



Evaluation of Non-Timber forest Products (NTFPs) In Bronze Casting Enterprise at Egun Street, Benin City, Edo state

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ABSTRACT: Evaluation of NTFPs input in bronze casting at Igun Street in Benin City was carried out with the use of measurement of inputs and questionnaires. Fifty percent sampling intensity was used to obtain 42 from the total population of 84 Bronze Casters. Data were analyzed with the use of descriptive statistics of frequency, percentages and inferential statistics using ANOVA. Results showed that there were significant differences ($P < 0.05$) among the mean weight of the inputs. The results revealed that the seasonal price variation among the various inputs were 30, 22, 38 and 10% of the respondents for charcoal, beeswax, fuelwood and laterite respectively. The patronage levels of bronze users were always (34.51%), sometimes and once a while accounted for 45.22 and 20.24% respectively. Difficulties associated with sourcing of bronze casting inputs were expensive nature, scarcity, exportation, exotic nature and unstable supply which accounted for 34.43, 27.05, 34.43, 2.46 and 1.64% respectively. Also, 100% of the respondents were of the view that bronze was very difficult to source while 42.42% of them were of the opinion that beeswax was difficult to source. Charcoal, laterite and fuelwood were easy to sources expressed by 28.33, 27.51 and 9.10% of the respondents' respectively. It is necessary to ensure sustainable management of NTFPs so as to guarantee their steady supply at reasonably low prices for bronze casting enterprise. © JASEM

Key words: Bronze casting, beeswax, charcoal, fuelwood, enterprise

Bronze casting is a guild known traditionally in Bini as "Igun Eronmwon". It existed for several centuries which dates back to the reign of Ogiso about 300BC. Membership is restricted to Igun Street indigenes who are engaged in the art of bronze carving. The other members of bronze casting outside Igun street are descendants of the original carvers who had moved on and settled in other parts of Benin (Aiyeloja *et al*, 2007). Bronze is a metal alloy produced by blending copper and tin in various amounts, depending on the application. Other elements such as manganese, lead and phosphorus are added to induce some specific properties. Bronze is a sturdy and durable metal that is why it is used to make items like bells, statuary, bearings, gears, valves, pipes and other plumbing fitting. A bronze cast for statues, contain between 2 and 20% tin (Smith, 2009). The bronze casting results to various types of beautiful works that are used for several purposes. Some of these items consist of human statues, bust of Bini kings and queens, swords, household utensils like cups, spoons and gift items like bottle openers and key holders.

Charcoal, fuel wood, laterite, and beeswax are among the most important inputs in bronze casting (Aiyeloja *et al*, 2007). The wax is made into a model doom shape of the desired items which melt at the temperature of about 700°C. The vacuum created by the melted wax becomes where the bronze is poured. In fact, NTFPs plays a very significant role in bronze casting. Fuel wood and charcoal generate heat energy that melts the beeswax as well as the bronze. The

energy output from charcoal and fuel wood is significant and dependable.

Bronze cast works are made through an assembly line version of lost-wax casting that simply recycles the same inner mould until the work is complete. Igun Street Bronze Casters also make engine parts for automobiles like its broken part (Joseph, 2005). The study focuses on the significance of the non-timber forest products (NTFPs) in age-long tradition of Bini; bronze casting enterprise with special emphasis on seasonal and annual price variation of bronze casting inputs, demand for bronze work and how the inputs are available.

MATERIALS AND METHODS

Study Area: The study was carried out at Igun Street in Benin City, which lies on a slightly elevated piece of flat land, about 80 metres above sea level and at longitude 5° east and latitude 6° north (Onokerhoraye, 1995). Igun Street which is the center of Benin Bronze Casters', who are noted for bronze casts, iron smelting, ivory and wood carving. The state is dominated by the moist tropical forest with lowland rainforest accounting for 76.5% of the total land area (FORMECU, 1999). The state is endowed with timber species suitable for charcoal production such as *Pentaclethra macrophyllum*, *Lophira alata*, *Cyclicodiscus gabunensis*, *Piptadeniastrum africanum*, *Rhizophora racemosa*, *Rhizophora harrisonii*. There are also abundant supplies of other inputs used for bronze casting enterprise such as laterite, beeswax and fuelwood that complement charcoal for energy production.

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Sampling Method: A recognizance survey was carried out at Igun Street in Benin City to identify the Bronze Casters. A total of 84 Bronze Casters were identified at Igun Street. Fifty percent sampling intensity was obtained from the total population of Bronze Casters. A total of 42 structured questionnaires were administered to the Bronze Casters at Igun Street. The same number of questionnaires was retrieved from the respondents. The distribution of questionnaires was carried out on the randomly selected respondents. Personal interview and weighing of inputs were carried out to find out the amount of charcoal, fuel wood and beeswax needed in the production process of bronze castings. This involved the collection of primary data through empirical measurement of inputs of non-timber forest products (NTFPs) used in bronze casting. That was realized by weighing the various inputs used in the process of bronze casting especially when producing various bronze items. For little bronze items that were mass produced (i.e. bronze ring), the weight of the various bronze inputs used for the production of one item was calculated then, the weight of the different bronze inputs used for the production of large quantities was determined. In getting the weight of inputs of a large sized bronze, the weight of the various bronze inputs used in its production process were measured in bits and

subsequently sum up the weights to get the total weight of the input used.

Data Collection and Statistical Analysis: The data were collected with the use of questionnaire, personal interview and through weighing the amount of charcoal, fuel wood and beeswax input in the production process of different bronze cast items. A total of 42 questionnaires were administered and interpreted in pidgin and Bini languages to the respondents. That was to ensure proper understanding of the questions. An accurate measurement of the different amount of inputs of non-timber forest products (NTFPs) needed in bronze casting was done using a weighing balance. Data collected was subjected to descriptive and inferential statistics. Percentages were use for analysis. The Analysis of Variance (ANOVA) was also use for analysis and LSD was used for further test of variability.

RESULTS AND DISCUSSION

Evaluation measures relationship among various inputs as well as quantities required in bronze casting. Table 1 shows the weight of the different bronze casting inputs used in the production of the identified bronze items. The result showed that there were significant difference ($P < 0.05$) among the mean weight of the inputs. The fuelwood inputs dominated every other inputs considered in the study.

Table 1: Inputs used in bronze casting (kg) Please use Microsoft table format to format all tables

Bronze items	Bronze	Charcoal	Beeswax	Fuel wood	Clay
Opener	0.05	0.25	0.06	0.1	0.1
Trophy	10	20	3	40	15
Traditional sword	30	25	40	60	15
FESTAC	5	8	2	30	12
Traditional	3	5	1	10	5
Normal human burst bell	30	50	12	100	30
Life size cattle	150	100	50	500	200
Royal plate	5	4	2	20	10
Plaque	5	10	3	30	10
Ife Burst	40	50	15	50	
Total	279.1	272.3	128.1	1000.1	347.1
Mean	27.91 ^a	27.23 ^a	12.81 ^a	100.01 ^b	34.71 ^a

This finding reveals the importance of fuel wood as an energy source in the bronze casting process. This is somewhat in agreement with the view that people depend on fuel wood as a source of energy because they lack the wherewithal to afford alternative source of energy since the burning of wood is currently the largest use of energy derived from a solid fuel biomass (Wikipedia, 2009).

Price of inputs: This denotes the market values of various inputs used in bronze casting process which are subject to changes in supply due to cost of

production, productive process, government policy and season. The results indicated that the prices of forest products used in bronze casting varied with the seasons of the year (Table 2). Charcoal, beeswax, fuel wood and laterite prices changed at 30, 22, 38 and 10% respectively.

Table 2: Seasonal price variation among various inputs

Bronze casting inputs	Freq.	%
Charcoal	30	30
Beeswax	22	22
Fuel wood	38	38
Laterite	10	10

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Total	100	100
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The observation revealed that the prices of fuel wood varied most frequent than any other inputs considered annually. This is in agreement with the view expressed by Kalu and Adeyolu (2000) that NTFPs supplies are often seasonal which have direct correlation with their productive system.

Patronage: The cultural status of the state lies to a large extent on visit and purchases of bronze works which is known in both near and far. Table 3 shows the patronage level of bronze users. The result indicated that the patronage level of bronze which ranged from always, sometimes to once a while accounted for 34.51, 45.22 and 20.24% respectively. The results showed that the respondents who patronized bronze sometimes dominated other levels of usage.

Table 3: Patronage level of bronze users' (%)

Respondents	Always	Sometimes	Once a while
Private individual	9.52	10.11	5.36
Traditional people	10.71	10.71	3.57
Local company	4.76	12.50	7.74
Foreigners	9.52	11.90	3.57

Total	34.51	45.22	20.24
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The findings reveal that people from different works of life patronize bronze works and their patronage level is more on a less regular basis. This corroborates the view of Aiyelaja *et al* (2007) that the patronage of bronze works has grown beyond the traditional court collection since people come from all over the world to acquire Igun bronze work. It is largely due to unprecedented increase in the production of bronze works in Benin City in recent time (Picton, 1997).

Income of bronze casters: There are various sources of income accruable to bronze casters which enable them to meet the day to day needs their households. The results showed the source of income of Bronze Casters (Table 4). Hundred percent of the respondents strongly agreed that bronze casting was their main source of income, while 27.58% agreed that it was their main source of income. About 32.76% of the respondents agreed that carving/welding was their source of income, while 18.85% of them disagreed that it was their source of income.

Table 4: Bronze Casters main source of income

Source of income	SA		A		DA		SD	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Bronze casting	26	100	16	27.58	-	-	-	-
Carving/welding	-	-	19	32.76	23	18.85	-	-
Farm work	-	-	4	6.90	38	31.15	-	-
Trading	-	-	19	32.76	19	15.57	3	100
Bronze casting	-	-	-	-	42	34.4	-	-
Total	26	100	58	100	122	100	3	100

Key = SA -Strongly Agree, A - Agree, DA - Disagree, SD - Strongly Disagree

It is evident that bronze casting serves as a major source of income in the projected study. This is somewhat in agreement with Joseph (2005) who states that Benin's Bronze Casters have shifted to new market adjusting to globalization; catering to Christian clients, businesses and attracting overseas customers; artisans fulfill orders for gate ornaments, testamentary status, and hotel foyer adornments. This also includes replacement of parts, custom-made hall way, niche busts and birthday or anniversary gifts. Indeed, bronze casting has been improved to meet the demand of the globalize world since it is a major source of income to the Bronze Casters.

Difficulties associated with inputs: Several difficulties impede associated sourcing of inputs used

in the production of bronze works. Table 5 pinpoints the identified reasons militate against sourcing of bronze casting inputs comprised: expensive nature, scarcity, exportation, exotic nature and unstable supply which accounted for 34.43, 27.05, 34.43, 2.46 and 1.64% respectively. The indication was that the factors such as expensive nature and exportation of inputs dominated other reasons.

Table 5: Reasons why sourcing of bronze casting inputs are difficult

Reasons	Freq.	%
Expensive nature	42	34.43
Scarcity	33	27.05
Exportation	42	34.43
Exotic nature	3	2.46
Unstable supply market/imperfect market	2	1.64
Total	122	100

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The findings corroborate the view expressed by Terry *et al* (2004) that the markets for NTFPs have strong and it is generally believed that long term-value accruing from the harvest that results in scarcity and increase demand of these resources. The results showed various degrees of difficulty associated with bronze casting inputs (Table 6). Hundred percent of respondents affirmed that bronze was very difficult, while 48.48% of them affirmed that it was difficult, and 2.50% of them affirmed that it was easy. In case of charcoal, 28.33% of respondents

affirmed that it was easy. About 42.42% of respondents affirmed that beeswax was difficult, while 11.67% of them affirmed that it was easy. In case of fuel wood, 9.10% of respondents affirmed that it was difficult, while 30.00% of them affirmed that it was easy. Indeed, procurement of bronze is believed to be the most difficult challenges facing the bronze casting industry. In addition, bronze which is a primary component of the bronze casting work is exported to Taiwan and other countries and thus has led to inflated prices for bronze.

Table 6: Level of difficulties associated with bronze casting inputs

Bronze casting	VD		D		E		C	
	Freq	%	Freq	%	Freq	%	Freq	%
	7	100	32	48.48	3	2.50	-	-
	-	-	-	-	34	28.33	8	100
	-	-	28	42.42	14	11.67	-	-
	-	-	6	9.10	36	30.00	-	-
	-	-	-	-	33	27.50	-	-
	7	100	66	100	120	100	8	100

Key: VD - Very Difficult, D - Difficult, E - Easy, C - Common

Table 7: Market trends of bronze casting inputs per kg

Bronze casting input	2003	2004	2005	2006	2007	2008	2009	Total	mean
Bronze (1kg)	180	230	260	300	370	430	440	2210	315.7 ^a
Charcoal (1kg)	18	20	24	26	30	30	32	180	25.7 ^b
Fuel wood (a billet)	20	21	27	31	34	38	40	211	80.1 ^{cd}
Beeswax (1kg)	53	67	73	90	113	137	140	673	96.1 ^c
Laterite (piece rate)	80	80	100	140	160	190	190	940	134.3 ^d
Total	331	418	484	587	707	825	842	4214	
Mean	70.2 ^a	83.6 ^a	96.8 ^{ab}	117.4 ^{abc}	141.4 ^{bcd}	165.5 ^{cd}	168.4 ^d		

Marketing Trends: The price and demand of inputs used in bronze casting vary among the variables concerned as well as the period under review. Table 7 shows prices of bronze casting inputs over a period of seven years (2003-2009). The results showed that the mean prices of bronze, charcoal, beeswax and laterite were significantly different ($P < 0.05$) among themselves. The results indicated that the mean prices of bronze and charcoal dominated that of the other input.

The findings is somewhat in agreement with the views expressed by Popoola (2006), that the prices of forest products are a function of the cost of production, scarcity and the demand for the products. The possible reasons could be; high cost of transportation, extraction and conversion which affect labour, lubrication, fueling, electricity and general maintenance, low recovery rate and varying but increasing externalities in business transactions.



Plate 1: An envisage object moulded with clay at its first stage of production



Plate 2: An envisage object with the clay covered with beeswax

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Plate 3: A finished bronze casted leopard

Conclusion: The study focused on the NTFPs inputs such as charcoal, fuelwood, beeswax and laterite which are vital ingredient of bronze casting enterprise. Results showed that the price of NTFPs varied from one season to another as well as annually. Some reasons why sourcing of bronze casting inputs are difficult is identified as: expensive, scarcity, exportable, exotic nature and unstable supply market which accounted for 34.43, 27.05, 34.43, 2.46 and 1.64%. The findings revealed that bronze casting enterprise remains one of the dominant source of income among the people involved in the business. The bronze users identified are; private individual, traditional people, local company and foreigners and their level of patronage was also specified. There is increase in the production of bronze works today than ever before due to an increase in its demand (Picton, 1997). This accounted for corresponding increase price and demand of inputs, thereby creating same difficulties. The levels of difficulties associated with sourcing of bronze casting inputs was identified, bronze was 100% very difficult, beeswax and fuelwood was 42.42% and 9.10% difficult, charcoal and laterite was 28.33% and 27.50% easy to obtain respectively .

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