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Aditya S. Ashtekar
Sinhagad institute of management, vadgaon
Email: adityaashtekar@yahoo.com

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Statistical Study of Silver Coins of Western Kshatrapa Dynasty

Aditya S. Ashtekar
Sinhagad institute of management, vadgaon

ABSTRACT

In this paper, I have tried to analyze some data of ancient coins of the western Kshatrapa dynasty. Here, I have tried to find if the cost of silver was stable or not during the period of mid-1st century AD to the start of 4th century AD. I have tried to explore it by the study through the coins of that era. This data was available to me through a book of Mr. Jha and Dr. Rajgor. When I analyzed it, I came to the conclusion that there was a value controlling system of coins even in the 1st century; just like today.

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1. INTRODUCTION

During the past 2700 years of Indian History, many kingdoms rose and fell. Some kingdoms turned into the large empires and controlled & ruled vast area for centuries while some kingdoms were restricted to small territories controlling small area. However the most common thing in all was that, all of them issued their currency or in more appropriate words, Coins. Study of coins makes a fascinating subject which can take us to the old kingdoms and examine some aspects of their economies.

Coin is a metal piece having some actual value which is its metal value and can be used as the medium of exchange for most of the transactions. These coins were issued by the authorities of the different kingdoms and had a seal of some authority on it. At early stage, these seals were punched on the thin metal sheets and then these sheets were cut into small metal pieces of equal value i.e. weight. The punches on these pieces used to speak about its authentication.

Story of the coins starts with the use of barter system in Indian history at ancient times. Barter system started when man's need exceeded the basics of food, clothing and shelter to luxurious life. Barter system means exchange of goods or commodities as per the need of persons involved in the exchange or transaction. For example, suppose if person A is in need of farming tools and he is having food grains in excess, he will exchange the grains against the farming tools with the person B who is in need of grains and have tools in excess.

This Barter system existed for many centuries but soon people started realizing that this system was inconvenient as human needs were not always complementary with each others. For transaction, needs are to be matched in barter system. This was not possible every time. Therefore people started searching for some other medium of exchange to replace barter system so that the exchange would become more convenient.

Different types of mediums of exchange were used all over India at different times. Some kinds of mediums of exchange were cows, food grains, beads used in ornaments, feathers, etc. But still, these things couldn't satisfy the requirements of an ideal medium of exchange. For example, cows were valuable but they were not easy to move from one place to another. Also for small transactions it was not useful because, cow couldn't be exchanged or it couldn't be cut into small pieces to use for small transactions. If done so, its value would become zero. Cows have limited life span so they couldn't be stored for long time.

Metal was the only thing that could finally satisfy all the requirements of an ideal medium of exchange. It was a perfect thing to be used as currency. Metal is precious and costly, it has a very long life, it could be cut into parts if transaction is to be done is of less value, it is easily movable from one part to another without any special efforts. Any person can carry metal with him or her wherever he wants to go. Because of all these things, metal started gaining acceptance as a standard medium of exchange amongst the people of India around 1000BC.

Metal pieces soon proved its trustworthiness to the traders, merchants and civilians in day to day transactions. The value of these metal pieces was considered as the weight of that metal piece. If needed, that too could be cut into several for smaller transactions. But metal too has its own limitations. Main drawback of metal was its impurity. Fineness of metal was not always same. This was the reason why people needed its authentication to be done by some valued person. Therefore, local authorities started putting their punches or seals on these coins.

History of the coins starts with these punched coins. These coins are called as punch-mark coins. These are first coins of India. These coins were standardized in its weight and fineness i.e. in its value by the authorities of that respective area. The punches on these coins were the authentication proof of the coins. This punch-marking system started in 700BC by the Maurya Empire. As time passed lot of development took place in coinage of India over different parts and periods. The very first coins in India were introduced in silver metal. Then came copper, lead, potin, and so on. Gold coins came very later in 1st century BC. Gold coins were introduced to India by Kushana rulers.

Punch marked coins.

The value of any coin was determined or was considered by its weight of metal and not on its size or shape. The only important thing in coin was its purity and its weight. Shape, size or anything else was not at all

important. We find coins in different shapes as round, square, hexagonal, bar shaped, hair-pin shaped, etc. Mohammad-bin-Tughlaq of Delhi brought token currency in circulation centuries back but people couldn't accept that. He made copper coins on which he stated that these coins should be accepted as silver coins. People then started getting silver coins in exchange of copper coins and became rich by selling that silver as metal while government totally lost its economic strength. Finally he had to withdraw his orders on token coins.

Islamic rulers of Delhi brought revolutionary changes in India's coinage in 11th - 12th century. They standardized the Indian coinage and introduced – Rupee, Anna, Dam, etc. We still use the word Rupee for Indian currency.

In the coinage of India we can classify the different periods of time in several parts. 1st part is ancient part or ancient period which is generally referred as 6th century BC to 12th century AD. After this Islamic rulers ruled India for a very long time. Islamic rulers bought standardization in coinage in India and all parts of Indian stated using these coins. This was a major change in Indian coinage. This period of Islamic rule in India is known as medieval period. Then the modern period starts with the British rule in India till today.

Objectives of the project

1) To see if there was any quality control system for coins controlling the value of it.
2) To check if the cost of silver was stable or fluctuating in India the time of western Kshatrapa dynasty.
3) To understand on the importance of impurities i.e. metals other than silver in silver coins of this dynasty.
4) Do wars affect the prices of the metals i.e. money?

I will try to study the various things related to silver coinage of western Kshatrapa dynasty which existed in ancient period or ancient coinage. I have got some information about 170 silver coins of different rulers of western Kshatrapa dynasty along with their weights, silver content and copper content, dates in which the coin was stricken, etc. We can conclude many things from this data by using statistical methods.

Materials and Methods

For the data, I have taken the reference from the book of Dr. Rajgor and Mr. Jha on coinage of western Kshatrapas. Also for explaining the introduction of coins in India, I have referred to book named Coins written by Mr. Gupta. Further, I have used the photographs of some coins which are in my private collection. I have put the few images in between so that the reader would know how these coins were. I have used simple mathematical and statistical methods to explain my points. Tables and Graphs will help in understanding the matter.

The Western Kshatrapa Dynasty and Its Coinage

History

The Western Kshatrapas were the Saka rulers who ruled over most the part of modern Gujarat state, Malwa and Saurashtra for more than 4 centuries. 31 Kshatrapa rulers are known to rule in this dynasty. They greatly influenced Indian politics of that time and had controlled the western India. The first ruler of this dynasty is Abhiraka who is believed to rule in early 1st century AD while the last ruler Rudrasimha III is known to end his rule around 415AD.

During these four centuries, 6 families of rulers represented the dynasty in which as many as 31 rulers are known to rule the Kingdome. The rule of western Kshatrapa dynasty came to end somewhere in early 4th century when Chandragupta II defeated the last ruler of western Kshatrapa dynasty. After the end of Western Kshatrapa dynasty, their land was controlled by the Gupta dynasty and the Vakataka dynasty. Both the dynasties issued their coins on the basis n pattern of western Kshatrapa dynasty.

It is believed that the western Kshatrapas were the governors appointed by Kushana Kings to govern the southern part of their Kingdome, at least till the early rule Rudradaman I. Rudradaman I declared himself as Independent ruler when he became powerful enough to maintain his own Kingdome. However, there is no strong evidence to prove that the western Kshatrapas were the governors appointed by Kushanas.

Coinage

The western Kshatrapa rulers issued several types of coins in Silver, Copper, Lead, Potin, Etc in their own names. Among these, Silver coins gained special importance in India and these silver coins influenced the coinage of many other dynasties like Satavahanas, Guptas, Kalchuries, Vallabhis, gadhaiyas, etc. But silver coins of western Kshatrapas itself were influenced by Roman silver coins now known as drachms.

Coins of western Kshatrapas are very important not just because it was a big and important dynasty of its time but because these coins are first dated coins of India. The year in which the coin is made is represented on the coin. The calendar used to record the dates is Saka calendar. We still use Saka calendar as Indian calendar and the era is called Saka era. Till today, the dates on these western Kshatrapa coins are found from Saka100 to Saka 337 i.e. 178AD to 415AD. Rudrasimha I introduced the method of putting the dates on coins in 178 and it ended with the last ruler of Kshatrapas Rudrasimha III around 415 as we know the last date of Rudrasimha III. Despite of the unique dating system on coins, they are also important because they have the name of ruler and his title as well as ruler's father name

and his title also. Because of this, the relations of these rulers with each other are very clear.

With the help of coins, historians and numismatists are able to do research about this dynasty very deeply. We today know the exact ruling period of almost all the rulers of the western Kshatrapa dynasty which is quite rare thing in ancient dynasties. Studying the coins is one of the very important medium of studying the history of ancient times. Numismatics has emerged as one of the very important research methodology for studying ancient history as other mediums as documents, monuments, records are rare. With the help of numismatics study many new rulers are now know to rule at ancient times.

Nahapana – The 1st ruler introducing silver coins in the Western Kshatrapa Dynasty

RudraSimha 3rd – The last known ruler of Western Kshatrapa Dynasty.

Forged coin of Rudrasimha 1st. The thin layer of silver plated on this coin has vanished during the past 1800 years. This should have been done by some fraud person at that time to earn money through wrong way.

Copper Coin – Rudrasen 1st. Date – 130 of Saka era (208AD).s

Observations

In these coins of western Kshatrapas various metals are used such as Ag, Cu, Pb, Zn, Ni, Co, Fe, Mn, Cr and Au. But Silver and copper in these coins were vital metals and particularly silver in the coin was its original value.

Sr. no.	King	Reign Of the King	'saka' date on coin	Weight in Grams	Silver %	Copper %
1	Nahapana	AD 48-94(?)	Undated	2.10	94.93	4.27
2	Nahapana		Undated	2.11	94.54	4.54
3	Nahapana		Undated	2.04	94.31	5.02
4	Nahapana		Undated	1.91	93.44	5.39
5	Nahapana		Undated	2.17	93.32	5.06
6	Nahapana		Undated	2.16	93.26	5.61
7	Nahapana		Undated	2.24	93.17	5.93
8	Nahapana		Undated	1.98	93	5.89
9	Nahapana		Undated	2.11	91.67	7.16
10	Nahapana		Undated	2.10	91.01	7.81
11	Nahapana		Undated	2.39	90.75	8.09
12	Nahapana		Undated	2.05	90.01	8.3
13	Nahapana-c/struck		Undated	2.33	98.74	0.38
14	Nahapana-c/struck		Undated	2.04	98.66	0.18
15	Nahapana-c/struck		Undated	2.17	96.21	3.18
16	Nahapana-c/struck		Undated	1.57	95.61	3.55
17	Nahapana-c/struck		Undated	2.17	95.53	3.82
18	Chastana	AD 78-130	Undated	2.06	94.3	4.57
19	Chastana		Undated	2.25	92.8	4.43
20	Chastana		Undated	2.11	92.6	4.9
21	Chastana		Undated	2.20	90.95	5.15
22	Chastana		Undated	1.88	90.75	4.78
23	Chastana		Undated	2.06	92.5	5.69
24	Chastana		Undated	2.44	92.3	4.35
25	Jayadaman	?	Undated	2.14	92.48	4.87
26	Rudradaman I	AD 130-150	Undated	1.85	94.81	3.78
27	Rudradaman I		Undated	2.12	94.63	3.6
28	Rudradaman I		Undated	1.94	93.83	3.65
29	Rudradaman I		Undated	1.90	92.6	4.9
30	Rudradaman I		Undated	2.10	91.86	5.53
31	Rudradaman I		Undated	2.03	91.82	5.58
32	Rudradaman I		Undated	1.89	92.98	5.84
33	Damjadasri I	Somewhere between AD150-178	Undated	2.05	95.08	3.12
34	Damjadasri I		Undated	2.35	91.67	5.72
35	Damghasada	Somewhere between AD150-178	Undated	2.13	92.48	4.8
36	Rudrasimha I	AD 178-197	Undated	1.64	80.21	7.12
37	Rudrasimha I		100	1.96	92.74	4.99
38	Rudrasimha I		101	2.18	91.84	5.21
39	Rudrasimha I		102	2.04	91.62	5.94
40	Rudrasimha I		103	2.26	91.62	5.83
41	Rudrasimha I		108	2.21	91.16	5.93
42	Rudrasimha I		100	2.18	90.82	6.04

43	Rudrasimha I		113	2.17	90.81	5.96
44	Rudrasimha I		112	1.50	80.84	15.78
45	Jivdaman	AD 197-198	120	2.06	92.57	5.64
46	Jivdaman		119	2.22	92	5.6
47	Satyadaman	AD 202	-	2.02	93.57	5.27
48	Rudrasen I	AD 199-222	122	2.24	91.99	6.33
49	Rudrasen I		139	2.00	92.45	4.46
50	Rudrasen I		140	2.35	92.27	5.56
51	Rudrasen I		134	1.95	91.69	5.1
52	Rudrasen I		124	2.20	91.46	6.39
53	Rudrasen I		-	2.20	90.98	6.55
54	Rudrasen I		131	2.12	90.52	6.35
55	Rudrasen I		130	1.66	89.54	6.61
56	Prithivisen	AD 222	144	2.20	90.86	7.1
57	Damsen	AD 223-236	149	2.14	92.12	5.91
58	Damsen		146	2.32	91.56	5.7
59	Damsen		157	1.89	91.28	5.29
60	Damsen		157	2.16	90.61	5.67
61	Damsen		150	2.36	90.42	6.64
62	Damsen		-	1.72	88.41	9.84
63	Damsen		145	1.75	89.83	6.73
64	Damjadasri II	AD 232-233	155	2.35	92.06	5.67
65	Damjadasri II		154	2.42	90.68	7.67
66	Virdaman	AD 234-238	-	1.64	90.85	6.14
67	Virdaman		-	2.02	90.74	6.09
68	Virdaman		156	2.27	90.25	6.74
69	Virdaman		-	2.25	89.83	6.97
70	Virdaman		-	1.81	89.54	7.63
71	Vijaysen	AD 239-250	160	1.78	91.8	6.62
72	Vijaysen		160	2.01	87.86	6.97
73	Vijaysen		165	2.20	92.1	5.4
74	Vijaysen		162	2.23	90.71	6.7
75	Vijaysen		161	2.01	90.6	6.72
76	Vijaysen		164	2.31	90.51	6.8
77	Vijaysen		171	1.86	90.5	7.89
78	Vijaysen		171	2.20	89.72	7.2
79	Vijaysen		170	2.03	89.03	7.91
80	Vijaysen		169	1.95	88.96	7.47
81	Vijaysen		164	1.87	87.5	6.97
82	Ishwardatta	AD 238-242(?)	2nd yr	1.93	92.65	5.1
83	Ishwardatta		2nd yr	2.56	91.35	6.79
84	Ishwardatta		1st yr	2.31	90.87	6.52
85	Ishwardatta		1st yr	1.79	90.57	7.14
86	Damjadasri III	AD 250-255	177	2.06	92.13	5.72

87	Damjadasri III		172	1.96	91.53	6.9
88	Damjadasri III		176	1.89	89.7	6.7
89	Damjadasri III		173	1.95	89.3	7.83
90	Damjadasri III		177	1.71	42.08	55.9
91	Rudrasen II	AD 255-278	185	2.30	91.86	6.92
92	Rudrasen II		188	2.10	90.73	7.6
93	Rudrasen II		192	1.74	90.64	7.4
94	Rudrasen II		188	1.76	90.38	8.6
95	Rudrasen II		177	2.00	89.52	8.75
96	Rudrasen II		183	2.18	89.2	8.93
97	Rudrasen II		179	2.33	87.8	9.82
98	Rudrasen II		187	2.30	87.52	9.6
99	Rudrasen II		191	2.13	86.71	10.7
100	Rudrasen II		189	1.31	87.29	11.85
101	Vishwasimha	AD 275-282	197	1.65	90.62	8.23
102	Vishwasimha		-	2.10	90.26	8.3
103	Vishwasimha		199	2.05	88.2	10.5
104	Vishwasimha		200	2.04	82.6	14.4
105	Bhartrdaman	AD 282-295	203	1.98	87.2	11.81
106	Bhartrdaman		200	2.28	86.3	12.4
107	Bhartrdaman		-	2.37	89.9	8.85
108	Bhartrdaman		-	2.01	89.82	9.6
109	Bhartrdaman		216	2.13	87.63	12.3
110	Bhartrdaman		212	1.69	87.12	11.8
111	Bhartrdaman		-	1.95	86.9	12.17
112	Bhartrdaman		217	1.58	86.69	12.25
113	Bhartrdaman		214	2.00	85.9	13.32
114	Bhartrdaman		209	2.12	80.6	16.01
115	Bhartrdaman		-	1.84	65.92	29.83
116	Bhartrdaman		-	1.68	72.84	23.6
117	Viswasen	AD 292-304	225	1.99	92.68	6.17
118	Viswasen		217	1.91	90.26	9.31
119	Viswasen		215	2.24	90.16	9.7
120	Viswasen		220	2.22	86.69	12.63
121	Viswasen		225	2.53	85.12	12.01
122	Viswasen		223	2.09	84.45	14.7
123	Viswasen		-	1.62	69.03	29.78
124	Viswasen		-	1.61	0.26	99.74
125	Rudrasimha II	AD 304-316	-	1.98	89.73	7.16
126	Rudrasimha II		227	1.92	89.45	8.31
127	Rudrasimha II		230	2.27	87.46	10.21
128	Rudrasimha II		-	2.02	87.28	10.18
129	Rudrasimha II		230	1.85	87.11	10.57
130	Rudrasimha II		235	2.12	86.01	11.6

131	Rudrasimha II		227	2.19	81.63	15.5
132	Rudrasimha II		-	1.81	9.05	88.01
133	Yashodaman II	AD 315-332	240	1.79	87.96	9.13
134	Yashodaman II		242	1.96	87.93	8.72
135	Yashodaman II		244	1.93	87.17	9.57
136	Yashodaman II		239	2.14	83.82	13.95
137	Yashodaman II		-	1.45	83.73	15.19
138	Yashodaman II		245	2.05	82.89	14.25
139	Yashodaman II		240	2.14	82.86	15.06
140	Yashodaman II		240	2.60	82.33	15
141	Rudrasen III	AD 348-378	280	1.84	91.74	7.44
142	Rudrasen III		273	1.76	90.87	5.77
143	Rudrasen III		-	1.28	90.76	7.37
144	Rudrasen III		294	1.74	90.49	7.27
145	Rudrasen III		296	2.04	90	7.32
146	Rudrasen III		290	1.82	90	7.8
147	Rudrasen III		294	1.76	89.18	9.82
148	Rudrasen III		299	1.96	88.08	9.06
149	Rudrasen III		271	1.90	87.86	9.91
150	Rudrasen III		-	2.03	85.47	12.69
151	Rudrasen III		285	2.01	84.72	13.68
152	Rudrasen III		288	2.36	84.27	14.24
153	Rudrasen III		292	2.14	82.33	15.69
154	Rudrasen III		270	1.92	79.51	16.46
155	Rudrasen III		-	1.87	37.95	59.72
156	Simhasen	AD 378-385	-	2.16	82.55	16.42
157	Simhasen		-	2.09	82.45	16.35
158	Simhasen		-	2.06	79.08	20
159	Simhasen		-	1.80	78.06	20.23
160	Rudrasen IV	AD 385-386	-	2.15	79.31	19.68
161	Rudrasimha III	AD 386-415	320	1.68	91.43	6.93
162	Rudrasimha III		-	1.55	90.67	8.35
163	Rudrasimha III		-	1.54	90.07	8.69
164	Rudrasimha III		-	1.46	88.06	8.79
165	Rudrasimha III		320	2.13	79.21	19.77
166	Rudrasimha III		-	2.18	79.01	19.71
167	Rudrasimha III		315	2.13	78.85	20.52
168	Rudrasimha III		31(4or5)	2.10	78.76	19.3
169	Rudrasimha III		-	2.13	78.39	20.18
170	Rudrasimha III		-	1.45	12.41	86.07

Table 1: Silver-Copper Table

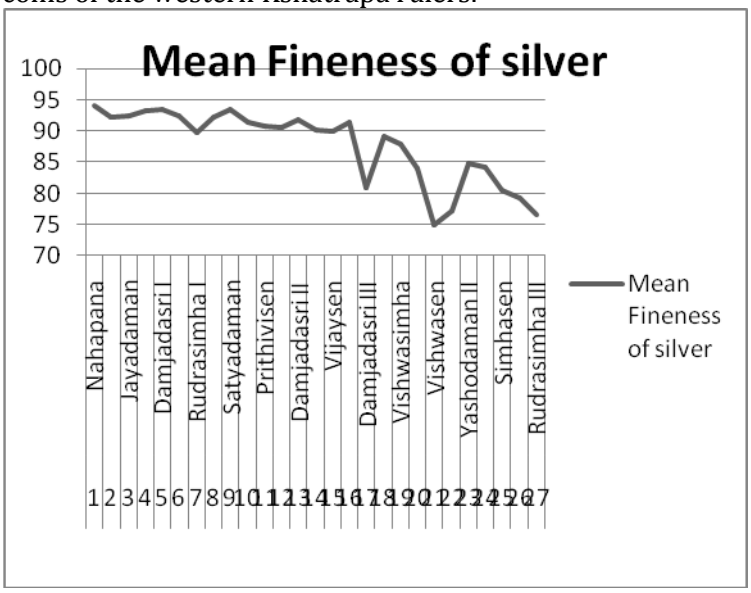
This is the table I have got about the percentage of copper and silver in the coins of Western Kshatrapa dynasty. Dates of the coins are also available on many entries. Along with these, we also got the weight of each coin and also the region of the king's rule in the dynasty.

If we take out the average fineness of silver metal of each ruler and call it mean fineness for each of ruler, we get the table drawn below.

King	Mean Fineness of silver
Nahapana	94.01
Chashtana	92.31
Jayadaman	92.48
Rudradaman I	93.21
Damjadasri I	93.37
Damghasada	92.48
Rudrasimha I	89.77
Jivdaman	92.28
Satyadaman	93.57
Rudrasen I	91.36
Prithivisen	90.86
Damsen	90.60
Damjadasri II	91.73
Virdaman	90.24
Vijaysen	89.93
Ishwardatta	91.36
Damjadasri III	80.94
Rudrasen II	89.16
Vishwasimha	87.92
Bhartardaman	83.90
Vishwasen	74.83
Rudrasimha II	77.22
Yashodaman II	84.83
Rudrasen III	84.21
Simhasen	80.53
Rudrasen IV	79.31
Rudrasimha III	76.68

Table 2: Mean Fineness Table

The mean silver content of first ruler is approx 94% and the last ruler is around 74%. So from 1st ruler Nahapana to the last ruler Rudrasimha 3rd the values are definitely decreasing. I have plotted a graph of the table shown above so that we could get some idea about the increase or in some cases increase of the silver content in the coins of the western Kshatrapa rulers.



Graph 1: Mean Fineness

From the above graph it is clear that as the time passed, the silver content in coins of western Kshatrapas decreased. Still it can be observed that it was quite consistent till the date of Ishwardatta i.e. 16th ruler. From the start of the rule of Damjadasri 3rd the fluctuation of silver content in coins is much greater that the previous ones. Some reasons behind this could be the rise in cost of silver or decreasing economic power of the Western Kshatrapa dynasty or lack of quality control due to reducing political strength of the dynasty. During the later period of Kshatrapa dynasty, influence of Gupta Dynasty was big in Indian politics. Their power was increasing against all other dynasties. Maybe all these reasons affected the striking of coins of Western Kshatrapa dynasty.

The most appropriate reason behind the reduction of silver content in the coins I can this is possibly the increase in the value of silver metal. Because of the increase in cost of silver, the value of the overall coin could have increased to some extent and people using them must have got confused about its value. Even today if a 1 rupee coin is having its metal value more than 1 rupee, many times the coin is melted to gain profit by selling its metal to gain that extra value. Same thing could have been happened at that time too.

A coin can run in the society only if its metal value is less that its face value. For example, a 5rupee coin is used as 5rupee coin only if its metal value is less than 5rupees in the market, otherwise people will melt it and sell the metal for its metal value to earn profit. So it is very important to control the actual value of coin below its face value. For this, different methods are used like adding some impurities or other cheaper metals to it, reducing the weight of coin, etc. Here in the Western Kshatrapas dynasty, the copper of other metals might have been used for the same reason i.e. to control the actual value of coin below its face value. Using other metals also recovers the making charges and other service charges in the process of striking of coins.

Ishwardatta Coin – After the end of reign of lshwardatta, quality of coins started decreasing in terms of silver metal in it.

Rudrasimha 1st's coin – made up of silver and copper alloy.

Increase in the cost of silver

If we consider that the increase in the cost of silver forced western Kshatrapa rulers to reduce the silver content so as to maintain the value of their currency, we can check several things and try to find out if we get some information out of it.

Lets imagine that value of 1 silver coin of western Kshatrapa was rupees 10 of the modern world. I will take Nahapana –the first ruler to start silver coins in the western Kshatrapa dynasty- as sample. He used 94.01% silver in his coin. If we consider whole weight of his coin as Rs.10 or modern world, then 94.01% silver content in the coin makes the value of coin Rs 9.401.

I have done calculations for each of the ruler of dynasty by the method stated above. The Figures I got are stated below in a table. Here, I have calculated the value of silver considering that if % of silver in each rulers coin.

For Example: If suppose 100% of silver makes 10 rupees of modern world, what would be the cost of silver in coin if we take average of fineness of each ruler's coin?

The equation goes like this:

100% is equal to Rs.10. So what would be the actual cost of coin of a ruler?

Therefore,

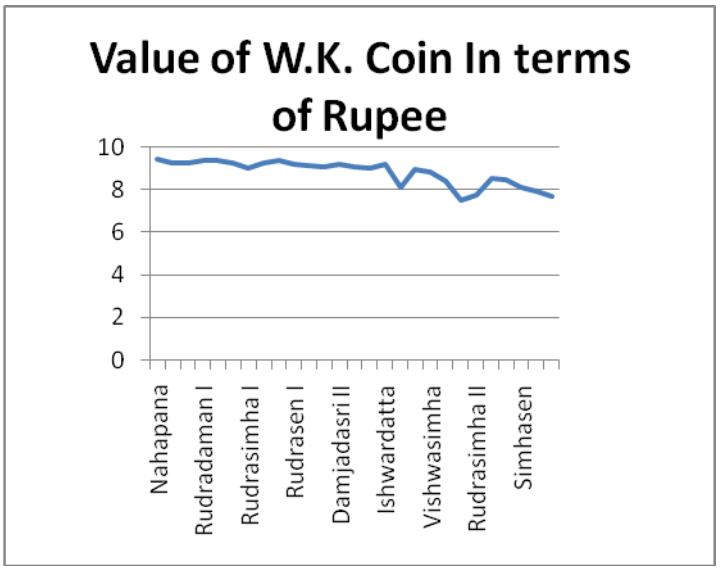
Actual % * 10/100

Similarly we can find out the same for each ruler of the dynasty and when I did that, I got the following figures.

King	Mean Fineness of silver
Nahapana	9.401
Chashtana	9.231
Jayadaman	9.248
Rudradaman I	9.321
Damjadasri I	9.337
Damghasada	9.248
Rudrasimha I	8.977
Jivdaman	9.228
Satyadaman	9.357
Rudrasen I	9.136

Prithivisen	9.086
Damsen	9.06
Damjadasri II	9.173
Virdaman	9.024
Vijaysen	8.993
Ishwardatta	9.136
Damjadasri III	8.094
Rudrasen II	8.916
Vishwasimha	8.792
Bhartardaman	8.39
Vishwasen	7.483
Rudrasimha II	7.722
Yashodaman II	8.483
Rudrasen III	8.421
Simhasen	8.053
Rudrasen IV	7.931
Rudrasimha III	7.668

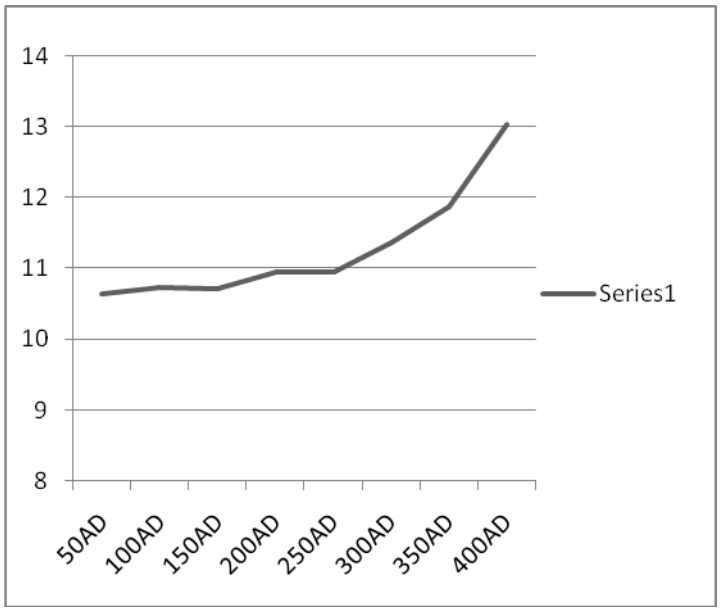
Table 3: Cost of silver in a coin



Graph 2: Imaginary value of W.K. coin in terms of modern rupee

This table shows that the cost of silver was increasing quite consistently at the time of western Kshatrapa rule in India. Even today the cost of silver is increasing. Due to this rise in cost of silver metal, the rulers of the dynasty had to reduce the silver content in their coins so as to keep the value of the coin fixed.

If we plot the graph with equal time gap of 50 years, it looks much better in a way to understand.



Graph 3: Silver cost as time passes

The slope of rise from the 50AD to 250AD is not so intense as compared to the slope from 250AD to 400AD. One of the reasons behind this must be increase in the cost of silver metal. Other reasons might be lack of economic stability, to increase the amount of available currency around the Kingdome, inflation due to wars or war-like conditions around the Kingdome, etc. The dots on the graph represent the wars occurred.

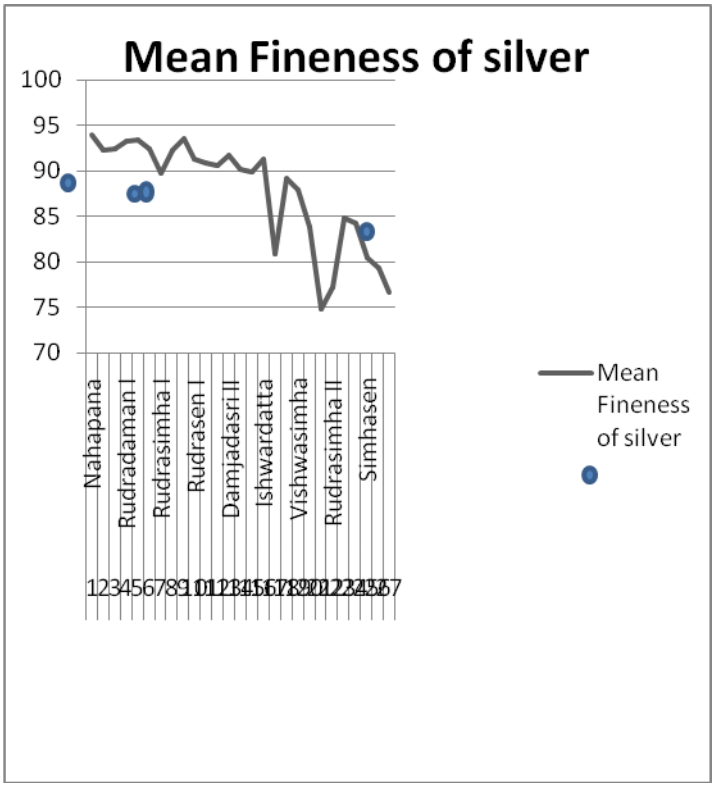
Did wars affect the coins?

Now we know some of the wars of western kshatrapas dynasty took place at the time of Nahapana, Rudradaman, Damghasadasa, Ishwardatta, Rudrasimha

III. Rest of the kings if participated in any war we don't know yet. The wars of Nahapana, Rudradaman, Damghasadasa and Rudrasimha III are evidently happened. Whereas Ishwardatta was an intruder into the dynasty and ruled simultaneously with Vijaysen so we can assume that there was a conflict between these two. Ishwardatta ruled only for 4 years and possibility that vijaysen defeated him is very likely as Vijaysen continued to rule even after Ishwadatta's reign was ended.

To check if there's any clue on what war did to money, we can use graph no:1 again and plot spots where/when war occurred.

Graph 4: Mean Fineness of Coin with war Situations.



As we can see there's a depression after first 4 wars in the mean fineness of silver in the western kshatrapa dynasty. Data after last war which ended kshatrapa dynasty is unfortunately not available therefore we cannot conclude what happened after that war. But still, we can say that war did affect the money in adverse manner. They reduced the fineness of coin each time they occurred.

DISCUSSION

After all the analysis of the data, it looks like the price of coin was not stable through the first 4 centuries in India. Just like today. Tables, graphs and charts made it easy to understand that cost of silver increased in the course of time. This definitely indicates that the economy of ancient India was dynamic and not stable. To keep the value of coin intact, the rulers decreased the silver content of the coins as the silver was getting costlier.

As stated in the 'periplus of etherian sea'- a guide for sailors and traders across the world- that India had trade relations with Europe, Africa and rest of Asia. Therefore the coins designed by nahapana were imitation of European coins and their fineness or quality was matched to those of roman coins of that period. This made trade easier.

Role of impurities was to cut down the value of coins. More the impurities lesser is the value of coin. Reducing the weight of coin could have made people confused and could have damaged their faith in the coins or the king. To avoid this, keeping the weight unchanged, they simply reduced the silver content. By doing this, both the objectives of reducing the value of coin and not making any doubt in the minds of people were achieved. Also the making or manufacturing charges of striking coins used to get recover by getting out silver of that value and therefore pitting in the impurities.

Even recently, these kinds of practices are done by British government as well as Indian government. British coins of 1 rupee in India used to have 91.6% silver in their 11.650 grams coins. In 1949, the cost of silver went far high. At that time, the British reduced the silver content to 51.6% and then in 1945, the removed silver out of currency completely.

Even in the rule of Indian government, nickel coins were in routine but when its cost increased beyond its face value, people started melting these coins and sold the metal with considerable profit. At that time too, government removed nickel coins and introduced new coins which were cheaper in metal cost. I also have a coin of western Kshatrapas which is made of copper and then plated in silver. But as time passed, its silver plating vanished and copper got visible. It was the imitation of silver coin by at that time. I have shown the photo of the coin above in this document.

CONCLUSIONS:

1. Quality and value controlling system existed in the ancient India as we found here in this dynasty. Controlling the value of currency is very important thing right from the start of currency till today. The quality of Western Kshatrapa coins was supposed to be matched with Greek-Roman coins of that period.
2. Value of silver metal was not stable. Rather it increased in the course of time. Silver was an important metal as gold was very scarce in India. Silver was the acceptable all over India as the currency.
3. Mixing up the impurities in the coins was the part of quality control. By including the impurities, the money spent of striking of coins through license fees, rent, wages, etc used to be recovered.

Wars did affect the prices of silver and each time a big war occurred, prices of silver went high and result was seen in the fineness of coin in terms of silver. After each war, fineness reduced.