

THE ROLE OF CRAFT SPECIALIZATION IN THE EVOLUTION OF PREHISTORIC SOCIETIES IN THE AMERICAN SOUTHWEST

Catherine M. Cameron

ABSTRACT: Craft specialization is often used as one indicator of social complexity and even as a prime mover in the development of hierarchical social organization. In these arguments, the important distinction between craft specialization and craft industrialization is generally ignored. Claims for craft specialization are examined in three prehistoric cultures in the American Southwest for which complex social organization has been suggested: Chaco Canyon, the Hohokam, and the Western Anasazi. The material correlates of craft industries in a number of early state-level societies are briefly described and contrasted in both scale and level of organization with the Southwestern pattern. Finally, several models for the development of craft production are used to evaluate the role of craft specialization in the social organization of groups in the puebloan Southwest. The apparent inability of Southwestern groups to produce a surplus of subsistence goods inhibited development of a social hierarchy that could support craft industries. Production and exchange of craft goods at the household level may have been primarily a form of insurance against an uncertain environment.

INTRODUCTION

Craft specialization is commonly used as one indicator of social complexity, and some argue that craft specialization has important, evolutionary implications because it signifies the growth of economic power in a society (Tatje and Naroll 1970). In the American Southwest specialized production of a variety of goods has been offered as evidence of the development of complex social organization (Judge 1983; Upham 1982). A distinction needs to be made between craft specialization, which involves individuals who themselves control the production and distribution of craft products, and craft industrialization, which involves the employment or coercion of dependent labor at the behest of an elite group. I will argue that craft specialization only becomes a significant factor in the evolution of complex societies when it comes under the control of pre-existing elite groups who transform craft specialization into craft industrialization. Craft specialization does not itself promote the development of an elite.

In the Southwest, craft production involved the occasional or part-time production and exchange of craft products and was most likely a method of maintaining alliances with nearby groups; the exchange of craft products for food may have occurred in years when food sources failed. The marginal environment of the Southwest prevented the accumulation of an agricultural surplus that could be used as a basis of power for the growth of an elite group. The types of craft products produced in the Southwest, although no doubt highly valued, could not be used to accumulate power.

The following sections examine claims for the presence of craft specialization in three areas of the Southwest for which complex social organization has been suggested: Chaco Canyon, the Hohokam, and the Western Anasazi. The material correlates of craft industries in a number of early state-level societies are described and contrasted with the Southwestern record. Finally, several models for the development of craft production are used to assess the role of craft specialization in the social organization of groups in the puebloan Southwest.

ARGUMENTS FOR CRAFT SPECIALIZATION IN THE SOUTHWEST

Turquoise Processing in Chaco Canyon

Chaco Canyon, located in the center of the San Juan Basin of northwestern New Mexico, contains a number of large, prehistoric pueblos built in a distinctive style that has been termed "Chacoan". Chacoan structures are also found scattered throughout the San Juan Basin and are connected with a series of prehistoric roads. This widespread network of sites and connecting roads, termed the "Chacoan System," has been assumed to represent a complex cultural adaptation to the marginal environment in this area. A number of models have been proposed to explain the development of this system (Altschul 1978; Cordell 1984; Judge 1979, 1989; Judge *et al.* 1981). Judge (1989) suggests that Chaco Canyon was a central place for the import, production and export of turquoise. The control of this exotic mineral permitted Chaco Canyon to become ritually dominant over other sites in the region and may have allowed the development of an elite group or dominant corporate unit (Judge 1989: 240).

Judge's model begins about A.D. 920. Since turquoise debris has been found in "workshop" areas at sites of this date (Red Mesa Phase, A.D. 920-1020), Judge suggests that these areas represent the work of full-time craft specialists (1989:235). By A.D. 1020, Chaco Canyon had become the central source of turquoise crafts in the southern part of the San Juan Basin and, further, had become a site of exchange for other items (durable or perishable). By the mid-11th century, turquoise became formalized as a ritual item and Chaco Canyon also became a locus of ritual importance in the San Juan Basin. As the system formalized, according to Judge, administration of the exchange network would have been necessary, and this administration would logically center in Chaco Canyon, where turquoise was produced and exchanged (Judge 1989:239-240). Thus, craft specialization led to the development of complex society in Chaco Canyon.

The source of turquoise nearest to Chaco is the Cerrillos mine, more than 170 km southeast of Chaco Canyon. Judge suggests that the Chacoan outlier at Guadalupe, (located in the Puerco River valley midway between Chaco and Cerrillos), served as an intermediate point for the control of the turquoise source (1989:237). Although no evidence of turquoise processing has been found at Guadalupe, Judge sees this absence as a demonstration of the effectiveness of transshipment procedures there.

Evidence to support Judge's model is unfortunately scanty. Mathien (1984) identified "jewelry workshops" at ten sites in Chaco Canyon. However, many of these "workshop" areas contain only small quantities of turquoise (34 pieces at site 29SJ1360; 23 pieces at Pueblo Alto; 14 pieces at Una Vida; 12 at Kin Nahasbas; 49 pieces at Kin Kletso; a "handful" of turquoise at Pueblo del Arroyo, etc.). Most of these areas also contain similar amounts of other types of ornament debris, such as shell, shale and selenite; that is, turquoise is not abundant absolutely or relatively. A few sites do have large quantities of turquoise. "Hundreds" of pieces of turquoise were found in a plaza area at site 29SJ629 along with lapidary abraders, small drills and other jewelry-making tools. Clearly turquoise jewelry was being produced at 29SJ629. However, many of these pieces of turquoise were "pinhead in size" (1984:178), so the scope and location of the activity area does not necessarily indicate large-scale production. Based on these data, Mathien (1984:184) finds no evidence for full-time craft specialization.

Large quantities of finished turquoise have been found at some sites in Chaco Canyon. For example, more than 50,000 pieces are reported from Pueblo Bonito (Mathien 1984). However, there is no evidence to indicate access or control of the Cerrillos turquoise mines by Chacoan inhabitants or evidence of large scale or carefully controlled processing of this mineral in Chaco Canyon. Most pieces of turquoise found in Chaco are bead-sized or smaller and since the advent of screening and flotation as excavation procedures, many pieces of turquoise recovered are microscopic. Although accurate data are not currently available, when viewed in terms of volume, the quantity of turquoise found at sites in Chaco seems small. When viewed within a temporal framework of several hundred years, the recorded amount of turquoise appears unlikely to have been the basis for the development of a complex social system in Chaco Canyon.

Although the way in which goods were distributed within the Chacoan system is unclear and the distribution of turquoise at sites outside Chaco Canyon has not been adequately investigated, studies of lithics and ceramics from Chaco Canyon have found no evidence for the redistribution of these goods from Chaco to sites in the surrounding region (Cameron 1984; Toll 1984a).

Shell Production at Snaketown

A number of investigators have suggested that the Hohokam had a complex sociopolitical organization (Doyel 1980; Wilcox and Sternberg 1983). While much of the evidence for this suggestion is based on architectural features such as ballcourts and the labor intensive irrigation system that characterizes Hohokam agriculture, the presence of craft specialists has also been used to support interpretations of complex social organization (Doyel 1980:30). Although evidence for craft specialization has been primarily based on the distinctiveness of the craft goods found at Hohokam sites (*e.g.* Crabtree 1973), the organization of production, until recently, has not been investigated. This discussion will focus on Seymour's (1988) study of the evidence for specialist production of shell ornaments, long a hallmark of Hohokam culture.

Quantities of marine shell found at Hohokam sites have led Haury (1976) and others (Nelson 1981) to suggest that the production of shell ornaments at Snaketown may have been the work of craft specialists. This interpretation is based primarily on the distance the material travelled from its source and the intricacy of shell production techniques.

Seymour's (1988) study of shell production at Snaketown identified several shell-working areas dating to the Sacaton phase in houses in a specific part of the site. Quantities were not large: 438 pieces were found on house floors, of a total of 3200 pieces (ornaments and manufacturing debris) found at the site as a whole. These quantities can be compared with the site of Casas Grandes in northern Mexico where almost four million pieces of marine shell, totaling more than 3000 pounds, were recovered from deposits dating to a similar time period (DiPeso *et al.* 1974). Tools that may be associated with shell working are also found at the Snaketown manufacturing areas. Seymour notes:

"Manufacturing debris clearly provides the most reliable data on the location of shell manufacturing loci, but concentrations of other items can provide corroborative evidence. Caches of both whole unmodified shell and finished unbroken ornaments were found in houses in manufacturing areas but

nowhere else. This distribution indicates that production groups not only had access to small quantities of raw shell but that they also retained control of finished ornaments for use and/or distribution" (Seymour 1988:823).

Despite the localized distribution of shell artifacts at Snaketown, Seymour argues that this pattern was not the result of specialist production. She suggests that: "... individuals residing in distinctive, probably kin-based, residential areas were responsible for craft production on a part-time basis. The distribution of manufacturing debris, tools, and finished craft items indicates that shell ornaments -- and probably other goods and services... -- were circulated among residential groups within the Snaketown community and perhaps also between communities (1988:826). Shell production does not seem to have played a role in the development of a complex social system at Snaketown.

Ceramic Production in the Western Anasazi Area

Several scholars have suggested that a complex sociopolitical system was in operation during certain time periods in the Western Anasazi area (Plog 1983; Feinman *et al.* 1981; Upham *et al.* 1981). The most comprehensive discussion of this system has been by Upham (1982). He describes the development of an elite class during the fourteenth century whose power is based on the control of an agricultural surplus and whose position is signalled and validated through the exchange of valuable goods with other elites. According to Upham, the primary goods in elite exchange were ceramics, most especially Jeddito Yellow Ware. Following Hantman *et al.* (1979), Upham suggests "a change [in ceramic production] from early household levels of organization to more centrally controlled and specialized forms" (Upham 1982:127). He describes the way in which the system functioned as follows:

"... the smaller pueblos, which lacked specialized architecture, were part of a larger sociopolitical unit that was localized at centrally located sites. Redistributive functions held at centrally located kivas may have been controlled by a developing managerial elite It is also likely that a great many of these large sites with specialized architecture were ceramic-producing centers. Ceramics from these centers may then have been distributed throughout the local settlement system (1982:128) [petrographic analysis] suggests that, as a general trend, control over ceramic production and distribution in the Southwest became increasingly centralized through time until the fourteenth century [and] particular ceramic technologies were probably the products of very few centers The increased managerial requirements associated with intensified use of agrarian labor is likely to extend to other specialists involved in production activities. Data from Nuvaqueotaka, for example, indicate that particular polychrome ceramics were commodities to which individual access was restricted ... a restriction indicating some managerial control over the distribution of these products" (1982:132-133).

The evidence Upham cites for the presence of ceramic specialists, however, is illusory. As Toll (1984b:27) notes, Upham's primary evidence for specialist production of ceramics concerns the homogeneity of temper attributes and localization of production areas. In regard to the first attribute, Upham's data can be questioned. He bases his interpretation of homogeneity on the petrographic analysis of the temper of ten sherds of Jeddito Yellow Ware

(an indefensibly small sample) when, in fact, this ceramic type is untempered by definition (Toll 1984b:27).

Evidence for localized production at large sites is based entirely on temper sources and design styles. Upham provides no evidence of production areas, and, in fact, many of the large central sites where he feels ceramic specialists operated have not even been excavated. Ceramic production areas are notoriously elusive in the archaeological record in the Southwest. There are no areas where large-scale ceramic production is evidenced by numbers of kilns or large quantities of wasters or storage heaps. Therefore, Upham's suggestion of localized production areas remains, at minimum, unverified. Toll (1984b:27) sums up Upham's evidence for the presence of ceramic specialists in the Western Anasazi area as follows: "... neither of these attributes [homogeneity and localization] is convincingly shown to be greater than, for example, ethnographic cases [in the Southwest]."

CRAFT INDUSTRIALIZATION IN STATE-LEVEL SOCIETIES

In this section craft production in archaeologically known early civilizations is described. Certain key features (high-volume production, localized and controlled production areas, etc.) distinguish production in these societies from that found in the Southwest. These comparisons can be used to evaluate the nature of craft production at sites in the Southwest and to reassess conclusions that have been drawn concerning Southwestern craft specialization.

Obsidian Production at Teotihuacan

The production of obsidian blades and tools at Teotihuacan in the Valley of Mexico was clearly the work of full-time craft specialists. More than one-third of the population of the city was made up of nonagricultural specialists, many of them obsidian workers (Spence 1981). Millon (1974) suggests that there may have been more than 400 obsidian workshops during the Classic period at Teotihuacan. Comprehensive mapping at Teotihuacan shows the localized nature of obsidian distribution. Obsidian production was not associated with every household unit, but only with workshop areas, and the quantity and concentrations of debris are spectacular. Obsidian blades and tools produced at Teotihuacan have been found all over Mesoamerica (Culbert 1983).

This sort of distribution supports an interpretation of "industrial" production of obsidian. Such industrial areas are clearly identifiable:

"An obsidian workshop ... is a site with some evidence for unusual obsidian working. This may be revealed by field observations of heavy obsidian density on the site surface, by high proportions of waste in the surface collection, and/or by the presence of unfinished artifacts. Although occasionally isolated, most workshop sites were clustered into workshop areas that included anywhere from two to more than a dozen workshop sites each" (Spence 1981:771).

Spence (1981) has distinguished three kinds of workshop areas: local, regional and precinct. Workshops that were not in the center of the city produced all types of obsidian

debris. Production was probably intended for local consumption and may have been part-time or involved only a small proportion of the population in the area. Regional workshops may have been producing not only for urban inhabitants, but also for populations over much of central Mexico. Some produced only certain types of items (cores, blades, bifaces, etc.). A very distinctive type of biface was found almost exclusively within regional workshops and was rare elsewhere at the site, suggesting that regional workshops were producing for distribution outside the city. Some regional workshops were located near public structures in the center of the city, while others had peripheral locations (Spence 1981). Precinct workshops were all located within Teotihuacan's main public structures (e.g., the Pyramid of the Moon and the Great Compound). Some precinct workshops specialized in specific types of obsidian products, while others were unspecialized. Spence (1981:774) suggests that precinct workshops may have been involved in state-supervised production, perhaps the production of obsidian tools as part of a state tax.

Two types of obsidian were used in Teotihuacan workshops: a grey obsidian from a nearby source and a green obsidian from a source 50 km northeast of Teotihuacan. The local, grey obsidian was preferred for biface and scraper production, while green obsidian was most commonly made into blades. The distribution of unprocessed nodules of grey obsidian at Teotihuacan indicates that this material was procured individually by each workshop area. Architectural and other evidence suggest that workshops represent social groups. Each group may have acted as a unit to procure grey obsidian.

Green obsidian appears to have been procured by a centralized agency, perhaps the state. The efficiency of this procurement system is indicated by the even distribution of green obsidian at workshops throughout the city. Procurement may have been direct, through state expeditions, or it may have been obtained as tribute paid by groups located near the source area (Spence 1981:778). It is apparent that sources of both grey and green obsidian were controlled by the inhabitants of Teotihuacan. The fact that this green obsidian is found at sites throughout Mexico suggests that Teotihuacan was able to restrict access to the source of this material; furthermore, this material may have come to have symbolic (not just economic) value because of its connection with the massive cultural complex at Teotihuacan.

Shang China Bronze, Ceramic, and Stone Production

The Shang Civilization of ancient China (eighteenth-twelfth century B.C.) presents clear evidence of specialized production. Bronzes, pottery, stone and bone artifacts were manufactured in restricted areas of the ancient Shang cities, and these areas were characterized by quantities of specialized tools, facilities and manufacturing debris. There is evidence that some craftsmen were people of relatively high status (Chang 1980).

At Hsiao-t'un, just north of the town wall of An-yang, a number of semi-subterranean workshops have been identified. A bronze workshop was described as follows:

"Several hundred bronze-casting molds and several tens of crucibles were found near [house] B-15, probably a bronze casting area" (Chang 1980:90).

Another bronze-working area was also found only slightly to the northwest, possibly connected with B-15:

"... as many as ten pit houses containing clay molds (1,610 pieces in one of the houses) with two of them possibly interconnected into an underground molten-metal pouring system "(Chang 1980:98-99).

A jade and stone workshop found nearby contained dozens of worked stones, jades, and shells and nearly a thousand stone knives. A bone workshop in the same vicinity contained nearly a thousand bone arrowheads and several hundred pieces of bone material (Chang 1980:98).

Bronze and bone workshops were also located in a Shang city in the Cheng-chou area, 150 km south of An-yang. The bronze workshop was located on the floor of one of the houses and in an area outside the house. Bronze-working was indicated by the presence of conical pits with bronze fragments and cores for bronze vessel legs (Chang 1980:227). The pottery production area was located south of the largest house floor, and contained a cluster of pottery kilns. The kilns were round holes with one opening for fuel and another where the pottery was placed to be fired. Unfired pottery, misfired pottery, paddles and impressing paddles were found in pits nearby (Chang 1980:281).

Chang summarizes the Shang settlement pattern:

"... one sees not only a highly stratified and specialized society but also a settlement pattern in which differences in social strata and profession were spatially expressed. At the heart was an enclosure in which were probably seated the rulers of the town, together with support personnel. Workshops of various kinds were found scattered in all directions outside the wall, some of them associated with ground houses [pithouses] with or without *hangt'u* floors and walls, possibly indicating -- as in the An-yang case -- that some craftsmen were appended to the upper, rather than the lower, class" (Chang 1980:283).

Inka Textile Production

Textile production appears to have been a specialized craft in Inka Peru (Morris 1972). At the site of Huanuco Pampa, a textile workshop has been identified which, because of its architectural arrangements, seems to have been controlled directly by the state. Using ethnographic and historical data, Morris (1972) has suggested that the textile producers associated with this industry were *aqllakuna* ("chosen women" or "nuns"), young, unmarried women selected for service to the state by the Inka rulers (Rowe 1982).

The textile production area at Huanuco Pampa (Unit 5, Zone VB) is architecturally more simple and orderly than other parts of the city. It is surrounded by a wall which affords access at only one location. Inside are 40 structures arranged in rows. A large number of artifacts associated with textile production have been found in this area, including about 300 ceramic and stone spindle whorls and bone artifacts used for tightening weave and maintaining the spacing between threads. The frequency of these artifacts in Unit VB5 were far greater than those found in other areas of the site.

Unit VB5 also showed evidence of living activities, including fire and refuse areas, but the type of residential patterns indicated by the debris were notably different from those in

other parts of the city. Morris (1972:55) suggests that the structures inside Unit VB5 were residence-workshops and that the total population of the compound was about 100 people. Two buildings adjacent to the entrance to Unit VB5 contained no evidence of either residence or textile working; these buildings may have been used for administration (record keeping and/or security) and suggest state control of the production unit.

Textile production was typically a female occupation in the Andes, and the evidence that these residence-workshops do not seem to have housed a family unit supports the suggestion that textile producers were *aqllakuna*. Other lines of evidence also support this suggestion: quantities of pottery found in Unit VB5 may be associated with *chicha* (beer) making, a woman's activity (especially *aqllakuna*), and controlled access to the compound indicates that it was occupied by a special class of people.

Cloth was highly valued by the Inka and was involved in nearly all important social, political and economic relationships throughout the Andes (Morris 1962:59). Although cloth is virtually impossible to trace archaeologically, it was almost certainly distributed beyond the city of Huanuco Pampa, both as gifts and as redistributive issue from the state to its employees. Murra (1962:721) notes that economic and political relationships between the Inka state and a newly conquered group were initiated with cloth, and the great storehouses in the Upper Mantaro Valley bear testimony to the importance of the state's redistributive system. More than 2000 of these storehouses have been discovered, and they are often more than 5 meters in diameter and 3 meters high (Earle and D'Altroy 1982).

Lapis Lazuli Production in Eastern Iran

Lapis lazuli was in great demand in Mesopotamia during the third millennium B.C. The primary source of this material was in Afghanistan, more than 1200 miles to the east (Tosi and Piperno 1973). Trade between these two areas was through intermediaries in the Iranian Plateau. These individuals eventually became full-time merchants who developed processing centers for lapis lazuli in their own communities. At the site of Shar-i Sokhta a single large workshop area appears to have been staffed by full-time specialists administered by a central authority that controlled both production and exportation (Tosi and Piperno 1973). Excavations indicate that the workshop was only one of a number of areas of occupational specialization that operated at Shar-i Sokhta during the third millennium (Tosi 1984).

Debris from the lapis lazuli workshop at Shar-i Sokhta covered over 3000 square meters (Tosi 1984) and contained large quantities of limestone cortex (the matrix in which lapis lazuli is found), flakes or blocks of lapis lazuli, small fragments with evidence of shaping or polishing, and both finished and broken beads. Associated with these materials were hundreds of specialized microlithic drills and borers, some of which still show traces of lapis lazuli on their working edges. Evidently lapis lazuli was transported to the site in raw form and then processed in two ways: 1) separation of the lapis lazuli from its matrix and 2) production of beads and other objects. Each of these processes was accomplished in a number of stages that (based on evidence of unfinished objects and waste) appear to have formed a rigid production sequence. It is evident (both from deposits at Shar-i Sokhta and artifacts found in Mesopotamia) that lapis lazuli was often shipped from Shar-i Sokhta to Mesopotamia in a semi-processed state, yet the elimination of the worthless matrix at the Shar-i Sokhta workshop apparently increased the end value of the product (Tosi 1984).

COMPARISON OF THE EVIDENCE FOR CRAFT PRODUCTION IN STATE-LEVEL SOCIETIES WITH THAT IN THE SOUTHWEST

Although the examination of craft production in state-level societies presented here was brief and general, certain common features of craft production can be noted in the four state-level societies discussed. These include: localized production areas, evidence of high-volume production, specialized tools and facilities associated with production areas, restricted access to sources of raw materials, and widespread distribution of products. In this section, these aspects of industrial production are compared with the evidence for craft production at sites in the Southwest.

Localized production areas characterize craft industries in the state-level societies discussed above. Production areas not only occupy a clearly defined location within the community but access to these areas may be restricted, perhaps, to certain members of the community (as in the Inka textile industry). Production was organized at a level higher than that of the household.

Production areas for some crafts can be identified by large volumes of production debris and the presence of a specialized set of tools and facilities (molds, kilns, etc.). Where sources of raw material for craft industries can be identified, restricted access or even state control of these sources is often apparent (such as the control by Teotihuacan of the source of green obsidian).

Widespread distribution of the products of craft specialists in state-level societies indicates a demand for craft products that this production has been designed to supply. Obsidian from the Teotihuacan workshops is found throughout Mesoamerica, and lapis lazuli from the processing areas on the Iranian Plateau are found all over Mesopotamia. Distribution on this extensive scale is clearly different from that which would operate when production was at the household level and was aimed at satisfying household needs and the demands of intermittent exchange.

The patterns of craft production and distribution seen in these state-level societies are absent in the Southwest. The complex system of turquoise processing suggested by Judge (1989) for Chaco Canyon seems to consist mostly of low-volume, individual jewelry-production areas. Jewelry workshops are found at both large and small sites during most time periods and there is no evidence of the organization of production areas or controlled access to any of the areas described as workshops. There is no evidence that Chacoan groups controlled the turquoise source, and the total volume of turquoise imported to Chaco Canyon resembles a household-level activity operated by craft specialists rather than a craft industry.

At Snaketown, while shell-working has been associated with a group of houses in a specific area of the site, there is no evidence of restricted access to or control of production. The quantity of shell recovered from Snaketown does not indicate a large-scale industry. For the Western Pueblo, Upham provides no evidence of ceramic production areas for the sites that he discusses, and, as specific production areas cannot be pinpointed, the scope of ceramic distribution can be questioned. Clay and temper sources for Jeddito Yellow Ware have not been located, so restricted access to these sources cannot be verified.

These comparisons demonstrate the difference in scale between craft production in the Southwest and that in state-level societies. Craft production and distribution in state-level societies is high-volume, highly organized and tightly controlled. In the Southwest, however, there is little evidence for high volume production, and organization seems to be no greater than that which may be found in household-level production (although other sorts of organization are possible). State-level craft industries differ both in kind and scale from the limited craft production found in the Southwest.

MODELS FOR THE ROLE OF CRAFT SPECIALIZATION IN THE DEVELOPMENT OF CULTURAL COMPLEXITY

Several recent models for the development of craft specialization relate to pottery production although they can also be used to examine the development of specialization in other types of crafts. The first of the three models described below (Rice 1981) argues that pottery production develops from household production to the level of a large industry through the demands for production by elite groups. The second model stresses population pressure and movement into agriculturally marginal environments as the impetus for the development of specialist pottery production (Arnold 1985). This progression eventually leads to the control of the industry by high-status individuals who are not the pottery producers themselves. The third model (Allen 1985) examines the development of specialist traders in coastal Papua New Guinea. The primary trade good here is also pottery. Even though pottery production in coastal Papua seems to have reached the level of a large industry, neither the craft industry itself nor large scale trading has evidently had much effect on the generally egalitarian structure of the societies in which they are practiced (Allen 1985).

Rice (1981) proposes a four-stage evolutionary sequence in the development of specialized pottery production. In stage one, pottery making is a household-level activity in egalitarian societies. The technology is relatively simple, there is equal access to resources and minimal division of labor. The pottery produced through this system is likely to be unstandardized, and random variations will reflect individual differences in raw material sources and/or methods of production (Rice 1981:222). In stage two, informal specialization develops among potters (for example, interhousehold exchange when one household cannot or chooses not to make pottery). Better potters or those residing near clay sources begin to make more pottery, which may then be used in formal exchange relationships or gift-giving. There may be some claims to raw material sources by lineage or other kin groups. Pottery will reflect these changes through more standardized selection of clays and tempers, greater skill and consistency in technological characteristics, less variation in stylistic attributes and a wider distribution of these standardized products (Rice 1981:222-223).

In stage three, socio-economic differentiation and ranking have developed (apparently for reasons unrelated to developing specialist production of pottery), and control of resources is gradually appropriated by emerging elites as part of the basis for their power. Innovation and elaboration of pottery may *result* from social differentiation and competition, and there may be increased demand for specialized elite, ritual or mortuary pottery. Standardization of types will be visible first in these special-function ceramics. Systems of exchange for specialized goods may be different than those for subsistence goods, and this exchange of special-function goods will foster increasing social distance among groups (Rice 1981:223).

Stage four occurs in stratified societies. Standardized craft products and social behavior are highly evolved. Elite groups may be forcibly extracting pottery from the producers, which would stimulate production of a surplus. The surplus would be available for tribute or trade. In this situation, locations of pottery making should be apparent as districts, barrios, etc., which would become fewer and larger through time. Mass production may be apparent (standard tools, standard vessel forms, nested vessels, storage areas, etc.). Distribution will be widespread. Non-elite pottery should be standardized and elite pottery may become more elaborate.

In another model, Arnold describes a "set of changing structural arrangements in the evolution of ceramic production" (1985:225). The first system-state is household-level production. Each household makes pottery for its own use and pottery will be produced by females (Arnold 1985:225-226). The next system-state is household industry and marks the beginning of specialized production. The change to this system-state is the result of population pressure, which reduces per capita agricultural production and forces farmers farther away from good agricultural land. Pottery production as a household industry is an adaptation to land that is limited or poor agriculturally but that has ceramic resources. Pottery production is used to supplement income from farming. Potters may be female or male if pottery making does not disturb the agricultural cycles; however, female potters may be valued individuals because they add to the family income. Male potters are low-status individuals because their production of pottery means they have limited access to or ownership of agricultural land.

For household industry to succeed, a demand for pottery must be created. Demand may be the result of population growth, or potters may innovate and tie pottery to social and ideological subsystems (*i.e.*, making pottery with mythical or religious themes or using pottery for ritual or burial). As the potter specializes (*i.e.*, moves further from agricultural production), he must develop marketing strategies to turn pots into food. These strategies may include extensive exchange networks or moving the locus of pottery production near central places (Arnold 1985:227).

The third stage in Arnold's evolution of ceramic production is the workshop industry in which production becomes a full-time craft. Population pressure has eliminated agriculture as a means of subsistence for some, and these people now live on the agricultural production of others. Potters are now male. In order for this type of production to succeed, risks must be reduced by increasing control over the process. This involves capital investment in technological improvements such as kilns, drying sheds, molds or pottery wheels. As most potters cannot afford these sorts of improvements, they must hire themselves to individuals who can afford them. Pottery making then becomes controlled by higher-status individuals who are generally not craftsmen themselves and are only managerially related to the industry. Stylistic and technological innovations are increased with this type of production because risks can be borne by workshop owners rather than craftsmen (Arnold 1985:230).

Arnold's final system-state, large scale industry, is characterized by substantial capital investment for maximum output and minimal unit cost. Production is a full-time male activity, and the technology of production minimizes the effect of environmental variables. Demand for pottery is ensured through production of both utilitarian wares and those with ties to the ideological and social structural systems. Distribution is very extensive (1985:231).

Both Rice's and Arnold's models describe roughly similar trajectories for the development of ceramic specialization. Arnold has a prime mover (population pressure) that explains the development of ceramic specialization, and the environment plays a large role in the initial circumstances that select for ceramic production as a means of subsistence. Rice emphasizes elite control of production and demand for special-function ceramic types as being the means through which specialization develops. Neither model suggests that ceramic production forms the fundamental basis for social differentiation, nor do they allow for the development of ceramic specialization in the absence of social differentiation. In fact, Arnold suggests that full-time pottery production cannot succeed unless it is subsidized by high-status individuals who are not the craftsmen themselves. The third model presented here questions the validity of this assumption.

Allen (1985) has examined specialized middlemen traders who operated near Port Moresby in Papua New Guinea before World War II. The area is agriculturally marginal and the Western Motu villages there relied on trade for the major part of their subsistence. The situation, thus far, conforms to Arnold's (1985) model for the development of craft specialization. The women of the Western Motu villages made up to 35,000 ceramic vessels a year, which were carried by canoe hundreds of miles to the west and traded for *sago*, the subsistence staple of the area. The volume of production suggests that the Western Motu potters were probably full-time specialists, and their husbands were specialists in trade. Yet, (here the situation deviates from Arnold's model) the social organization of the Western Motu was largely egalitarian.

Allen's model for the development of this system shows a series of increases in economic complexity leading to instability and breakdown followed by regrowth. He defines complexity as diversification of food procurement, increasing population, increasing economic diversification, greater efficiency in transport and communication, increasing knowledge of distant markets and continued flexibility in social organization (Allen 1985:443). Over time, systems develop more rapidly, each new system is economically more complex than the last and there is a net gain in total complexity. Systems become more localized.

However, hierarchical systems do not develop. There are both social and environmental reasons for their absence. The traditional social mechanism of exchange was the trading partnership. In order to expand the trading system, an increase in organizational complexity would be necessary. A change of this sort would threaten the competitive nature of Western Motu society. Furthermore, social rules prohibited the accumulation of wealth, which also forced limits on the system.

Environmental variables may underlie limitations of organizational development. Allen (1985:447) argues that if trade was expanded so that the goal was the acquisition of wealth rather than simple subsistence, then changes in the nature of trading would follow. However, subsistence sources are areally too dispersed to be controlled by any of the existing political configurations of the Western Motu. So, while specialized trade was a launching pad for the development of hierarchical structures, it was hindered by the lack of an ensured subsistence base.

CONCLUSIONS

Based on comparisons with state-level societies, it can be concluded that craft industries did not develop in the Southwest. Organization of production probably never evolved beyond Rice's second stage of development or Arnold's "household industry." Two related reasons might be suggested for this level of development. Following the Rice and Arnold models, the absence of an elite class that could initiate and support production, create a demand for high-status craft items and absorb the risks of technological and stylistic innovations, limits the development of craft specialization in the Southwest. In fact, the nature of Southwestern craft production would suggest that there were no elite classes to control craft production. Allen's model suggests that craft specialization might develop in the absence of an elite class, but the real limiting factor preventing growth of political hierarchies was the lack of a concentrated surplus of agricultural products that could form the basis of differential acquisition of power.

The agricultural marginality of the Southwest is widely acknowledged (Cordell 1979, Gillespie 1985, Plog *et al.* 1985). If Allen's model can be extended to the Southwest, then elites did not develop here because agricultural surplus was not available. Arnold's and Rice's models, if applied to the Southwest, indicate that craft specialization did not develop because elites were not present. It might be further suggested that craft specialization of the sort found in Papua New Guinea depended on the specialists seeking out markets where surplus was available. The Western Motu did this by travelling long distances in canoes. High-volume, long distance trade was not an option in the Southwest because transport was exclusively pedestrian. These models suggest that the absence of craft specialization in the Southwest is a result of both the lack of agricultural surplus from which an elite power base might develop and the inability to reach markets where agricultural surplus might be present.

Craft production in the Southwest has been compared with that in state-level societies and differences both in scale and level of organization have been identified. Craft production in the Southwest appears to have been organized primarily at the household level. There is little evidence of the high-volume production or widespread distribution that characterizes state-level craft industries. Seymour (1988:824-825) has discussed the integrative role of exchange both within and between communities. She notes that there may be intra- or inter-community specialization in the production of certain types of craft or food items. These items are exchanged in gift-giving and to maintain alliances within and between communities. However, even though all craft items may not be produced by all members of a community or region, specialization at this level is not full-time.

The degree to which production and exchange of craft items in the Southwest contributed to subsistence is unknown, but, if exchanges were made primarily to maintain social alliances, these alliances may have buffered bad agricultural years. Colson (1979) has suggested that specialization either of crops or of crafts is risky because the failure of this particular product leaves few options for alternative means of subsistence:

"... men and women may develop skill in handicrafts, without being willing to spend all their time in this pursuit. They know they can produce more items if they work full-time at their craft, but they also know that they will be at a stark disadvantage in a bad year, given that food then can be had only at a

premium" (Colson 1979:23).

The semi-arid Southwest was a marginal area for subsistence agriculture and the production of a consistent agricultural surplus here is unlikely, with the possible exception of the Hohokam area (Fish 1989). The inability of a portion of the population to gain economic power through differential access to subsistence goods inhibited the development of a social hierarchy, and, because of this ceiling on social evolution, the organization and control of craft industries was not possible. Production and exchange of craft goods may have been primarily another form of insurance against an uncertain environment.

REFERENCES CITED

Allen, Jim

- 1985 Pots and Poor Princes: A Multidimensional Approach to the Role of Pottery Trading in Coastal Papua. In *The Many Dimensions of Pottery* edited by S. van der Leeuw and J.C. Pritchard, pp. 409-463.

Altschul, Jeffery H.

- 1978 The Development of the Chacoan Interaction Sphere. *Journal of Anthropological Research* 34:109-146.

Arnold, Dean E.

- 1985 *Ceramic Theory and Cultural Process*. Cambridge University Press, Cambridge.

Cameron, Catherine M.

- 1984 A Regional View of Chipped Raw Material Use in Chaco Canyon, New Mexico. In *Recent Research on Chaco Prehistory*, Reports of the Chaco Center No. 8 edited by W. James Judge and John D. Schelberg, pp.137-152.

Chang, Kwang-Chin

- 1980 *Shang Civilization*. Yale University Press, New Haven.

Colson, Elizabeth

- 1979 In Good Years and In Bad: Food Strategies of Self-Reliant Societies. *Journal of Anthropological Research* 35:18-29.

Cordell, Linda S.

- 1979 Prehistory: Eastern Anasazi. In *Handbook of North American Indians* Vol. 9 edited by A. Ortiz. Smithsonian Institution, Washington D.C.

- 1984 *Prehistory of the Southwest*. Academic Press, New York.

Crabtree, Don E.

- 1973 Experiments in Replicating Hohokam Points. *Tebiwa* 16(1):10-45.

Culbert, T. Patrick

1973 Mesoamerica. In *Ancient North Americans*, edited by J. Jennings, pp. 495-555. W.H. Freeman, San Francisco.

DiPeso, Charles C., J.B. Rinaldo and G.J. Fenner

1974 *Casas Grandes, A Fallen Trading Center of the Gran Chichimeca. Amerind Foundation Series 9*. The Amerind Foundation and Northland Press, Dragoon and Flagstaff, Arizona.

Doyel, David E.

1980 Hohokam Social Organization and the Sedentary to Classic Tradition. In *Current Issues in Hohokam Prehistory*, D. Doyel and F. Plog, eds. Arizona State University Anthropological Research Papers No. 23.

Earle, T. and T. D'Altroy

1982 Storage Facilities and State Finance in the Upper Mantaro Valley, Peru. In *Contexts for Prehistoric Exchange*, edited by J. Ericson and T. Earle, pp. 265-290. Academic Press, New York.

Feinman, Gary M., Steadman Upham and Kent G. Lightfoot

1981 The Production Step Measure: An Ordinal Index of Labor Input in Ceramic Manufacture. *American Antiquity* 46(4):871-884.

Fish, Paul

1989 The Hohokam: 1000 Years of Prehistory in the Sonoran Desert. In *Dynamics of Southwestern Prehistory* edited by L. Cordell and G. Gummerman. Smithsonian Institution Press, Washington D.C.

Gillespie, William B.

1985 Holocene Climate and Environment of Chaco Canyon. In *Environment and Subsistence of Chaco Canyon* edited by F.J. Mathien. Publications in Archeology 18E. Chaco Canyon Studies. National Park Service, Albuquerque.

Hantman, J.L., K.G. Lightfoot, and S. Upham

1979 *The Implications of Changing Modes of Ceramic Production in the Prehistoric Plateau Southwest*. Paper presented at the 44th annual meetings of the Society for American Archaeology, Vancouver, British Columbia.

Haury, Emil W.

1976 *The Hohokam: Desert Farmers and Craftsmen*. University of Arizona Press, Tucson.

Judge, W. James

1979 The Development of a Complex Cultural Ecosystem in the Chaco Basin, New Mexico. In *Proceedings of the First Conference on Scientific Research in National Parks, Vol. 3*, edited by R.M. Linn, pp. 901-906. National Park Service Transactions and Proceedings Series 5.

1989 Chaco Canyon -- San Juan Basin. In *Dynamics of Southwestern Prehistory*. Linda S. Cordell and George J. Gummerman, eds. Smithsonian Institution Press, Washington D.C.

Judge, W. J., H. Wolcott Toll, William B. Gillespie and Stephen H. Lekson

1981 Tenth Century Developments in Chaco Canyon. In *Collected Papers in Honor of Erik Kellerman Reed*, edited by A.H. Schroeder, pp. 65-98. Papers of the Archaeological Society of New Mexico 6.

Mathien, Francis Joan

1984 Social and Economic Implications of Jewelry Items of the Chaco Anasazi. In *Recent Research on Chaco Prehistory*, edited by W. James Judge and John D. Schelberg, pp. 173-186. Reports of the Chaco Center No. 8, National Park Service, Albuquerque.

Millon, Rene

1974 The Study of Urbanism at Teotihuacan, Mexico. In *Mesoamerican Archaeology: New Approaches*, edited by N. Hammond, pp. 335-362.

Morris, Craig

1972 Reconstructing Patterns of Non-agricultural Production in the Inca Economy: Archaeological Documents in Institutional Analysis. In *Reconstructing Complex Societies* edited by Charlotte B. Moore. Supplement to the Bulletin of the American Schools of Oriental Research No. 20.

Murra, John V.

1962 Cloth and Its Function in the Inca State. *American Anthropologist* 64:710-728.

Nelson, Richard S.

1981 *The Role of the Puchteca System in Hohokam Exchange*. PhD Dissertation, Department of Anthropology, New York University, New York.

Plog, Fred

1979 Prehistory: Western Anasazi. In *Handbook of North American Indians* Vol. 9, edited by A. Ortiz. Smithsonian Institution, Washington, D.C.

1983 Political and Economic Alliances on the Colorado Plateaus, A.D. 400-1450. In *Advances in World Archaeology* edited by F. Wendorf, pp.289-330. Academic Press.

Rice, Prudence M.

1981 Evolution of Specialist Pottery Production: A Trial Model. *Current Anthropology* 22:219-240.

Rowe, John

1982 Inca Policies and Institutions Relating to the Cultural Unification of the Empire. In *The Inca and Aztec States A.D. 1400-1800*, edited by G. Collier, R. Rosaldo, J. Wirth, pp. 93-118. Academic Press, New York.

Seymour, Deni J.

- 1988 An Alternative View of Sedentary Period Hohokam Shell-Ornament Production. *American Antiquity* 53(4):812-828.

Spence, Michael W.

- 1981 Obsidian Production and the State in Teotihuacan. *American Antiquity* 46(4):796-788.

Tatje, Terrence A. and Raoul Naroll

- 1970 Two Measures of Social Complexity: An Empirical Cross-Cultural Comparison. In *A Handbook of Method in Cultural Anthropology*. The Natural History Press, New York.

Toll, H. Wolcott

- 1984a Trends in Ceramic Import and Distribution in Chaco Canyon. In *Recent Research on Chaco Prehistory*, edited by W. James Judge and John D. Schelberg, pp. 115-136, Reports of the Chaco Center No. 8, National Park Service, Albuquerque.

- 1984b Of Pots and Pans and Pueblos, Of Selfishness and Greed, of How Exchange Isn't Timeless and Whether Facts We Need. Ms. in possession of the author.

Toll, H. Wolcott, Mollie Struever Toll, Marcia L. Newren and William B. Gillespie

- 1985 Experimental Corn Plots in Chaco Canyon: The Life and Hard Times of *Zea mays* L. In *Environment and Subsistence of Chaco Canyon*, F.J. Mathien, ed. Publications in Archeology 18E. Chaco Canyon Studies. National Park Service, Albuquerque.

Tosi, Maurizio

- 1984 The Notion of Craft Specialization and its Representation in the Archaeological Record of Early States in the Turanian Basin. In *Marxist Perspectives in Archaeology* edited by M. Spriggs, pp. 22-52. Cambridge University Press, Cambridge.

Tosi, Maurizio and Marcello Piperno

- 1973 Lithic Technology Behind the Ancient Lapis Lazuli Trade. *Expedition* 15:15-23.

Upham, Steadman

- 1982 *Politics and Power*. Academic Press, New York.

Upham, Steadman, Kent G. Lightfoot and Gary M. Feinman

- 1981 Explaining Socially Determined Ceramic Distributions in the Prehistoric Plateau Southwest. *American Antiquity* 46(4):822-833.

Wilcox, David and Chas. Sternberg

- 1983 A Model of Hohokam Prehistory. In *Hohokam Ballcourts and Their Interpretation*. Arizona State Archaeological Series 160.