices and the extent to which they both underpin and shape work organization and labour discipline. In the context of work organization, spatial and temporal zoning become important attributes of accounting and administrative practices that promote precision, detailed calculations and control. Setting work targets entails expectations of the completion of certain tasks in specified times and places as determined by administrative and accounting practices. Moreover, measuring actual performance against targets involves time-space zoning in which accounting measurement and reporting are heavily implicated. The determination and payment of wages engage a process in which accounting and administrative practices seek to reward labour for their effort, even if the rewards are fixed per type of employee irrespective of level of achievement. These issues have been examined by students of work organization in contemporary settings. The value of this paper lies in extending this examination to the vastly different social, political and economic settings of the Middle Kingdom, ancient Egypt. By contextualizing the emergence and functioning of accounting and administrative

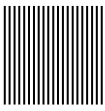


practices within these settings, it is hoped that a more informed understanding can be gained of the roles of accounting and administrative practices in organizations and society.

Writing a paper of this kind poses considerable problems concerning the use of terminology. Terms such as 'work organization' and 'labour discipline' are contemporary and signify meanings whose literal extension to ancient civilizations is problematical. Textbooks on work organization (e.g. Salaman, 1979; Thompson and McHugh, 1995) tend to identify specific elements to work organization that are drawn from industrial and post-industrial Western societies. The strict application of these theoretical frameworks to a historically remote society such as that of ancient Egypt runs the risk of privileging contemporary conceptions. For example, textbooks would typically define labour discipline in terms of a rewards/sanctions structure that is judiciously applied by superiors to motivate subordinates to work harder and faster towards the achievement of specific targets. In the case of ancient Egypt, there are two immediate problems in pursuing such an emphasis. First, only a small fraction of archival material has survived and hence it is likely that any evidence that might relate to the design and functioning of such a reward/sanction machinery has been lost forever. Second, and more critically, insistence upon the presence of a specific element of work organization, such as a finely tuned reward system, presumes that this is the only means by which 'labour discipline' can be achieved. A basic punitive scheme that severely punishes failure but does not offer material reward for success, coupled with strong social sanctions, may function as a potent disciplinary regime. That apart, my focus in this paper upon 'division' of labour, monitoring of attendance, determination of work targets, reporting on work in progress and distribution of rations/wages covers, at least in name if not in the precise meaning of such concepts, the remaining elements considered by contemporary scholars to be key to work organization.

Given the problems noted above, in writing this paper I have sought deliberately to avoid the temptation to engage with theory-laden arguments because of my concern that the epistemology and ontology underlying such theoretical endeavours may not map appropriately onto the historical material examined here. Moreover, there is a risk that the richness and uniqueness of the historical material and the ancient Egyptian context could be impaired if a heavy-laden theorizing is superimposed on the analysis.

The remainder of this paper is organized as follows. In the next section, I provide a brief account of the social, political and economic contexts of the Middle Kingdom in order to help contextualize the historical evidence. Then I examine evidence relating to the organization of work. I consider in some detail methods of drawing up rosters and name lists, and ways of organizing a large labour force into smaller, more manageable and accountable groups. This is followed by an examination of



material relating to the determination of work targets, including time-volume ratios and conversion ratios. Thereafter, I show how the ancient scribes reported on actual achievements as compared with targets. In the penultimate section I examine methods of wage determination and calculation of wage equivalence across different commodities. The final section summarizes the main conclusions of the paper and outlines its main implications.

The Historical, Sociopolitical and Economic Settings of the Middle Kingdom

The Middle Kingdom epoch of ancient Egyptian history was characterized by historical, sociopolitical and economic contexts significantly different from those of the Old Kingdom. The Old Kingdom exhibited high stability, self-assurance and very powerful centralized governments before it collapsed around 2180 BC, followed by 130 years of state disunity and chaos, known as the First Intermediate Period (Grimal, 1992; Kuhrt, 1997). A measure of the problems encountered during this period may be gleaned from the literary text 'The Admonitions of Ipuwer', which laments the weakness of the state and inability to collect taxes:

Lo, Yebu, [This] . . . are not taxed because of strife. . . What good is a treasury without its revenues?. . . See now, the land is deprived of kingship by a few people who ignore custom. . . See, the mighty of the land are not reported to. . . The king's storehouse is 'I go-get-it', for everyone, and the whole palace is without its revenues. (Lichtheim, 1975: 152–9)

At the end of this traumatic period, Egypt was reunited again and the Middle Kingdom was born.

Responsibility of Government, State Bureaucracy and the Economy

The chaos of the First Intermediate Period was not totally eliminated during the early years of the Middle Kingdom, as evidenced by the continued existence of provincial governors of considerable influence (Kemp, 1983). Wilson (1951: 106) has suggested that the Middle Kingdom 'was at first very decentralized and has justly been called a "feudal" state. It is generally recognized that the tight control assumed by the Pharaohs of the early Old Kingdom could not be regained.' However, this is an oversimplification because some Pharaohs of the Middle Kingdom established a fairly powerful state underpinned by a well-developed administration. It was also during the Middle Kingdom that more systematic and detailed bookkeeping emerged (Kuhrt, 1997: 162). There was a paramount expectation that the Pharaoh protected, and provided for, his subjects and secured social justice, an ideal rooted in the concept of *Maat*, which implied truth, righteousness and order among humans and between them and their gods (Hart, 1986; Lichtheim, 1992; Watterson, 1996).

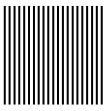


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In the Middle Kingdom, the Pharaoh relied on four crucial functions: the Vizierate, the Treasury, the Priesthood and the Military. These functions were attended to by the Vizier, followed by officials, courtiers, locals and semi-officials (Quirke, 1990). Each town was governed by a provincial official (mayor). The stable periods were characterized by a quest for structure and order effected through careful planning (David, 1986; Kemp, 1989). The system of administration was simply a collection of royal decrees revised to cope with emerging complaints, which were handled through a cycle of decision–complaint–redress (Kemp, 1989). Although trading in local markets existed (Janssen, 1975) no market price mechanism was developed; rather, the economy was regulated in the main via the administrative machinery.

Because of the diversity that characterized the Middle Kingdom, Egyptologists have divided this period into the ‘early phase’ (2050–1878 BC) and the ‘late phase’ (1878–1780 BC). A most decisive discontinuity occurred when, in the 1870s BC, Sesostri (Senusret) III embarked on his Nubian campaign. Seeking to secure Egypt’s borders, he had a channel cut at the First Cataract (near Egypt’s southern borders with Nubia) to allow navigation during low Nile levels from the Second Cataract to the Mediterranean. The extension of the Egyptian borders was not only of political significance; it also had strong economic implications. As Quirke (1990: 2) has put it: ‘Although invisible, the order of economic relations and patterns of transport and communication are transformed at a profound level by the Nubian policy of Senusret III. The policy may be considered both a product of the trend towards greater precision and a major factor for change.’

This decisive break was accompanied by major administrative changes. Many tasks became defined in more concrete terms, previous titles with fairly broad mandates became far more specific, and some completely new title designations were invented. In 1860 BC, ‘a complete reorganization of provincial administration was undertaken by King Sesostri [Senusret] III. As a result, the old system of hereditary monarchs was replaced by a bureaucratic machinery, the operators of which owed their allegiance to the king in his residence’ (James, 1985: 51). Although Quirke (1990: 3) is correct in stating that ‘the innovations may not amount to new methods of operation so much as represent a more exact embodiment of existing practice’, the critical point is the formalization of such practices into specific, carefully defined titles. What is looming large here is the visible hand of administration, which, while externally legitimized through securing the completion of public works and overseeing the economy for the Pharaoh, was simultaneously reproducing and reaffirming itself through the further writing and propagation of administrative titles. A modular organization of society was developed, dividing the population into several distinct groups to promote urbanism and bureaucratic control:



[This model] reflects the prevailing mentality of the Middle Kingdom, which tended towards an extreme structured view of society, apparent both in an inclination to devise arithmetic calculations for every facet of economic life, and in the attempts to control human behaviour and property by means of a strict bureaucratic framework. (Kemp, 1989: 155)

This 'administrative revolution' has been interpreted by James (1985: 136) as the main cause underlying the massive expansion in the number of scribes during the Middle Kingdom:

The strong, centralized, regime of the Twelfth Dynasty generated the settled circumstances in which fine work was produced, including hand-some sculpture, relief-work, and hieroglyphic inscriptions. The same circumstances produced a development of bureaucracy accompanied by a great increase in written documents. Greater scribal activities meant more scribes; the training of more scribes required more scribal schools, and an attention to scribal practices which had not been needed in earlier times.

The above discussion points to a symbiotic relationship that developed between centralization, bureaucracy and account keeping. With centralization being a mode of organizing aspired to by the ancient Egyptian administration, bureaucracy developed to underpin the functioning of the state centralized apparatus. The functioning of this bureaucracy in turn was made possible through the emergence of a professional class of scribes who could readily apply their numeric and writing skills to the keeping of detailed accounts of the activities of the centralized institutions of ancient Egypt.

The Redistributive Roles of State Institutions

A significant measure of centricity (goods flowing into the centre and out of it again) was established to facilitate the operation of state bureaucracy. The palace had a number of departments to help administer the redistributive economy (Kemp, 1986): the Treasury (including the granaries), the labour bureau, the butler and the state workhouse (or the registering house). Moreover, the Vizier and other state administrators played important roles in ensuring the functioning of the redistributive system, taking into account special needs or shortages so that contributions from sources of supply could be revised occasionally and buffer stocks from state granaries could be released to meet shortages in specific locations. The temples drew on regular food offerings, many of which derived from productive resources owned by them. These offerings ranged from durable wealth, such as precious metals, to permanent sources of revenue, such as cultivable land. The temples also had their own labour force, many of them renting land at a rate of 30 per cent of the crop. Other offerings included access to mineral resources, animal herds, fishing rights, vegetable plots, vineyards and beehives (Kemp, 1989).

A symbiotic relationship ensued between the state and the temple. Janssen (1979: 509) has remarked that the depiction of the Pharaoh in every temple in the land as the real high priest 'was not only an



expression of a dogmatic theory, but also of the actual economic reality. The temples together with all their property were at the disposal of the Pharaoh.' Within the economic context, the temples served as state institutions; they were organized via the administrative machinery and were subject to frequent state intervention. In many cases, temple overseers were laymen attached to other state services, and the necropolis workmen (a state body) were frequently given food provisions by the temples. A tradition of 'reversion of offerings' (Kemp, 1989: 193) was followed according to which offerings presented to the gods were initially taken before statues of lesser cults and subsequently used to pay for temple overheads (e.g. rations for priests and workmen).

Organization of the Workforce

This section examines examples of the intertwining of administrative and accounting practices relating to the physical organization of workers and the monitoring of their attendance. Before doing so, however, it is important to reflect briefly upon the nature and meaning of the, much taken-for-granted, word 'work'.

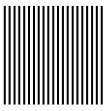
Work and Its Meaning

The distinction between 'work' and 'non-work', and indeed between work and leisure, is problematical. Grint (1991: 7) succinctly noted this problem when he stated:

Whether any particular activity is experienced as work or leisure or both or neither is intimately related to the temporal, spatial and cultural conditions in existence. . . [W]e should consider the past and present definitions of work as symbols of cultures and especially as mirrors of power: if what counts as work is glorified or despised or gender-related, then the language and practice of work allows us to read embodied fragments of wider social power.

This emphasis upon understanding work as something embodied in 'the temporal, spatial and cultural conditions in existence' of a particular society is crucial, for it rejects the notion that work can be defined through a set of seemingly objective criteria that are invariant over time and space. Rather, the meaning of work is constructed through a discourse that is a symbolic re-presentation of social interests: 'the meanings of work do not inhere within the practices of participants but are created, challenged, altered and sustained through the contending discourses: if particular forms of activity are represented through discourse as valued or valueless then the activities themselves take on such characteristics for those appropriating such a discourse' (Grint, 1991: 9).

Given this view, the following points are pertinent to the arguments advanced in this paper. First, we may understand the difference between work and non-work as something that resides more within the social context in which activities are undertaken than in the actual activities



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themselves; in this sense, both work and non-work are ambiguous and transient. Second, and relatedly, work does not have to be gainful full-time employment from industrial occupation of the kind with which we are now familiar, and which has been known only over the past two centuries in some Western societies. As Grint (1991: 10–11) has noted, there is a difference between the much broader sociology of work, which is the focus of this paper, and the narrower sociology of occupation and sociology of the profession. Nor should the presence of an economic incentive be a fundamental requirement for activities to be designated as 'work'. Religious incantations and, as Malinowski (1978) has observed in the case of the Trobriand Islanders, social obligations may act as a powerful incentive to work. Similarly, work may come to an end as soon as what is deemed to be the minimum necessary activity has been completed, such as gathering enough food for survival in hunter-gatherer societies (Sahlins, 1972). Whether one 'lives to work' or 'works to live', the activities involved will be treated as work as long as the discourses related to them construct them as such. Third, as was the case in ancient Egypt, the state may divide its subject population into those who qualify as members of the workforce (economic subjects), whether on a permanent, seasonal or ad hoc basis, and those who are not considered part of the labour force (non-economic subjects), and hence the meaning of work may be imposed by the state.

In the case of ancient Egypt, the ideology of the state, promoted through religious, artistic and literary texts, was centred around the divine right of the king to secure the submission of his subjects to his royal will in return for their right to expect protection, subsistence and the preservation of *Maat* (order, justice, righteousness) in society. Although the reality of life in ancient Egypt did not always correspond to the theoretical ideals, the Pharaohs were invariably able to mobilize their subjects to work on state public projects as and when they desired. Workers may have derided these chores as an unbearable burden, but such feelings seem to have counted for very little in terms of avoiding work toil.

Important state projects, such as building temples, royal residences and tombs, were typically initiated through royal decrees, which were fairly general and addressed to the Vizier or other senior staff. One example is the assignment of duties by a decree (on the Berlin Stele 1204) from King Senusret III, Dynasty 12 (Wente, 1990: 24):

Royal decree to the hereditary noble, count, seal-bearer of the king, sole companion, overseer of the two houses of gold and overseer of the two houses of silver, the chief treasurer Ikhnofret, a possessor of honor:

My Majesty has commanded to have you sail upstream to Abydos of the Thinite nome in order to make a monument for my father Osiris, Foremost of Westerners, that is, to refurbish his mysterious cult image with the electrum² which he (Osiris) caused My Majesty to bring back from Nubia in victory and in triumph.



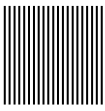
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Now it is in the proper way of doing things in benefiting(?) my father Osiris that you will do this since My Majesty sends you, trusting in your doing everything to justify My Majesty's confidence, because it is a fact that you profited from My Majesty's tutelage when as My Majesty's foster son, a sole pupil of my palace, you grew up. My Majesty appointed you as companion when you were a young man of twenty-six years of age. Because I discerned that you were one of excellent behavior and keen tongue, who had issued from the womb already wise. My Majesty did this.

And now My Majesty is sending you to do this, for My Majesty has perceived that there is not anyone who should do it except you. Go now and return after you have done according to all that My Majesty has commanded.

The above decree simply assigns the task of making a monument for Osiris (god of the Netherworld) to Ikhnofret without providing any specific details on what the monument should look like or how it should be built. These details were left to the discretion of the chief treasurer and his senior engineers, no doubt constrained by the Pharaoh's aspirations for his own regime. But the decree invokes various strong social norms. Ikhnofret is reminded of his upbringing as one of those lucky ones who benefited from royal favours such as education and fostering in the palace and promotion of his career thereafter. Various statements also emphasize the trust placed in him by the Pharaoh: integrity, wisdom and competence to perform tasks.

Given these normative expectations, and the socialization process experienced by the chief treasurer in his early, formative, years, he was expected to respond to the responsibilities entrusted to him in a positive and competent manner. Those who failed to honour expectations of normative behaviour were severely punished (see below). Compared with work responsibilities assigned to personnel located on the lower rungs of the administrative hierarchy (see later), we may note here the brevity of the decree issued to someone as senior as Ikhnofret. The decree leaves much detail 'unspoken'; seemingly all that Ikhnofret is required to do upon his return is to 'render an account' to the Pharaoh. It may be that the need to specify a detailed and explicit account was deemed culturally unsuitable at such a senior level; for King Senusret III it seems it would suffice for Ikhnofret to return after he has 'done according to all that My Majesty has commanded'. However, even this broad decree exhibits a skeletal form of human accountability: the definition of a specific task, the allocation of a task to a competent and trusted royal subject, the expectation that the duty will be discharged competently, and the need to render an account of what the subject had done. At the operational level, however, more detailed, day-to-day, administrative practices were developed to secure high labour discipline.



Rosters, Name Lists and the 'Division' of Labour

Rosters and name lists for workers were used extensively. Papyrus Reisner I, from the reign of Sesostris [Senusret] I in the early Twelfth Dynasty, 1971–1926 BC (Simpson, 1963), contains entries for a building project involving nearly 300 workers and foremen organized by division (a subset of a phyle; see below). The various documents used included: (i) number of enlisted workmen, per day per year; (ii) lists of named individual workmen grouped under a named foreman; (iii) daily attendance and absence for individual workers grouped under named foremen; (iv) lists of workmen on the move to jobs in other locations; (v) specified measures and quantities of various products/tasks converted into equivalent man-days; and (vi) rations allocated to each workman. Similarly, Papyrus Reisner II (Simpson, 1965) details the accounts of the Dockyard Workshop at This, an administrative centre near Abydos. It contains a daily roster of approximately 50 people over 228 days, showing the number of man-days expended on the project and the totals calculated at the end of each month.

Crucial to the construction of these rosters and workers' name lists was the system used to organize labour, generally known as the crew system, whose genesis can be traced to pre-dynastic Egypt. Early evidence suggests that this system was connected to initiation ceremonies and protective divinities, and subsequently used in mortuary cults and as a means of organizing temple priesthoods (Eyre, 1987; Roth, 1991). The system was then adapted for use in the palace and other administrative domains in the Old Kingdom. The crew had an internal structure that was amenable to fine administrative tuning. In the Old Kingdom, a crew was made up of two gangs, a gang was divided into four or five phyles, and each phyle had four divisions of about 10 men each, although this number could vary (Roth, 1991). Hence, the total labour force in a crew could well reach 400 men, possibly even more.³ But as Eyre (1987: 12) has suggested, 'there is no reason to suppose that the numbers were constant, not varying from project to project'. In the Middle Kingdom, the most frequent sizes of a division (including one foreman) were 10, 14 and 20 (Gardiner et al., 1952, 1955; Mueller, 1975; Simpson, 1963, 1965, 1969, 1986). However, there were smaller division sizes of 9 and 4, with two supervisors combined into one larger division (Griffith, 1898).

The systematic classification by division, phyle, gang and crew would have made it possible for the administrators to monitor labourers both spatially and temporally. Each gang was allocated a particular space on a project. In the South Cemeteries of Lisht (the reign of Senusret I, 1971–1926 BC; see Arnold, 1990), workmen were expected to comply with certain control measures, while working on projects, and their work progress was reported upon and monitored by the scribes. The control measures included: (i) output control forms, showing for each workman his location, number of stones requested, number delivered, and the



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remaining balance for every working day; (ii) control notes which provided information about dates, procedures for transporting stones and the workmen involved; (iii) team marks (which identified the specific division, phyle and gang); and (iv) setting marks intended to ensure that the stones were assembled in the right order. Each division had a specific name, and belonged to a specific phyle, which in turn was classified under a particular gang making it easy for those in charge to trace responsibility to individual workmen, to check their absence or presence, and to rotate them either individually or in groups.

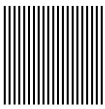
A distinction should be drawn, however, between the definition of a division used for work organization and that used in entries relating to the distribution of rations. In the case of work organization, it was customary to count only the number of workmen and not the foremen. Table 1 shows a total of 12 workmen excluding the foreman, Inyotef's son Dedu, and without any entries against his name in terms of being present or absent. Simpson (1963: 39) suggests that the foremen were permanent and always present, whereas the workmen were less permanent and hence were counted daily. However, it is also possible that the relative status of the person is of relevance here: the list may be silent about the foremen because of their relative status compared with ordinary workmen.

Two more examples are of interest. One is the name list from Kahun (Griffith, 1898: 42, Plate XV), which shows the date, the issuing bureau, the authorizing official, the accountant as scribe and the names of corvée workers responsible for hauling stones. The second example, also from Kahun and kept at the Petrie Museum (UC 32170), is a fragment of three columns from a list of corvée labour.⁴ The list contains names, title

Table 1. Attendance List: Papyrus Reisner I

	List of Workmen	Total Days	Days on Project	Days of Absence
	<i>The foreman Inyotef's son Dedu</i>			
	Oker's son Sobk-hotpe	11	11	
	His brother Inyotef	11	8	3
175.	Ketiu's son Nedjes	75	42	33
10 h	Se'n-Worset's son Sehetep-ib	75	46	29
	Inyotef's son Nesu-Mentu	75	65	10
10 h	Ameny's son Nefer-Kha u	75	75	
10 h	his brother Sefkhy	75	75	
180.	Sobk-hotpe's son Nakhti's son Inyotef	11	9	2
	Sobek-nakhte's son Mereri	75	60	15
	Hedejenenu's son Mer-su	11	11	
	Sobk-hotpe's son Anhur-ankhu	11		11
H	Nefer-tjentet's son Se n-Wosret	75	55	20
185	Total = 12	580	457	123

Source Simpson (1963: 123–4).



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Table 2. Payroll from the Sinai

1 foreman	(and) 20 men (5 divisions ^a)	= 1[05] men
1 "	(") 14 men (8 divisions)	= 120 men
1 " of the stone cutters	(") 10 men (4 divisions)	= 44 men

^a Mueller's translation says 'crews', but 'divisions' is used here for consistency (see note 3).

Source Mueller (1975: 252).

'commander' in red for the first group of 9 men (= 10 including commander), and check marks at the start of lines, with a black dot for presence and a red dot for absence. Also, for the first time, the second name of each worker is noted—a departure from past practice where only the first names were recorded.

The procedures were quite different when defining work units for the determination of rations (wages in kind). In this case, the division size was fictitiously fixed by the scribe into an equivalent number of workmen with equal rations so that, if the foreman has twice the rations of a workman, the division size is increased by counting the foreman as two workmen, as in the payroll from the Sinai (Table 2). In each of the three rows, the men's total is calculated by multiplying the number of divisions by the number of workmen and foreman plus one. For example, in the last entry, the number of 44 men was arrived at by multiplying 4 divisions by 10 (9 workmen and 1 foreman) plus 1 more to make up for the foreman having twice the rations of a workman. The status of foremen is clearly marked arithmetically in the double rations allocated to each of them compared with ordinary workmen. This is also evident from problems in the Rhind Mathematical Papyrus:⁵

Method of distributing (*irt*) 100 bread loaves among 10 men, if the skipper, the crew-leader (*tsw*) and the doorkeeper (receive) double: you add up the people to receive supplies; (that) makes 13. Divide the 100 bread loaves by 13; (that) makes $7 \frac{2}{3} \frac{1}{39}$ (i.e., $7 \frac{9}{13}$). Then you say: (this) is the consumption of the 7 men, (while) the skipper, the crew-leader and the doorkeeper receive double. (Peet, 1926: 109)

The allocation and ordering of workers within a hierarchy of groups (divisions, phyles, gangs, crews), their listing into rosters and their attendance sheets had strong disciplinary implications not only for the workers but also for the foremen and supervisors. Supervisors and foremen had the ability to render an account of the activities under their responsibility. Workers could be readily traced in terms of their precise spatial location and also, on a specific day, in terms of their absence and presence. By demarcating workers' responsibilities (and work targets) both spatially and temporally, by being able to ascertain their presence and absence and by observing and recording their effort directly compared with targets, administrators were in a position to impose strict work discipline on the labour force.

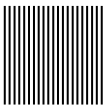


Setting Targets: The Use of Time–Volume Ratios

I have already alluded to the problems of interpreting ancient records such as those analysed in this paper. In the case of documents relating to work targets, at least three plausible interpretations are possible. First, a modernist view would assume that such work targets would have been used in ancient Egypt as a form of work discipline in precisely the same manner they would be used in contemporary organizations. This, however, would impose a strict modernist view on a culture and society that is fundamentally different from the contemporary world. Second, the determination of targets and the recording of actual achievement could be interpreted as being largely ritualistic and not leading to any form of administrative intervention. Compelling as it may be, this view would fail to explain adequately much of the administrative emphasis that the history of ancient Egypt so clearly exhibits (e.g. Kemp, 1989). Third, while not totally excluding the possible role of rituals, these targets could be seen as having a clear administrative role although, as noted earlier, they sought to track either time or output but not both simultaneously, given the relatively recent genesis of conjoining output and time. It is this latter view that guides the following discussion because, at the very least, it leaves open to consideration both the ritualistic and the administrative roles.

Work targets were set for divisions or individual workmen and were monitored daily by the scribes using a variety of accounting techniques, such as time–volume ratios and conversion ratios. Papyrus Reisner I offers rich evidence on the use of these techniques. The papyrus includes calculations developed for various stages of brickwork and related materials (Papyrus Reisner I: 126). Apart from the precise dates, the account shows length, width, depth/thickness, number of units, and equivalent number of enlisted workmen (see Simpson, 1963: 56). The account covers a number of activities: (i) striking (kneading) the ground, and working on walls, trenches and corridors; (ii) carrying materials; (iii) loosening clay in the fields; (iv) removing water from the field; and (v) tower building. By specifying the length, width, thickness and unit indicator, the volume is calculated for every set of activities.

The papyrus also shows a detailed list of the assignment of the labour force (Papyrus Reisner I: 127), presumably for the purpose of facilitating the management of the building project. For each entry, this document specifies the nature of the task performed, the days on which the task began and ended, the number of workmen employed on the task, the total number of days spent on the task (first to last inclusive) and the equivalent number of man-days. The account contains a portfolio of different activities: (i) downstream and upstream trips; (ii) names of foremen, masons and bricklayers; (iii) removal of acacia from the river bank; (iv) carrying and transporting; and (v) erection of interior portals or doorways.



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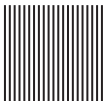
Table 3. Days of Work and Transit between Projects: Papyrus Reisner I

	Days in Transit	Days on the Project
J2 from 6-13 IIII Proyet inclusive	8	
J2 to J11 14 IIII Proyet to 7 I Shomu		24
J11 from 8-20 I Shomu inclusive	13	
J11 to J17 21-27 I Shomu		7
J17 from 28 I Shomu to 7 II Shomu inclusive	10	
J17 to J18 8-9 II Shomu		2
J18 from 10-20 II Shomu	<u>10/11</u>	
	41/42	<u>33</u>

Source Based on Simpson (1963: 58).

A wealth of information relevant to monitoring and control can be derived from this account; a complete picture can be constructed of the time spent by the overseer of the audience chamber both travelling and on the project. Given that the period involved began on the 6th of the month IIII Proyet and ended on the 20th of the month II Shomu, we can calculate that the overseer spent either 41 or 42 days in transit travelling north and 33 days overseeing the project, in total being credited with 74 or 75 days (see Table 3). This breakdown of time spent travelling and overseeing the project has spatial and temporal monitoring implications. By specifying the precise location and the days spent on the project and away from it, the administrators could trace and assess the performance and competence of the overseer. They could also calculate the total time, in man-days, spent on a particular project in a specific location, and plan work for future projects.

Detailed accounts such as those discussed above were fed into a summary account (Papyrus Reisner I: 128) which shows two numbers: the product or volume and/or the equivalent man-days. From this summary account it is possible to calculate the different values of equivalent metrics for different tasks (see Table 4). Simpson (1963: 84) assumes, with no supportive evidence, that these equivalence metrics were 'fixed on the basis of the weight of the material, the relative difficulty in handling it, the distance it had to be moved, and the speed with which the operation could be carried out'. He is in effect suggesting that due allowances were made for all the possible attributes of both the type of material and the task in hand when determining these equivalence metrics. It is hard to comment without further evidence on the extent to which these metrics for specific tasks were fixed over time. It could be argued that these work targets read more like 'pure' or decontextualized calculations that take no explicit account of 'uncontrollable' local difficulties that might render the targets impossible to meet. These physical targets could still have functioned well, precisely because of the absence of any time pressure. Workers did not have to hit joint time/output targets, so they would have worked for as long as required until output targets had been met.



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Table 4. Tasks and their Equivalent Man-Days: Papyrus Reisner I

Entry	Task/Item	Equivalent Man-Days (V/E)	Volume (V)	Equivalence Metric (E)
2	earth rubble	443 ½	4,435	1:10
3	builders	85	381 ½	2:9
4	hauling stone	715	143; 2 palms	5:1
5	carrying (items)	36 ½	183	1:5
6	carrying sand	101 ½	152 ½ ¼	2:3
10	brick	602	39,118	1:65
13	loosening fields (earth)	55 ½	556 ¼	1:10

Source Based on Simpson (1963: 128).

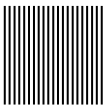
Alternatively, it is possible that uncontrollable events were taken into account implicitly while physical targets were being constructed (for a more explicit example of allowing for uncontrollable events in target-setting in ancient Egypt, see Ezzamel, 1997). Whichever interpretation is valid, it is important to note that the mere calculation of these metrics signals the likely intent of the scribes to monitor diverse activities by collapsing them into one common denominator. Different types of work were converted into additive man-days through the use of the appropriate equivalence metrics.

Further examples of the use of conversion ratios can be found in Papyrus Reisner II. In Table 5 (an account of the metals delivered to the Dockyard Workshop), the three axes, two adzes and one chisel are aggregated into a total metal weight of $100\frac{1}{2}$ *deben* (a weight measure)— $22+19+19+10\frac{1}{2}+10+20$ —which the steward Anhur-hotpe delivered to the coppersmith Nakhti for recasting.⁶ Because the weights were on the small size for axes and adzes (but not for the chisel), and because of the statement at the end of line 10 ('converted into a single unit'), Simpson (1965: 31) suggests that these tools were all worn or broken and hence were weighed together to be added as a single unit of scrap for recasting.

Table 5. Metal Account: Papyrus Reisner II

9.	<u>III Shomu 9</u>			
10.	given to the coppersmith Nakhti converted into a single unit			
11.	copper: axes	2	<u>22</u>	<u>19</u> Thebes
			units 1	<u>Sobk-hotpe</u>
12.	axes	units 1	<u>19</u>	units equals
13.	adzes	units 1	<u>10½</u>	units <u>Si-Hedjenuwy</u>
14.		units 1	<u>10</u>	units 1 <u>Si-Hepepi</u>
15.	chisels	units 1	<u>20</u>	units 1
		<u>the steward Anhur-hotpe</u>		
16.	equalling	debited to him units $100\frac{1}{2}$		

Source Simpson (1965: 31).



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Table 6. Account Work Targets Expressed in Man-Days: Papyrus Reisner III

F	17 <i>hsbw</i> 676(<i>f</i>)	<u>6760</u> (<i>e</i>)	2040 (<i>a</i>)	<i>sty</i>
	18 <i>kmtnf m hn dh</i> ' <i>hsb</i>		2	20 (<i>b1</i>)
	19 <i>kmtnf m k't dht</i>		" 30	300 (<i>b2</i>)
	20 <i>kmtnf m shmw</i>		" 12	120 (<i>b3</i>)
	21 <i>kmtnf m nhy.f</i>		" 50	500 (<i>b4</i>)
	22		total	<u>2980</u> (<i>c</i>)
	23		total	3780 (<i>d</i>)

Source Simpson (1969: 23).

Papyrus Reisner III (Simpson, 1969), early Twelfth dynasty, provides evidence on the use of other types of ratios. This papyrus covers the activities of about 21 people over 72 days, including stewards, overseers, clerks agents and other officials (see Table 6). In Table 6, *f* is number of enrolled men or equivalent man-days and *e* is the work target expressed as man-days (if *f* denotes number of enlisted men) or as man-hours (if *f* denotes number of man-days), where $e = f \times 10$. Further, *e* is corroborated by adding together $a+b+d$, where $a+b = c$ denotes work completed, and *d* is remaining work to be completed. Hence, in Table 6, work completed is $(2040+20+300+120+500 = 2980)$ which, when deducted from the work target of 6760 (*e*), leaves 3780 (*d*) as work to be completed. The number of enlisted labourers/man-days (*f*) is converted into an equivalent workload as a target, and at the end of the account period completed work is quantified and taken away from the target to determine the remaining work to be done. In this way, the administrators could: (i) establish quantifiable performance targets expressed in physical measures of workload that illiterate labourers could understand; (ii) monitor and quantify work completed at the end of a period; (iii) quantify the remainder of work to be completed; and (iv) to the extent this was deemed desirable, identify the total number of man-days spent on completing any particular project, which might also be helpful in estimating the number of man-days required for future projects.

The account shown in Table 7 demonstrates the same relationships: several individuals are listed with their assigned man-days, workload targets, work completed and work remainder, in addition to an obscure final column. A glance at this account would have enabled the scribe to ascertain the amount of work completed and the remainder of work to be completed per overseer. Moreover, an overall view of the whole project, or any part of it, entrusted to a given number of overseers and their workforce could be formed from the totals column in line 7. Simpson (1969: 14, original emphases) has suggested that in these accounts:

The two related concepts stressed were the *time standpoint* and the matter of *real* figures as opposed to *ideal* figures. The figures should be differentiated when possible as they apply to computations of material and work (past), operations being performed (present), and results to be achieved (future). They must also be distinguished in terms of data (real figures) and



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Table 7. Account of Man-Days: Papyrus Reisner III

Workman	Assigned Man-Days	Workload Targets	Work Completed	Work Remainder	
1 Mer-kau	210	2100	1826 $\frac{1}{2}$	273 $\frac{1}{2}$	300
2 S'ankhi	400	4000	3745 $\frac{1}{2}$	254 $\frac{1}{2}$	300
3 Sobk-nakhte II	214	2140	1468	672	300
4 Redi-es-'ankh	280	2800	2477 $\frac{1}{2}$	322 $\frac{1}{2}$	300
5 Sobk-nekhte I	177	1770	1688	82	300
6 Iuh	360	3600	3668 (<i>sic</i>)	232	300
7 Total	1587	164[10]	14873 $\frac{1}{2}$	18[35] $\frac{1}{2}$	

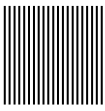
Source Simpson (1969: 29).

calculations (ideal figures). The latter are generally round numbers. The fixed dimensions and their product represent data and belong to the realm of the past. The multiplication of this product by a conversion factor, in one operation to yield the number of man-days, belongs to the realm of the present.

What bothers Simpson about these accounts is that workload targets were invariably rounded off numbers, always with a zero as the final digit, whereas the sets of numbers representing work completed and remaining are less rounded and frequently with fractions; hence his distinction between the *ideal* and the *real*. But, contra Simpson, there is *nothing* necessarily unusual about this. Targets are frequently expressed in complete, rounded numbers. In contrast, an inventory of work completed, and by implication work not yet completed, is likely to end up with less rounded figures, given frequent divergences between targets and actual achievement and the ad hoc nature of the time period chosen to perform the inventory of work completed.

Sanctions

The above discussion sought to highlight the details of labour organization practices used in the Middle Kingdom. The accounts contained in the Reisner papyri provided the basis for both planning and labour compensation (in the form of rations/wages). Moreover, many of the documents in these papyri reflect a close relationship between work, time (expressed as days rather than in the form of a modern time discipline) and place. Each worker's presence and absence were noted carefully, thereby making it possible for the administrators to monitor work attendance across time and space. Those who fled from their work duties were punished severely. An intriguing papyrus dating from the late Middle Kingdom (Hayes, 1955) contains a list of 76 residents of southern Upper Egypt who were held in the Great Prison at Thebes because they had absconded without completing, or to avoid performing, services required of them by the state administrators. The same papyrus includes state directives instructing the Great Prison to deal with these



individuals in accordance with the relevant sections of the criminal law, and a third section records the execution of penalties and the conclusion of nearly all the cases. The following is an example of one of these individuals (Hayes, 1955: 64):

- (a) The [daugh]ter of Sianhur, Teti,
- (b) (of) the Scribe of the Fields of This,
- (c) a woman:
- (d) (An order) was issued to the Great Pri[son] (in) Regnal Year 31, Month 3 of Shomu, Day 9, to release (her people) in the law-court, being (an order issued in order to execute against her the law pertaining to one who runs away without performing his service.
- (e) Here (Check mark).
- (f) Statement by the Scribe of the Vizier, Deduamun: 'it [is] completed.'
- (g) Case closed.

Without wishing to rule out alternative interpretations totally, I suggest that the practice of keeping name lists and attendance rosters was not a purely ceremonial activity. Absence from work on state projects was clearly noted and acted upon; it was classified as a criminal offence against the state and punished severely. It should not come as a surprise therefore that the mere presence of a workman at work was not sufficient to discharge his responsibility either; the aspirations were that workers were required to work as hard as humanly possible (without that necessarily being the real outcome), and they were held responsible for their achievements. In undertaking their work duties, the activities of the labour force were shaped and disciplined by the temporal and spatial dimensions of the time. As Kadish (1996: 438) has noted: 'Workers and their managers went about their daily tasks, the rhythms of their labour shaped by the natural indicators of day, season, and year, as well as by the artificial constructs of civil calendar, festivals, the formal length of the work day, and, at least in some periods, regular days off. To paraphrase the words of the poet of the hymn to the Aten, each day, when the sun has risen, the entire land went off to work.' By showing targets to be achieved, the amount of work already completed and current work in progress, these accounts inextricably linked the past, the present and the future into one integral temporal unity that was differentiated by imposing the periodicity of time intervals upon it for the convenience of administrative and accounting reports.

Reporting Achievement and Work in Progress

We have already caught a glimpse of how the scribes reported on work in progress. However, my main concern in discussing these accounts was to examine the different ways in which the scribes determined and quantified workload targets. In this section, my aim is to focus more explicitly on the practice of reporting on work already completed and the remainder to be carried forward to a future period, or indeed to be noted as the



failure of workmen to meet targets. I distinguish two forms of reporting: letters and accounts.

Reporting on Work in Progress Using Letters

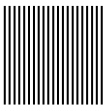
Two types of business-related letters can be traced in the Middle Kingdom: model letters and letters dealing with actual economic activities. Model letters were typically short, and their main aim was to teach the young, inexperienced scribe the key parts of a business letter and the accepted way of writing them. The Hieratic Papyri from Kahun (the reign of Amenemhat III, 1844–1797 BC), Middle Kingdom, contain nine letters of this type covering items such as geese, seed, corn and fruit (Griffith, 1898: 67–70). Letters dealing with actual business typically had four main parts: (i) a number of opening statements from a humble subordinate praising the superior; (ii) a broad statement that all the superior's 'affairs are sound and prosperous' by the favour of the relevant deities; (iii) some specific statements raising particular problems faced by the subordinate and seeking advice as to how to proceed, or rendering an account to the superior; and (iv) a closing number of statements praising the superior. Some of these letters were very general, simply attending to parts (i), (ii) and (iv) and without specific requests or numerical rendering of accounts.

An example is found in Papyrus Berlin, 10003A II (Wente, 1990: 73), where the incoming phyle reports on the state of affairs in a temple during the reign of Senusret III (Dynasty 12):

Report of the first phyle of the priestly corps of this temple which is entering upon the monthly duties. What they said was:

'All your business affairs are safe and sound. With everything belonging to the temple being safe and sound, we have received all property of the temple from the fourth phyle of the priestly corps of this temple which is retiring from the monthly duties. The temple is flourishing in very good order.'

This practice of phyle reports involved both the *departing* phyle and the *incoming* phyle. The first phyle reported on what he had left behind and the second acknowledged what he had received upon arrival; thus the circle of human accountability was squared. However, in opening up this issue of accountability, a question arises as to whether or not this customary statement of 'sound and prosperous' or 'safe and sound' is purely ceremonial. To demonstrate that letters reporting on work progress were not produced as idealized, ceremonial texts purely to affirm theoretical compliance, consider a letter sent from a woman to her male superior. The letter begins with the customary 'all the affairs of the Master, L.P.H.! [may he live, be prosperous and happy] are sound and prosperous', then asks 'what thou shalt do (?) unto the women servants who continue without weaving cloth for the temple' (Griffith, 1898: 75). The woman who wrote this letter acknowledges, and reports upon, failure to complete woven cloth and seeks advice on how to deal with



that problem. Hence, any suggestion that all letters were purely ceremonial and always emphasized ideal compliance is laid to rest. In these letters, the prior is one of good news: 'all is well', with other (sometimes bad) news following discursively from that.

A more detailed example is a letter (Griffith, 1898: 73–4) at the beginning of which the subordinate Arisu writes to the superintendent Sakaanu to inform him that 'all the affairs of the Master . . . are sound and prosperous'. He then gives specific accounts on the timing of his own arrival, 3 labourers sent by the deputy to accompany, presumably, another Master (e.g. a relative) normally resident at the work site, a loaded boat, amounts of barley and corn, carpets, chairs, etc. delivered to other agents, 11 labourers who may have to continue working longer to complete their workload, and 5 other labourers who continue to quarry stones. Again, the focus here was on labourers working until output was completed, rather than holding them responsible for meeting joint time/output targets.

In summary, my inspection of a large number of letters would suggest the following. If the letter contains the statement 'all the affairs are safe and sound' followed by more specific details concerning work or account-rendering problems, then it may be read as meaning 'all affairs except those stated below are sound and prosperous'. In this case, the attention of superiors is drawn to those problem areas that require intervention and possibly corrective action or the application of sanctions. If there is no itemization of problems, then the statement should be taken literally: that work was conducted as expected and no remedial or corrective action from superiors is needed, unless of course the subordinate is deliberately misinforming the superior.

Reporting on Work in Progress Using Accounts

More detailed reporting on work in progress was typically in the form of accounts, which showed the total (target) work to be performed, the amount of work actually performed and the remainder to be completed. One example reports on brick-making in Kahun (see Table 8). In this account, the total number of bricks to account for (116,511) is exactly equal to the number of bricks made of two different sizes; 5 palms (23,603) and 6 palms (92,908)—1 palm being approximately 3 inches. Senbef was named as responsible for supervising the making of the bricks.

Another example is the official journal account Kahun III.1 (Griffith, 1898: 55–8). The account is rather lengthy and covers a number of activities, including delivery of grain, distribution of land and the numbers of days actually worked by each division of men on a project. Although the account covers a period of four months, each division worked for only two months, giving a maximum total of 60 days. Allowing for 4 days' rest, this leaves a maximum of 56 working days per



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Table 8. Brick Account: Kahun

36. Total	116511
37. Particulars of these	
38. Bricks of 5 palms	23603
39. Remainder	92908
40. <i>under the hand of the zau.n.satu, Senbef</i>	

Source Griffith (1898: 59).

division. In some cases the division(s) worked less than the allotted 56 days, implying remaining work for them to complete.

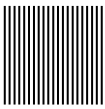
No matter which account we consider, the pattern of reporting on work in progress looks very similar. In each case, there is a clearly specified work *target*, e.g. number of bricks of a given size to be made or number of days to be worked. Then an inventory of *actual* work is performed; this is compared with the *target*, allowing a *remainder* to be implicitly calculated or explicitly stated. This system of accountability embodied the three elements of target-setting, measurement of actual achievement and comparison of achievements against targets to signal the remainder. What is notably missing here is evidence on *action* by superiors following from these reports either to correct or to reward performers. Unfortunately this evidence is lacking, but its absence in this particular case should not necessarily be taken to imply that such action was never taken.

Accounting and the Administration of Wages

The concern in this section is the determination and payment of wages to state employees. I exclude payments made by the head of a family to household members because this is more in the nature of redistribution of resources, although the line dividing redistribution and wages is rather a fine one.⁷ There is also the problem of distinguishing rations from wages. Whereas rations were distributed to dependants whether or not their labour fully justified the rations given, wages are typically understood to refer to due payments to free labour according to the amount of work they performed, their skill base and their seniority. Wage lists might also have been prepared for determining the cost of a particular project without necessarily reflecting payments to workers. Partly to overcome these problems, I will follow the approach taken by Mueller (1975: 262–3) in treating as wages individual allowances that are ‘structured in a manner approaching our income groups, because they often exceed the daily food consumption of one person, and because they may have been to some extent convertible. This does not preclude the possibility that “ration” and “wage” may have occasionally coincided.’

Accounting and the Determination of Wages

Table 9 shows one of the more complete documents on the administration of wages in the Temple of Illahun, Middle Kingdom (Borchardt,



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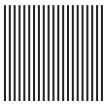
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1902/3).⁸ The account records temple receipts of loaves of bread and jugs of *sd'* and *hpnw* beer and their distribution to personnel in precisely denominated amounts. The first part of the account lists temple receipts of bread and beer, divided between those received daily and those delivered from the temple of *Sobk* as sacrifices offered to the dead. From these totals for each type of commodity large deductions are made in the form of distributions to the priests of the dead, but without providing any details, presumably because the proportions of the distribution were determined by the families of the dead. The remainders represent the

Table 9. Temple Wage Distribution

Calculation of this temple's receipts	Loaves of bread	Beer		
		<i>Sd'</i> (jugs)	<i>Hpnw</i> (jugs)	
List of daily receipts	390	62	172	
Brought from the temple of the Sobk at Krokodilopolis	20	1	–	
Total	410	63	172	
List (?) of sacrifices offered to the dead				
Distributed to the priests of the dead	340	28	56 ½	
Total	340	28	56 ½	
Remainder	70	35	115 ½	
List (? distribution?) of this remainder	Portions (?)	1 ⅔	⅔ + ⅙	2 ⅔ + ¼ ₀
Chief priest and temple director	1 10	16 ⅔	8 ⅓	2 [7] ⅔
Head lay priest on duty this month	1 3	5	2 ½	8 ⅙ + ¼ ₀
Head reader	1 6	10	5	16 ½ + ¼ ₀
Temple scribe on duty this month	1 1 ½	2 ⅙ + ⅙ ₈	1 ⅙	3 ⅔ + ¼ ₅
Usual reader on duty this month	1 4	6 ⅔	3 ⅓	11 ⅙ ₅
<i>Wtw</i> – Priest on duty this month	1 2	3 ⅓	1 ⅔	5 ½ + ⅙ ₀
<i>Imi-ist</i> – Priest on duty this month	1 2	3 ⅓	1 ⅔	5 ½ + ⅙ ₀
<i>Ibh</i> – Priest on duty this month	3 2	10	5	16 ½ + ¼ ₀
Royal priest on duty this month	2 2	6 ⅔	3 ⅓	11 ⅙ ₅
<i>Md w</i>	1 1	1 ⅔	⅔ + ⅙	2 ⅔ + ¼ ₀
Doorkeeper	4 ⅙	2 ⅙ + ⅙ ₈	1 ⅙	3 ⅔ + ¼ ₅
Night doorkeeper	2 ⅙	1 ⅙	½ + ⅙ ₈	1 ½ + ⅙ + ⅙ ₀
Temple worker	1 ⅙	½ + ⅙ ₈	¼ + ⅙ ₆	⅔ + ¼ + ⅙ ₀₀
Total		70	35	115 ½

Source Borchardt (1902/3: 115), translated by Ian Wilson.



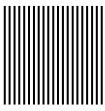
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amounts to be distributed as wages among the temple personnel. Here we see clearly the visible hand of administration at work, in terms of using differentiated wages for different occupations. The key statistics are those listed under 'Portions'; this refers to both the horizontal entry in line with it and the two columns immediately below it, which show the number of individuals in a given category of personnel and the proportion or wage for that category. Adding up the proportions in the second column after multiplying by the number of individuals in the first column, we get $41 \frac{2}{3}$. Both Borchardt (1902/3: 116) and Gillings (1972: 124–5) have argued that the writing of the account indicates that another night porter (with an allocation of $\frac{1}{3}$ of one loaf of bread) was included, in which case the total portions equal 42. This makes it easy to read the horizontal portions. For example, for bread loaves, 70 times $\frac{1}{42}$ gives $1 \frac{2}{3}$. Whether the scribe used 42 or $41 \frac{2}{3}$ portions, his calculations were at times slightly inaccurate. In the last row, the scribe matches the total wages paid out with the remainder recorded in the upper part of the account, but seems to have used the upper figures to reach the totals to compensate for the minor inaccuracy in his calculations.

Although the account gives some insight into differential payments to temple personnel, these differentials should be interpreted carefully. A temple worker or a doorkeeper received a very small wage compared with the wages received by more senior staff, such as priests, temple scribe or temple director. These differentials presumably reflected differences in skills (including literacy and numeracy) and prestige between lower and higher levels of personnel. What is more perplexing is that the head lay priest received a salary half that of a head reader. Borchardt (1902/3) has suggested that this apparent disparity is explained by noting that lay priests had other paid civilian jobs. It may also be that the relatively low salary for the scribe is explainable in these terms. Those employed full time in the temple (the temple director, head reader, etc.) received relatively higher wages. Borchardt also suggested that these wages were supplemented by allocations of other goods, such as meat and vegetables, and that the priests employed for the cult of the dead could have received some of the goods deducted from the temple's receipts.⁹

There are several other sources that make possible the construction of a more complete picture of the wages and salaries paid to state personnel in the Middle Kingdom. These sources include the Reisner papyri, the Inscriptions of Sinai, Papyrus Bulaq 18 and the Inscriptions of Siut. The Reisner papyri cover wages paid to the labour force working on various royal projects; one example is Section 'O' of Papyrus Reisner I (Simpson, 1963: 43–6, 131) shown in Table 10. The document begins, as usual, with the day, month and year of the beginning of the project to be accounted for,¹⁰ followed by wages paid to a list of 20 workmen who worked at This (an administrative centre near Abydos) over six periods of varying lengths (10–15 days), reaching a maximum of 72 days per single work-



man. Although the 'basic wage' is not constant across all individual workmen or for the same workman over time, the most frequent 'basic wage' is 8 units (loaves) of *terseset* bread. For every workman, this 'basic wage' (or an alternative wage) is multiplied by the number of days worked by him to arrive at the total pay for the length of period worked. In some entries, for example lines 5 and 10, first period, the number of days entered is 12 but no payment was made, presumably because the workman was absent (as indicated by the diagonal stroke in the original document). In other cases, for example line 18, first and third periods, the number of days worked was stated first (in black ink) followed by the number of days for which the workman was absent (in red ink, hence the underlining in the translation to signify this), and the pay is then a multiple of the number of the days worked and the 'basic wage'.

Simpson (1963: 44–5) has attempted to explain the variations in the 'basic wage' across workmen and time. Given that even for the same workman the 'basic wage' was not constant, any variations across the six periods cannot be satisfactorily explained as reflecting difference in status. Similarly, given that in at least some cases the same workman received the same 'basic wage' across all six periods, any differences that may be observed for others across time cannot be simply explained as being a function of variations in the nature of these periods. Accepting that 8 *terseset* units of bread were probably the 'basic wage', Simpson (1963: 45) surmises that variations from that occurred because 'deductions were made in certain cases. These deductions may reflect his [a workman] having worked less than a full day, the withholding of advances made to his account, or penalties levied against him.' This assertion may be justified but is not supported by the evidence. Nonetheless, we can safely assume that some notion of a 'basic wage' was at work there. It is worth quoting Simpson again in full: 'The significance of the section [O] lies in the nature of the apportionment of *terseset*-loaves to the men on the basis of the length of time they worked. Since the rations are usually issued in terms of bread and beer, and since no other ration list occurs in the document, one has the distinct impression that the *terseset*-loaf is used as a unit of value for compensating the men' (1963: 46).

Further evidence in Papyrus Reisner II (Simpson, 1965: 32–3) supports the 'basic wage' notion. In one part of Section K (lines 47–50), a number of entries show payment in bread loaves and beer. The number of equivalent working days is multiplied by the 'basic wage' in terms of bread units (loaves) but with a clear differential pattern. Three basic payment levels are evident: 10 loaves, 15 loaves and 20 loaves. The payment of beer ranged between a $\frac{1}{2}$ jar and 1 jar per man per day; the men who received 1 full jar per day invariably were those paid the highest wage in bread (20 loaves). Unlike the more random pattern of variation in wages in Papyrus Reisner I, there is a more systematic pattern of variation, which may indicate differences in seniority or status.

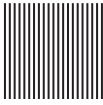


Table 10. Labour Wages Account: Papyrus Reisner I, Section 0

	12 days trsst (1st period)	12 days trsst (2nd period)	11 days trsst (3rd period)	days trsst (4th period)	[days trsst] (5th period)	days trsst (6th period)
1. Year 24, II Shomu 21;						
2. List of enlisteas who are in This.						
3. Nakhti's son Se'ankhi- <u>nedjes</u>	12 94	12 80	11 80	12 88	10 80	15 120
4. Sen-mutef's son Se'n-Wosret Redi-wi-Sobk	10 7 56	12 96	11 244	12 94	10 80	15 120
5. Senbebu's son Se'n-Min	12 8 64	12 88	11 80	12 62	10 80	15 80
6. Se'ankhi's son Anhur-nakhte	12 2 80	12 9 3 72	11 88	12 48	10 80	15 120
7. Wosre's son Ikeki	12 94	12 96	11 88	12 80	10 80	15 120
8. Senet's son Kemni	12 80	12 88	11 88	12 88	10 80	15 120
9. Iri's son Mentu-hotpe	12 80	12 88	11 88	12 88	10 80	15 120
10. Renef-'ankhu's son Si-Anhur	12 94	10 2 80	11 88	12 88	10 80	15 120
11. Hedjenenu's son Gem-mutef	12 90	12 84	11 88	12 92	10 80	15 120
12. 'Ankhu's son Anhur-nakhte	12 94	12 96	11 88	12 80	10 80	15 120
13. Inyotef's son Sefkhy	12 94	12 96	11 88	12 88	10 80	15 120
14. Sobk-wosre's son Sobk-nakhte	12 94	12 96 60	11 88	12 88	10 80	15 130
15. Sobk-nakhte's son Sobk-nofre	12 94	12 96	11 88	12 92	10 80	15 120
16. Nakht-'aa's son Nakht-tjen	12 94	12 96	11 88	12 92	10 80	15 120
17. Sobk-nakhte's son Shemai	12 94	9 3 72	11 88	12 88	10 80	15 120
18. Se'ankhi's son Sobk-hotpe	10 2 80	12 96	3 8 24	12 84	10 80	15 120
19. Irnes' son Yu	12 94	12 96	11 88	12 84	10 80	15 120
20. Se'n-Wosret's son Sehetep-ib	12 94	12 96	4 7 32	12 84	10 80	15 120
21. Ameny's son Nefet-kha'u	12 64 Merer- <u>nedjes</u>	5 40	11 47	12 1530	10 1280	15 1710
22. his brother Sefkhy	12 94	12 96	11 47	12 1530	10 1280	15 1710
23.	total 26 1610	8 1546(?)	47 1564	1530 100	1280	1710

Source Simpson (1963: 131).

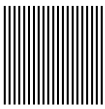


Table 11. Wages Account: Sinai Inscriptions

			Hf- Loaves	Various Bread	Various Wine	Beer
⁵ Foreman 1,	20 men,	100 men,	1	4	1	
	14	100 men	2	6	1	
Stone cutters	10	64 men	4(?)	8(?)		
⁶ Remainder of young troops	10	151 men	2(?)	9(?)		

Source Gardiner et al. (1955: 138).

The Inscriptions of Sinai (Gardiner et al., 1952; Mueller, 1975) have three characteristics with parallels in other wage documents (see Table 11). First, the scribe used ‘basic wage’ multiples to differentiate payments to personnel occupying different positions. Second, wage payments were made not only in bread and beer but also in other commodities. Third, there were two different types of payment: regular payment/income (*‘qw*), which I treat here as equivalent to wages or salaries, and occasional (*‘fq’*) payments, which could be equivalent to ‘bonuses’.

The basic daily wage unit was 10 loaves of bread (compared with the 8 loaves in Reisner I) and 2 jars of beer, which is consistent with Reisner II and ‘evidence’ from literary sources relating to the same period. In the story of the ‘Eloquent Peasant’ (Simpson, 1973: 36), once the peasant Khunanup had completed his first speech in his petition against a miscarriage of justice, King Nebakure put him on a daily allowance of 10 loaves of bread and 2 jugs of beer.

Although the Inscriptions of Sinai provide strong support for the use of a ‘basic wage’ per workman, they do not show the multiples that may have been used to reward individuals of different skills or at different levels in the administrative hierarchy. An example of such information in the Middle Kingdom is the Wadi Hammamat Inscriptions (Goyon, 1957: 17–19; see Table 12). The relevant part of these inscriptions was written by the herald Ameni (G. Hamm., no. 61) in regnal year 38 of Senusret I (early Twelfth Dynasty, as in the Reisner Papyri). Ameni’s report was divided into three main sections: a roster of the personnel under his command; a description of the work load; and a wage list. Apart from Ameni himself, the roster comprised more than 80 officials divided into 13 categories. These categories included the commander of the stone-cutters and of the craftsmen, the chamberlain, 2 stewards of the Great Board, 2 stewards of the Treasury, 4 scribes of the Great Board, 4 scribes of the Treasury, 3 ‘Greatest of the Thirty of Upper Egypt’, 3 male secretaries, 1 police officer, 10 seal bearers, 20 mayors, 30 royal retainers, and 1 more official. These officials were in charge of a labour force of some 18,660 workers divided into hunters, sandal-makers, stone-cutters, quarrymen, rowers, guardsmen (naval and infantry), brewers, millers, bakers, butlers, and a remainder of 17,000 unskilled workers.



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Table 12. Herald Ameni's Report: Wadi Hammamat Inscriptions

1	Le roi de la Haute et de la Basse Égypte, Kheper-Kâ-Rê, qu'il vive éternellement. L'an 38, le 3 ^e mois de la saison Akhit [jour] 25 et le 3 ^e mois de la saison Akhit [jour] 27,	
2	commencement des travaux sur cette contrée, par le médiateur Ameni, avec la troupe venue avec lui. Jusqu'à ce que je sois descendu en paix, [voici] la liste de la troupe parue avec moi vers cette contrée :	
	Grands des 30 de la Haute Égypte	3
	Pachas	20
3	Suivants du Roi V. S. F.	30
4	Le chef de la troupe et des carriers de la Nécropole, chef des sculpteurs, chef de tous les travaux du Roi, celui qui aplanit toutes les difficultés, Sankhptah.	
	Chefs du Grand Collège des Juges	2
	Chefs de la Trésorerie	2
5	Le véritable connu du Roi, chef du Cabinet Royal, Nisoumontou. Facteur	[1]
	Gendarme	[1]
	« Forts-de-voix » (raïs)	3
6	Scribes du Grand Collège des Juges	4
	Scribes de la Trésorerie	4
	Scelleurs (chanceliers, hommes de confiance)	10
	Armurier	1
	Pensionnés du prince du nome de Thèbes	300
7	Citoyens du nome	700
	Chasseurs	30
	Carriers de la Nécropole	100
	Tailleurs de pierres	100
	Matelots	200
	Pêcheurs	60
8	Cordonniers	60
	Hommes de troupe faisant [tous] les travaux	17.000
	Ravitailleurs qui suivent cette troupe :	
	Brasseurs	20
	Meuniers	20
9	Boulangers	20
	Serviteurs	50
10	Cette troupe entière était sous ma surveillance à faire tout ce que je disais et [à suivre] toute directive que je déterminais pour elle en ce qui concerne tous les travaux de la Maison Royale, conformément à la grande faveur de mon Maître V. S. F., le Roi de la Haute et de la Basse Égypte Kheper-Ka-Rê, puisse-t-il vivre éternellement.	
11	Excellent auprès de son cœur, j'ai l'habitude d'exécuter toutes missions que S. M. ordonne au serviteur ici présent, comme un dieu envoie son serviteur consciencieux, fils du serviteur du père auparavant.	
13	Il me louait grandement, parce qu'il avait l'habitude de louer un serviteur qui agit mieux que tous les humains. Je suis revenu en paix, le cœur épanoui, ayant fait ce que S. M. avait ordonné.	
14	Compte de ce que j'ai rapporté de cette contrée : 60 sphinx, 150 statues de <i>bekhenou</i> , sous encens.	

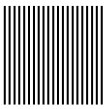


Table 12. Continued

15	Chaque pierre étant tirée par 2.000 hommes, 1.500 hommes, 1.000 hommes ou 500 hommes en plus de (sans parler de) ceux mentionnés ci-dessus (qui constituent) les beaux produits de la contrée.		
16	Jamais rien de pareil ne fut descendu vers l'Égypte depuis le temps du dieu. Compte de nourriture de cette troupe (pour) une durée (de temps) concernant les travaux en cette contrée : trente jours. L'Inspecteur général du bataillon des Recrues de Marine et Commandant de l'Infanterie :		
	Le médiateur Ameni	pains 200,	bière 5 (mesures)
	Grand des 30 de la Haute Égypte	pains 100,	bière 3
	Suivant du Roi, V.S.F.	pains 30,	bière 1
	Pacha	pains 100,	bière 3
17	Chef de la troupe et des carriers de la		
	Nécropole	pains 100 (?),	bière 3
	Chef de la Grande Djadjat	pains 50,	bière 2
	Chef de la Trésorerie	pains 50,	bière 2
	Scribe	pains 30,	bière 1
	Intendant du Cabinet Royal	pains 30,	bière 1
	Scelleur	pains 15,	bière 1/3, 1/4, 1/5 [= = 47/60]
18	Armurier	pains 15,	bière 1/3, 1/4, 1/5 [= = 47/60]
	Chasseur	pains 15,	bière 1/3, 1/4, 1/5 [= = 47/60]
	Sculpteur	pains 20,	bière 1/2
	Chaque homme de ma troupe	pains 10,	bière 1/3
	[Le tout provenant] du Grenier du Roi V. S. F.		
19	Les morceaux choisis de viande et de volailles (proviennent) du Magasin de Ravitaillement du Roi, V. S. F. Les outres, tombereaux, sandales ointes de résine et tout le nécessaire pour les travaux de toutes les fonctions de l'Administration Royale (proviennent) de la Trésorerie du Roi, V. S. F.		

Source Goyon (1957: 17–19).

Overseeing such a massive force would have required not only major organizing skills but also a very careful accounting system to monitor its activities as well as to determine and distribute differential wages to the personnel belonging to different categories. With 13 official ranks, 13 labour ranks, and the official position of Ameni, the overall leader of the expedition, we have 27 possible wage pay-scales. The question now is: How did the ancient scribes handle such diversity? The third section of the Inscriptions, which deals with wages, shows only 14 groups of personnel having been paid and using only 7 pay categories. I will describe the differential wage system of this expedition by moving up gradually from the bottom of the hierarchy. In Table 13, I show not only the bread and beer payments per category of personnel, but also the multipliers used in each case, assuming that the pay levels for the unskilled workers represent the 'basic wage'.

A number of observations on Table 13 are pertinent. First, some professional occupations were considered of equivalent pay worth; for



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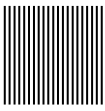
Table 13. Distribution of Rations

Occupation	Daily Bread Loaves	Multiplier	Daily Beer Units	Multiplier
1. Unskilled workers	10 loaves	1	$\frac{1}{3}$ unit	1
2. Seal bearers, guardsmen and hunters	15 loaves	1.5	47/60 unit	2.35
3. Craftsmen	20 loaves	2	$\frac{1}{2}$ unit	1.5
4. Royal retainers, scribes and the chamberlain	30 loaves	3	1 unit	3
5. Stewards of the Great Board and Treasury	50 loaves	5	2 units	6
6. The Greatest of the Thirty of Upper Egypt, mayors, and the commander Sankh-ptah	100 loaves	10	3 units	9
7. The herald Ameni	200 loaves	20	5 units	15

example, retainers, scribes and the chamberlain. This partly explains why only seven pay categories were used. Second, several other groups do not appear in the pay list; in particular the male secretaries, the police officer, the stone-cutters, the rowers, the quarrymen, the sandal-makers, the brewers, the millers, the bakers and the butlers. Third, the craftsmen who appear in the wage list are not mentioned in the roster, and the scribes of the Great Board and of the Treasury, which are distinguished on the roster, have been grouped together on the wage list.

One possible explanation for the absence of a number of groups of personnel from the wage list is that their wage payments were recorded on a separate document, but this is not a convincing explanation for two reasons. First, there are no compelling reasons why these groups would have been treated separately from those mentioned on the above wage list. Second, there is no evidence of other absent wage documents from this expedition. Mueller (1975: 257) offers a plausible explanation by suggesting that the way the scribes of the Great Board and the scribes of the Treasury were grouped together into one pay band offers an important clue: 'The scribe who drafted the document has apparently omitted from the wage list all members of the expedition whose wages fell into a category already represented by men of a different profession but with the same income.' Hence, the entry for craftsmen in line 3 of Table 13 included at least some of the groups in the roster not mentioned explicitly in the wage list: stone-cutters, quarrymen, sandal-makers, etc.

Of more crucial importance for my purposes are the implications of the differential wages in bread and beer and their significance for understanding methods of wage payment. It is clear from Table 13 that the wages paid to the unskilled workers represent minimum wage payments for the expedition. A clear pecking order is established in the table, whereby the multiplier for bread and beer wages increases as skill levels



and/or hierarchical positions increase. The multipliers for bread and beer reach their maximum in the case of the leader of the expedition, Ameni, being 20 for bread and 15 for beer. So it appears that the scribe simply used the outcome of multiplying the 'basic wage' by the appropriate multiplier to determine the wage of a particular group of personnel. The status differences between various classes of personnel were thus clearly marked out through the use of arithmetic multipliers.

Determining the Value of Wages and the Mode of Payment

The details of the multipliers and the levels of payments in terms of bread loaves and beer units raise three questions. First, why did the multipliers for bread and beer differ in some cases for the same group? Second, why did the scribe make use of such inconvenient multipliers, such as the 2.35 beer multiplier for the seal bearers, guardsmen and hunters (47/60 beer unit)? Third, could a single man, such as the leader Ameni, on his own have consumed 200 loaves of bread and 5 units of beer daily?

It has been suggested that the lack of symmetry between the multipliers for beer and bread for the same group could be explained by differences in the measures used or the quality or dilution of beer (see Mueller, 1975: 257, fn 36). Although this may be a plausible explanation, it is not entirely convincing, for the same argument could be made in the case of bread, which could differ in dilution, weight and size, as evidenced from the bakery accounts during the reign of Seti I (see Spalinger, 1986; Ezzamel, 1997). Alternatively, Mueller (1975: 259) suggests that the explanation lies in the argument that bread and beer were used to determine the value of wages rather than necessarily to signify the precise mode of payment:

The conclusion that wages were always paid in bread and beer is, nevertheless, open to some doubt. The third income group in Ameni's expedition received an allowance of 15 loaves and 47/60 of a unit of beer. Similar figures occur in *P. Berlin 1005*, where the surplus revenue of the Illahun temple is divided into shares of $1 \frac{2}{3}$ loaves, $\frac{5}{6}$ of a unit of beer, and $2 \frac{23}{30}$ *spnw*. It is difficult to see how even the most meticulous of paymasters could have measured fractions of this type, and one is forced to the conclusion that these are merely mathematical units indicating the value of the shares, not the actual rations.

Mueller marshals other arguments to support his position, for example the use of fractions of cattle for taxation purposes in Illahun (1975: 259), and suggests that the much higher wages calculated in bread and beer for more senior officials (such as Ameni) were not paid in just bread and beer to be consumed there and then. Rather, payment of the equivalent value of wages was made in different commodities. One possible objection to the explanation offered by Mueller is that, even for senior officials where wages were high, payment could still have been made exclusively in bread and beer, not for immediate consumption but for a combination of



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consumption and exchange for other commodities such as meat and vegetables. In this sense, bread and beer would have simply functioned as a 'money of account' or a unit of value. In which case, once a person had received his payment in equivalent bread loaves and beer units, he could exchange parts of it for other goods. Such an explanation was considered briefly by Mueller when he states that 'the bread-and-beer allowances of the Middle Kingdom were also convertible into "objects of all kind" ' (1975: 260). He goes on to discuss the entries made by Ameni immediately below the wage list, which refer to 'joints (*dpw*) of meat and fowl from the Storehouse of the Lord, with skins, crowbars, sandals greased with myrrh, and all other utensils for the activities of every department of the Royal Palace (coming) from the Treasury of the Lord' (1975: 261). Mueller then points out: 'Here, however, exact figures are conspicuous by their absence. This is most easily explained if the meat rations came out of the bread-and-beer allowance: if the worker "paid" for his meat with some of his bread, the value of the wages listed in the preceding section would not have been affected by the delivery of meat and fowl from the storehouse, and the respective quantities could be passed over without impairing the accuracy of the calculations involved in determining the labor costs' (1975: 261). This, Mueller would argue, casts doubt upon the payment of wages in terms of only bread loaves and beer jugs.

A stronger clue to the mode of wage payment, which Mueller does not refer to, is the extent to which the number of loaves of bread and units of beer required for one day's payment for the whole expedition could be produced by the bakers and brewers who accompanied the expedition. To consider this possibility, I focus here on bread only, with the same argument applying equally to beer. Based on the wages of bread loaves shown in Table 13, I calculated the total number of loaves that had to be baked daily if payment for bread wages was to be made in bread alone. For those groups listed in the roster but not explicitly mentioned in the wage list, I assumed that they were paid the same rate as the craftsmen in line 3 (20 loaves of bread each). This may be questionable across groups, since it is probably more accurate to assume that the rowers would have been paid 10 or 15 loaves each, whereas the police officer and the male secretaries might have been paid a higher wage than the craftsmen. However, the effect of this approximation on aggregate wages is likely to be negligible, given that precise wage rates are known for the majority of members of the expedition.

On this basis, I calculated that 201,010 loaves of bread would have been required daily. The expedition had 20 bakers, 20 brewers and 20 millers; so I assume that the millers were divided between the brewers and the bakers, say on an equal basis. But it is the number of bakers that really matters for my calculations. With over 200,000 loaves of bread required daily and 20 bakers, each baker would have had to produce more than 10,000 loaves daily. Assuming a working day of 10 hours,



target production per baker per hour would be 1,000 loaves. This would have been an impossible target. I will have to rely on evidence from the New Kingdom to demonstrate my point. In the bakery accounts translated by Spalinger (1986) and Kitchen (1993), dating to the reign of Seti I, the baker *Djdja* produced 602 loaves of bread in a whole day (see Ezzamel, 1997: 579). Even allowing for all kinds of reasonable inaccuracies in my initial calculations, and differences that could have existed in the size and quality of bread, as well as baker productivity, a daily target of 10,000 loaves per baker was clearly impossible to meet. I therefore argue that we can be reasonably certain that the bread payments in the wage list could not possibly have been actual daily payments but rather represented the *value* of wages converted into bread and beer as common denominators or ‘monies of account’.

In summary, the ancient scribe worked with the notion of a ‘basic wage’ that was then combined with the appropriate multiplier to determine the total wage for an individual with a particular skill type or occupying a specific position in the hierarchy. However, the ‘basic wage’ did not appear to be, nor did it necessarily need to be, universally fixed. So in comparison with the 8 loaves mentioned in Papyrus Reisner I, we encounter 10 loaves in Papyrus Reisner II, the Sinai Inscriptions and the Wadi Hammamat Inscriptions.

In considering these various wage scenarios, it is appropriate to locate them in the broader nexus that involves, on the one hand, rationality, centralization and bureaucracy and, on the other hand, account-keeping, ratios and rations. Within the social order of ancient Egypt, the centralized bureaucracy of the state was expected to observe *Maat* (order, justice, righteousness) in dealing with its subjects. Accounting expertise was mobilized by the administration to evolve rations that could be demonstrated both to provide a minimum subsistence level that secured a reasonable living even for those located at the bottom of the hierarchy and to differentiate sufficiently between individuals occupying differing ranks. Securing a minimum level of subsistence depended upon deriving appropriate *rations* that ensured human survival, even though at a very basic level. Ensuring that those occupying differing ranks were differentially rewarded required *rations* reflecting such hierarchical differences to be developed and applied. The notion of *rations* also was applied to set performance targets (such as time–volume ratios), to establish conversion ratios between different tasks and to determine exchange equivalence between different commodities, say bread and meat. Accounting expertise was at the heart of this exercise, in terms of generating both *rations* and *rations*, applying them to the appropriate economic domain and inscribing these activities in accounting journals as evidence for all (i.e. those few literate people) to see. In doing so, the scribes provided an indelible record that rationalized and legitimized the activities of others and, importantly, their own professional expertise. This provides a tripartite in which some notion of ‘*rationality*’ (most likely not similar to



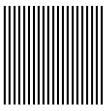
modern notions of rationality), *ratios* and *rations* became strongly intertwined. With this tripartite, bureaucracy and centralized administration in ancient Egypt were able to flourish for millennia.

Conclusions

Although the material I have examined in this paper could be interpreted from a religious or a ceremonial angle, my aim was to explore the variety of roles played by administrative and accounting practices in making possible the forms of organization and discipline documented in the centralized administration of the Middle Kingdom, ancient Egypt. The evidence examined here points to a wide-ranging influence of administration and accounting. The clear identification in rosters and name lists of individual labourers by name, along with the relevant supervisor, and the recording of their daily attendance and absence from work would have made it easy for the scribe to account for and assess the competence of every individual. The individual was a locus of accountability, a focal point of scribal measurement and reporting and an entity whose location was delineated both spatially (by project and place) and temporally (by specific day, month and year; temporal targets; and periodic measurements, rather than a modern notion of time discipline).

The partitioning of large workforces into a hierarchy of entities, ranging downwards from crews, through gangs and phyles to divisions, provided a neat way of aggregating and decomposing labourers as administrators saw fit. A pyramid of cascading work organization was established by this partitioning, where those at each level knew precisely the reporting levels below and above them. This was underpinned by accounting practices that made possible the tracing of responsibilities to the appropriate level. The accounts I examined here did not simply mirror this organizational partitioning of the workforce; rather they were actively involved in constructing these partitions. Through the intervention of accounting, each specific level was converted into a quantity that also designated work quality.

The translation of various work activities undertaken by groups of individuals into accounting numbers susceptible to more detailed and thorough analysis occurred through the intervention of scribes applying their expert knowledge. Allocated tasks were quantified as precisely predetermined targets of performance. Although no evidence exists on the permutations used to develop these targets, or the extent to which uncontrollable events were factored into their construction, there is sufficient consistency across different documents to suggest an underlying systematic method that was deployed by the scribes in the calculation of these targets. Targets were set in weights, specific time–volume ratios and other conversion ratios. The notion of time emphasized in these practices was not ‘timed labour’, the concept associated with



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industrial capitalism, but rather was much closer to 'task orientation' (Thompson, 1967: 60–1). In this emphasis, concern was focused upon ensuring that a particular task was completed, rather than being obsessed with meeting time targets, such as those enshrined in modern time-and-motion studies. This tendency to focus either on physical targets or on time targets but not on both simultaneously can be seen as recently as two centuries ago. For example, Carmona et al. (1997, 2002) have noted how, in the Royal Tobacco Factory in 18th-century Spain, cigar operators were paid on the basis of piece-rate whereas snuff operators were paid on a weekly basis. It was not until the 19th century that time and output targets were conjoined into one system of work discipline (Hoskin and Macve, 1986). Yet, far from suggesting a primitive, indiscriminate use of these alternative time–volume ratios, the evidence strongly points to careful differentiation by the scribe according to the nature of the task at hand—as evidenced, for example, by the judicious use of different division sizes for work organization compared with wage determination.

Concern with accountability meant that actual achievements could be compared periodically against pre-specified targets. To ensure that all relevant dimensions of performance were covered, the scribes received special training involving the writing of model letters to report on work in progress. This acquired expertise was then put to the test through the preparation of accounts that inventoried actual achievements, compared achievements against targets and signalled the difference. From these accounts, it would have been possible for administrators not only to identify work carried forward to be completed during the following period, but also to assess the competence of an individual or a group in carrying out assigned tasks. By coding workers spatially and temporally, their performance could be traced, monitored and assessed more accurately in a specific place at a particular point in time. Letters and autobiographies from the Middle Kingdom attest to the importance individuals attached to being seen to have done 'a good job'. This signalled not only competence, but also personal integrity, trustworthiness and concern with righteousness as reflected in *Maat*. This seems to have been an important social/ethical drive that was aimed, at least in an ideal world, to propel behaviour towards a more disciplined application of effort to perform tasks deemed important for the kingship, such as state projects. By combining such social/ethical drives with the administrative and accounting practices outlined throughout this paper, a more complete picture of the overall work discipline in the Middle Kingdom becomes apparent.

Variations in wages signalled to individuals the worthiness of their effort. In a hierarchical society such as that of ancient Egypt, it is not surprising that the wage system was fine-tuned to emphasize differences in skill, achievement and social status. Through the intervention of

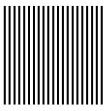


accounting, with its seemingly precise calculus, the differential worthiness of individual endeavour could be constructed down to a fraction of one loaf of bread. These precise wage lists were accounting codes that constructed and *visualized* the relative importance of employees, providing a definite ranking so that the position of each was known unambiguously both to himself and to others.

The determination of wage lists is only one, albeit important, part of the impact of ancient accounting practices upon wages. For, once wage lists were drawn up, a suitable means of payment had to be found. In an economy that lacked a currency of universal circulation, payment using a variety of commodities was possible. Accounting expertise proved indispensable here: it was used to construct a system of equivalence whereby a wage measured in a particular commodity was easily translatable into other commodities. Typically, one commodity might be designated as the unit of measurement, or the 'money of account', such as numbers of loaves of bread. As value equivalence was defined between these 'money of account' commodities, a flexible scheme was established whereby payments could be made in any commodity (e.g. fish, geese, beer) while observing strict *value* equivalence.

These wide-ranging, and significant, roles played by accounting and administrative practices are a testimony to their centrality in promoting work discipline—which is more than can be claimed for violent coercion or religious devotion. Both accounting and administrative practices combined to emphasize a particular spatial and temporal zoning that served as the basis of work organization and discipline. This strong emphasis upon precision, detailed calculation, order and control had its parallels in the wider society at large, as the rulers sought to move beyond the traumatic chaos of the First Intermediate Period. A calculus involving the determination of seemingly appropriate *ratios* (of time–volume; conversion; hierarchical location) and *rations* was judiciously used through the intervention of accounting to underpin some notion of rationality (however divorced from contemporary notions of rationality this may be) in order to make possible the functioning of a centralized state bureaucracy.

A number of issues concerning the functioning of premodern accountability systems, such as those discussed in this paper, merit careful reflection, and my intention here is to flag them up for further scholarly scrutiny rather than to suggest a way of resolving them. First, it could be argued that, for an accountability system to function effectively, performance targets have to be contextualized within the precise work setting for which they are intended in order to reflect local difficulties and must also take account of matters that are beyond the control of those subjected to it. Although evidence from the New Kingdom (Ezzamel, 1997) points to the ability of the scribes to contextualize targets, the material analysed here lacks direct evidence that has a bearing on this issue. It is possible that, in the absence of time targets conjoined to output targets, this lack of



contextualization was not deemed problematical by the ancient scribes because labourers were required to work as long as needed to produce the target outputs. The extent to which some specifically time-focused discipline of labour was established in the Middle Kingdom, ancient Egypt, either via the higher order of the administrative machinery or at the local level by foremen, has to remain pure speculation.

Second, the discussion of target-setting throughout the paper has assumed a unidirectional tendency: the scribes determining targets and labour, willingly or unwillingly, simply having to abide by these targets. Possibilities of slack being built into these targets at higher or lower levels have not been explored because of the lack of direct evidence. The lack of evidence, however, should not be taken to suggest the lack of scope for slack to have been incorporated into the targets.

Third, there is the question of literacy, and by implication the level at which accountability systems enshrined in accounting inscriptions could have functioned, in premodern times. In the case of ancient Egypt, literacy was not widespread; although, compared with the Old Kingdom, literacy significantly improved in the Middle Kingdom, it remained a signifier of high status because the vast majority of the population remained illiterate (Baines, 1983). Apart from the important implications for the power relations that would have existed between the scribes and workmen, there is the question of how such writing-based accountability systems could have been used. One possibility is that, at the beginning of the work shift, the foreman orally announced the targets to the workmen, and at the end of the shift an announcement was made of the output achieved and the remainder to be completed on subsequent days. This interpretation would also allow for the possibility that inscribed accounts were used more directly in the case of more senior, and presumably literate, personnel. What is being suggested here is a two-level form of accountability: inscriptional at higher levels and oral at lower levels. Quite how these two systems might have functioned in parallel, and the extent to which the oral mapped onto the inscriptional, are important issues, but they cannot be addressed here because of lack of evidence.

Notwithstanding these important issues, and although the evidence on the intervention of accounting may vary in its precise manifestation from one historical episode to another, the message seems to remain the same. Accounting, I would argue, was a fundamental part of the administrative and social arrangements of ancient Egypt, just as it remains firmly embedded in the functioning of contemporary organizations and society.

Notes

I would like to express my special gratitude to Gibson Burrell, Jonathan Morris, Stephen Quirke and Hugh Willmott for their invaluable advice and constructive comments and to the two anonymous reviewers.



- 1 Some might argue that accounting is a fairly modernist term and its application to a context as remote as that of ancient Egypt is controversial. Although not wishing to open up that debate here, the remainder of the paper is underpinned by a base-line understanding of accounting that renders it in my view amenable to ancient cultures. The basis for this understanding is: 'First, that accounting is the *practice* of entering in a visible format a record (an account) of items and activities. Secondly, that any account involves a particular kind of *signs* which both *name* and *count* the items and activities recorded. Thirdly, that the practice of producing an account is always a form of *valuing*: (i) *extrinsically* as a means of capturing and re-presenting values derived from outside for external purposes, defined as valuable by some other agent; and (ii) *intrinsically*, in so far as this practice of naming, counting and recording in visible format in itself constructs the possibility of *precise valuing*' (Ezzamel and Hoskin, 2002: 335, emphasis in original).
- 2 Electrum is 'an alloy of silver and gold used in ancient times' (*Concise Oxford Dictionary*, 1995: 437).
- 3 Some of the texts use the term 'crew' to designate a group of workers of an equivalent number to what I describe here as a 'division' (e.g. Simpson, 1963, 1965, 1969, 1986; Mueller, 1975). I have followed the definitions used by Roth (1991).
- 4 I am grateful to Stephen Quirke for bringing this fragment to my attention and for translating its content for me.
- 5 It was in the Middle Kingdom that the military rank 'general' was used for the first time in a non-military context in the Sinai Inscriptions to describe the senior foremen of crews, presumably of military troops used on work (in this case mining) expeditions (see Faulkner, 1953: 37–8).
- 6 In Papyrus Reisner II, Simpson (1965: 31) translated line 16 of this account as 'equalling debited to him units 100 $\frac{1}{2}$ '. However, in Papyrus Reisner III, Simpson (1969: 10) corrected 'units 100 $\frac{1}{2}$ ' to read '*deben* 100 $\frac{1}{2}$ '.
- 7 For an example of private redistribution within a household, see the Hekanakhte Papers (James, 1962; Goedicke, 1984; Ezzamel, 2002).
- 8 Table 9 is a translation of the German translation by Borchardt made for me by Ian Wilson. I have checked Wilson's translation against another made by Gillings (1972: 125) and found the two to coincide. I will however make use of Wilson's translation here because it involves the whole of Borchardt's paper and not only the account reproduced here.
- 9 In commenting on the period to which the wages relate, Borchardt (1902/3: 117) has suggested that the account is a record of the monthly distribution of receipts. If this were the case, then at least some of the entries that show very low wages would require additional explanation, because they would not suffice to support one person, let alone his family. For example, the temple worker listed at the very end received only 5/9 of one loaf of bread, which, if it covers a one-month period, would make no sense. Gardiner (1956: 119) insists that 'Borchardt failed to see that the whole account is concerned, from start to finish, with daily receipts and payments', which is supported by the text itself and the revenues of similar temples.
- 10 Simpson (1963: 430) suggests that the actual beginning of the period may have been three days after the stated date; this would allow for the workmen to finish off one project before moving on to the next.



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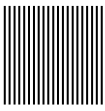
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