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An analytical approach of the accurate measuring scale of principal measuring unit of *Vaḍuriyana*

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Abstract

In Sri Lanka, a variety of measurement scales have been employed in house construction. These basic measurement scales have been recommended analytically, taking into account the physical dimensions of the human body. Additionally, certain scales have been developed based on the indigenous grain varieties of Sri Lanka. In the realm of house construction, measurement units derived from these scales are utilized to determine the dimensions of residential structures. The inch serves as the smallest basic measurement unit, while the cubit, which has undergone various modifications of the inch, is recognized as the primary measurement unit. Furthermore, practitioners in the construction industry in Sri Lanka also utilize a principal measurement unit known as the *vaduriyana*. There exists a range of theories concerning the scale of the *vaduriyana*; however, an exact and standardized measurement of this unit has yet to be subject to scientific investigation. Consequently, the primary research focus of this study is to investigate and ascertain the precise scientific scale of the *vaduriyana*. In accordance with qualitative research methodology, a variety of primary sources pertaining to historical and classical literary history were extensively consulted, with a particular emphasis

on the literary accounts of foreign travelers. Comprehensive research concerning the social structure of medieval Sri Lanka was also undertaken. The ancient architectural work entitled "***Purāṇa Mayimataya***," regarded as a primary source in Sri Lankan architecture, was subjected to thorough examination. Field observations were conducted in historical areas where archaeological evidence and references to "*Vaduriyana*" can be located. Moreover, I examined the measuring rod utilized by *Devasurendra Mūlācārya*, currently housed in the Kandy Museum. Interviews were conducted with architectural consultants, carpenters, and representatives from institutions engaged in the recommendation of measurement scales within Sri Lanka. The principal grain utilized for measurement scales in Sri Lanka is paddy, which has been employed since antiquity. According to architectural standards, a Sinhala inch corresponds to a cumulative value derived from seven grains of paddy. Furthermore, a "*Vaduriyana*" scale is formulated from 24 such units. There exists considerable variability in opinion regarding the precise measurements of the *Vaduriyana* scale in contemporary Sri Lanka, leading to complexities and controversies in architectural calculations pertaining to the length and width of residential structures. This research presents an opportunity to address these diverse and entrenched conflicting viewpoints, facilitating a clearer understanding of measurement scales employed in residential construction. Additionally, it enables a detailed analytical comparison of the two principal measurement units utilized in Sri Lanka: the *Vaduriyana* and the Sinhala inch. The precision of any design is fundamentally contingent upon the accuracy of measurement scales. Therefore, this research represents a significant contribution to the field of architecture and endeavors to uncover new avenues for scholarly exploration.

Keywords: Cubit, Riyana, *Vaduriyana*, Vāstuśāstra

Introduction

The ***Riyana***, also known as the cubit, serves as the primary unit of measurement in the architectural tradition of Sri Lanka. Literature sources present two distinct analyses regarding the scale and application of this unit of measurement. These analyses categorize the cubit into two scales: the general cubit and the carpenter's cubit. While some sources treat these scales as one, others consider them as separate entities.[1] extensively discusses these two variations of the *Riyana* in the literature.

The primary unit of measurement in Indian architecture is the "*Hasta*," which is also referred to as "*Hattha*" in the Pali language. The term " *Hattha*" and the Sanskrit word "*Hasta*" are consistently utilized in Sinhala translations such as *Mahāvaṁsa* and other chronicles.[2] In these translations, the term "Riyana" is used to replace "*hattha*" or "*hasta*." In English translations, "*Riyana*" is interpreted as "cubit," with an English standard cubit measuring 18 inches. Consequently, there has been a tendency to suggest that the length of the "hasta" is 18 inches. This issue has arisen due to translations that did not consider the contextual meaning of the original texts. As a result, there is ongoing disagreement in Sri Lanka's traditional measurement system regarding whether a cubit measures 18 inches or 24 inches. This disagreement persists into modern times, reflecting unresolved variations in ideologies.

In his work, the encyclopedia of Hindu architecture referred to the *hasta* as Cubit and noted its volume as 24 inches, comparing it to the modern 18 inches.[3] According to his findings, he suggested that 3/4 of a modern inch is equivalent to a unit of arm volume. It's

1. Ariyapala, M. B., (1962). *Madhyakalina Lanka Samajaya*. Department of Education, 137p.
2. *Mahavaṁśaya- Sinhala* (Buddhist cultural Centre). (2015). Buddhist cultural Centre, Dehiwala, 68p, 78p, 83p, 107p.
3. Acharya, P. K. (with Robarts - University of Toronto). (1946). *An encyclopaedia of Hindu architecture*. London: Oxford University Press, 4p. http://archive.org/details/encyclopaediaofh07achauoft

worth noting that this interpretation represents not that of Dr. Prasanna Kumara. Nevertheless, this conclusion is widely acknowledged and is featured in Dictionary of Hindu Architecture.

The *Abhidhānappadipikā* states that a *ratana* is composed of two *vidadthis*, with each *vidadthi* measuring 12 inches.[4]. Consequently, the scale of a *ratana* is 24 inches. The *Hatthakarapāṇiyo - Ratanaṁ kukku hattho* is also of significant importance, as it interprets the synonyms of *ratana* or *hasta*.[5]. It denotes that the word "*kukku*" is synonymous with "*ratana-hattha*." This "*Kukku*" appears to be equivalent to "*Kiṣku*" found in Sanskrit architectural works. "*Kiṣku*" is the standard *hasta* recommended for items measuring 24 inches. Hence, it is firmly established that the average *hasta* or cubit measures 24 inches.

Methodology

In Sri Lanka, various measurement scales have been employed in the construction of houses. These fundamental measurement scales have been analytically recommended based on the physical dimensions of the human body. Additionally, some measurement scales have been derived from indigenous grain varieties found in the region. In the context of house construction, units of measurement that have emerged from these scales are utilized to define the dimensions and proportions of residential structures.

The *Angala*, or inch, represents the smallest foundational measurement unit. The *Riyana*, or cubit, has evolved from the inch and serves as the primary measurement unit in this context. Furthermore, architects in Sri Lanka commonly utilize another key measurement unit known as the *vaḍuriyana*. There exists a variety of theories regarding the scale of the *vaḍuriyana*; however, an exact standardized scale has yet to undergo scientific examination.

4 Ariyadasa, S., Nagoda. (1998). *Abhidhanappadipika, A Lexicon of Pali Language*. Samayawardhana, Maradana, Colombo 10, 49p.

5 Ibid., 49p.

Consequently, a principal research question addressed in this study is the identification of the precise scientific scale of the *vaḍuriyana*. The qualitative research methodology employed in this study involved the examination of primary sources related to historical and classical literary history, with particular emphasis on the literary observations of foreign travelers. Additionally, research pertaining to the social structure of medieval Sri Lanka was incorporated. A key primary source, the ancient architectural text known as *Purāṇa Maimata*, was meticulously analyzed. Historical sites exhibiting archaeological evidence, as well as artifacts related to *vaḍuriyana,* were investigated through field observations. Furthermore, the ***Riyan*** phalanx, a measuring instrument utilized by *Devasurendra Mūlācārya*, was evaluated at the Kandy Museum in Sri Lanka. To enhance the research findings, interviews were conducted with architectural consultants, carpenters, and officials from institutions that promote measurement scales within the domain of traditional architecture in Sri Lanka. The primary grain utilized for measurement scales in Sri Lanka is paddy. Various types of paddies have been employed throughout Sri Lanka's history, and the precise metric values of these grains were subjected to scientific examination for accuracy.

According to architectural standards, the value of seven paddy grains is necessary to define a Sinhala inch. The *vaḍuriyana* scale is constructed from 24 such values. This research presents a precise determination of the *vaḍuriyana* scale through a scientific methodology. In Sri Lanka, there exists a variety of perspectives regarding the accurate measurement of the cubit. Consequently, this has led to complexities in architectural calculations, ranging from the dimensions of residential structures to broader design considerations. This study offers an opportunity to address and resolve the myriad conflicting opinions that have emerged socially. Furthermore, it empowers architects and builders by providing the ability to compute all relevant scales of residential construction with high precision. Additionally, this research facilitates a comprehensive analysis of the

differences between the two principal units of measurement employed in Sri Lanka: the *Riyana* and the *Vaḍuriyana*. The consistency of any architectural design is fundamentally reliant on the precision of these scales. Therefore, this research represents a significant advancement in the field of architecture and aims to unveil new avenues for scholarly inquiry.

Literature review

The term *Vaḍuriyana* is frequently encountered in Sinhala literary texts. For instance, references such as "A gems about four cubits from the *Vaḍuriyana*" and "*Byāmprabhā*, that is twelve cubits tall from *Vaḍuriyana*" are commonly found.[6] The translation of the Pali term *Hattha* into Sinhala as *Vaḍuriyana* can be observed in examples such as ***Aṭṭhapaññāsā Hatthubbhedaṁ***, which is rendered as ***Vaduriyanin eight panas riyan*** in Sinhala.[7]

In the *Mahāvaṁsa*, instances of the translation of the word *Hattha* into Sinhala as *Riyana*, as seen in phrases like "***Vīsa hatthaṁ Ucco, Hemamālīti Vissuto***" and "***Navahattha Parikkhepaṁ Pañcahatthaṁ Gabhīrato,***" are evident.[8] This translation is consistent across various references such as ***Tassā Dakkhiṇasākhāya*** and ***Catuhatthapamāṇakaṁ***.[9]

The use of the term *Vaḍuriyana* as a potential synonym for Sanskrit *Hasta* or Pali *Hattha* suggests the existence of different measuring scales, such as ***Samariyana*** or ***Riyana***. Dharmasena Thero's literary work, *Saddharmaratnāvali*, composed during the *Dambadeni* period, is widely acknowledged to reflect contemporary common usage. This indicates the possible usage of *Vaḍuriyana* for the Pali

6. Ariyapala, M., B,. (1962). *Madhyakalina Lanka Samajaya*. Department of Education,137p.
7. Ibid, 137p.
8. *Mahavaṁśaya- Sinhala* (Buddhist cultural Centre). (2015). Buddhist cultural Centre, Dehiwala, 15th Ch., 167 Stanza.
9. *Ibid.,* 18th Ch., 27 Stanza.

word *Hattha* in the context of its contemporary usage. The presence of the term "*Samariyana*" alongside "*Vaḍuriyana*" further suggests the existence of multiple measuring scales in use during that time.

Mr. Matugama Seneviruwan has delved into the traditional measurement units prevalent in the Sri Lankan context. According to his findings, three mustard seeds constitute one raw grain, three raw grains form one rice grain, and three rice grains amount to one inch.[10] Subsequently, 12 inches constitute a *viyata* or span, and combining three spans with an additional four inches results in the scale of a *Vaḍuriyana*. Although some scholars attribute this information to the Vaijayantatantra, no such reference exists in the book. Nonetheless, based on this analysis, the scale of the *Vaḍuriyana* is estimated to be approximately 40 inches.

The Purāṇa Maimata, a Sinhala architectural work, uniquely introduces the term "*Vaḍuriyana*." In its 42nd poem, the structure of *Vaḍuriyana* is delineated, specifying its measurements.[11] It is explained that the scale of *Vaḍuriyana* is determined by adding one cubit, one span, and four inches from the right hand. This analysis reveals that "*riyana*" and "*Vaḍuriyana*" are distinct measurement scales, both utilizing cubits for measurement. Purāṇa Maimata suggests calculating the dimensions of *Vaḍuriyana* based on an individual's right hand. Using architectural measurement units, a cubit equals 24 inches, a span *(Vīyata)* equals 12 inches, and an *Aṁgula* equals 4 inches. When combined, the scale of *Vaḍuriyana* measures 40 inches. In the English translation by Mr. Bonnie G. MacDougall, the format of *Vaḍuriyana* is described as commencing from the right-hand side, measuring one cubit *(Rīyana),* one span *(Vīyata),* and four fingers.[12] This analysis highlights two interpretations of "*riyana*" - as *riyana* and *Vaḍuriyana*, or as carpenter's cubits.

10. Mathugama, S. (1998). *Sinhala Vastu Kirittama*. Author publication, 83p.
11. *Purana Maimataya*. (n.d.). Modern Book Publication, Nugegoda,4p.
12. *Ibid.* 4p.

According to John Davy, the smallest unit of measurement in Sinhala culture is one-seventh of a grain of rice.[13] It is noted that seven grains of rice equal one inch, and seven inches make up a *viyata* or span. To form a *dunna* or bow, nine such spans are required.[14] The Sinhala culture also employs specific scales and units for various industries. For instance, special measuring scales were utilized by carpenters in Ceylon, with their ruler scale measuring 24 inches. Interestingly, a carpenter's inch is defined as the length between the second and third knuckles of the index finger. Furthermore, John Davy mentions that the 24-inch *Vaḍuriyana* used by carpenters was divided into four parts.[15]

Mr. Ananda Kumaraswami has made reference to a measuring implement housed at the Kandy Museum.[16] This implement is identified as a measuring scale utilized by Devendra Ācārya and comprises 24 sections adorned with floral markings on one side.[17] The configuration of this measuring rod bears resemblance to the manual measuring scale of the Samarāṁganasūtradhāra.[18] It is suggested that the design of palm and inch scales incorporate floral embellishments. In terms of arrangement, Mr. Ganapathi Bhattacharya's examination of the Hand Scale ruler closely resembles these unit scales found in the museum[19] In addition to Ganapati Bhattacharya, the measuring scale of the *Hasta* ruler has been fashioned in accordance with the principles of Mānasāra, alongside Rajavallabha and Samarāṁganasūtradhāra.[20]

13. Davy, J. (1821). *An account of the Interior of Ceylon and of its inhabitants with travels in thar island*. Tisara press, Dutugemunu Street, Dehiwala, Sri Lanka, 189p.
14. Ibid.,189p.
15. Davy, J. (1821). *An account of the Interior of Ceylon and of its inhabitants with travels in thar island*. Tisara press, Dutugemunu Street, Dehiwala, Sri Lanka, 190p.
16. Kumarasvami, A. K. (1994). *Madhyakalina Sinhala Kala*. Department of National Museum,141p.
17. Ibid., 142p.
18. Ganapathisastri, T. (1966). *Samaramganasutradhara*. Oriental Institute, Baroda, 35p.
19. Vibhuti, C. (1998). *Indian Architectural Theory*. curzon press, India, 39p.
20. Ibid.,40p.

According to the analysis by Mr. Anandakumaraswami, the measuring ruler used by Devendra has been introduced as *Riyan Daṇḍa* or *Riyan Lella*.[21] The *riyana*, or measuring rod, is divided into 24 inches. Mr. Anandakumaraswami recommends that the length of the carpenter's thumb is equivalent to the third link of the index finger. This recommendation differs from other sources which suggest the use of the middle finger and middle knuckle.[22] Notably, the use of the index finger and its third phalanx is highlighted as a unique contradiction. According to Mr. Ananda Coomaraswami, *Vaḍuriyana* is prepared by joining a regular *Riyana*, *viyata*, and four finger links.[23] *Vaḍuriyana* is a specialized measuring scale used by carpenters, distinct from ordinary cubits. Mr. Ananda Coomaraswami's volume of *Vaḍuriyana* aligns with the analysis of *Purāṇa Maimata*. However, it is not specified which scale was referred to as common cubits. According to Sinhala literary sources, the scale should be 24 inches. Additionally, Mr. Ananda Coomaraswami states that the distance of a *viyata* is 07 inches.

Accordingly,

Standard cubit	Span	inches	- *Vaḍuriyana* of Carpenter’s cubit
24	07	04	- 35
18	07	04	- 29

The *Riyan* plank utilized by Devendra Moolācārya measures approximately 30 inches, while the Gaḍāladeni plate corresponds to a cubit of about 31 inches. The *Vaḍuriyana* line inscribed on the palm of Gaḍalādeniya measures 30 English inches. The cubit is crucially divided into 24 parts. Indian architecture has been notably influenced by the measuring scale known as *Riyana* or *Vaḍuriyana*, which is

21. Kumarasvami, A. K. (1994). *Madhyakalina Sinhala Kala*. Department of National Museum, 141p.
22. Kumarasvami, A. K. (1994). *Madhyakalina Sinhala Kala*. Department of National Museum,142p.
23. Ibid.,141p.

divided into 24 parts.[24] Furthermore, without implementing different scales, the inch scales of the ruler are clearly indicated by dividing the ruler into 24 parts, with each inch being equivalent to $1\ ^{7}/_{24}$ English inches. Additionally, rectangular rods of $3\ ^{7}/_{8}$ inches, $_{2}\ ^{7}/_{12}$, $_{1}\ ^{7}/_{24}$, and $^{31}/_{48}$ are divided into parts. Mr. Anandakumaraswami posits that these measuring methods were commonly utilized by technicians during that era.[25]

The analysis presented highlights the distinction between *Vaḍuriyana* and ordinary cubits as two distinct measuring scales. In Sanskrit Vāstuśāstra, the standard cubit is defined as the distance from the elbow to the tip of the thumb, whereas the basic texts of Sanskrit Vāstuśāstra specify the standard scale as the distance from the arm to the tip of the middle finger. Robert Knox suggests that a cubit is the length of the elbow from the inside of the wrist to the tip of the fourth finger.[26]. It is important to note that measuring from the tip of the elbow to the tip of the index finger or fourth finger yields contradictory results.

In his text, Mr. Mathugama Seneviruwan references the perspective of Mr. Ananda Coomaraswami and elucidates the utilization of different scales within Sinhala society. Specifically, he notes that the unit of measurement in common households is the *Vaḍuriyana*, which consists of 24 phalanxes. Conversely, the houses of ministers, generals, and officials use the twenty-eight *puruk* or joints as a measure, while the palaces of kings and priests employ thirty-two finger joints. It's worth noting that while these three variations of *Vaḍuriyana* are said to have been utilized in Sinhala society, there is a lack of verifiable sources supporting this claim.

Furthermore, Sinhalese folklore offers an interesting analysis: one mustard seed is composed of three dust particles, one grain of raw

24. Ibid.,141p.
25. Ibid.,142p.
26. Karunararthne, Devid. (2005). *Eda Hela Diva*. Gunsdena Samagama, Colombo, 207p.

consists of three mustards, and one paddy of rice comprises three raw.[27] Moreover, three grains of rice are equivalent to one inch. Additionally, according to the folklore, *Riyana* is made up of two *viyata*s.

Discussion

Mr. Ralph Peiris conducted a study of the measurements employed during the Kandy period.[28] His analysis revealed that the measuring scale was equivalent to the length of a carpenter's arm from the inner side of the elbow joint to the tip of the fourth finger. Additionally, he referenced a statement from Knox, indicating that when the hands are extended outward with the thumbs touching, the distance between the two elbows represents the scale of the *Vaḍuriyana*. Mr. Ralph determined that the *Vaḍuriyana* scale measures 24 inches.[29] Furthermore, he noted variations in the *Vaḍuriyana* scale, with measurements of approximately 30 inches on the *riyana* of Gaḍalādeṇiya and around 27 inches in the Kāvyasekhara edition.

The text mentions Mr. Anandakumaraswami's reference to a unit of measurement called *Keṭi* or short, also known as Riyana.[30] This unit is defined as the length from the elbow to the top of the second ring finger when the wrist is bent. Additionally, it discusses the *viyata* or span, which is the length from the tip of a well-stretched thumb finger to the index finger. The text further elaborates that a standard inch is equivalent to the second knuckle of the index finger and that one foot consists of twelve such inches. Mr. Anandakumaraswami concludes that the measurement scale of an average measuring ruler is approximately 17 inches.[31]

27. Mathugama, S. (1998). *Sinhala Vastu Kirittama*. Author publication,84p.
28. Relph, Peris. (2001). *Sinhala Samaja Samvidhanaya*. Visidunu Prakashana, 171p.
29. Ibid., 173p.
30. Kumarasvami, A. K. (1994). *Madhyakalina Sinhala Kala*. Department of National Museum,141p.
31. Ibid.,142p.

It is evident from the text that ancient Sri Lankan craftsmen meticulously calculated measurement scales. An example provided is the collaborative effort of four carpenters in the Kandy era, who were each given four pieces of wood to join together. This experiment confirmed that the specified scales had been accurately drawn, showcasing the craftsmen's precision and attention to detail.[32]

Mr. Harmanis Appuhami is renowned for his pioneering work in translating Sanskrit architectural texts into Sinhala. In his book "Vastuvidyā or Architecture," he discusses *Vaḍuriyana*, a unit of measurement not found in Indian architectural works. Appuhami suggests that *Vaḍuriyana*, possibly based on a 24-inch cubit, was used by Sri Lankan carpenters. He notes its mention in the Samantapāsādikā Vinaya Commentary, where it is compared to the hand size of a middle-class man.[33] Appuhami recommends the use of 24-inch cubits, made of eight *yava* seeds, for household work and asserts that *Vaḍuriyana* was likely employed in the construction of pagodas and statues in early Sri Lanka. He concludes that *Vaḍuriyana* is not a measurement scale of *Aryans*, challenging traditional beliefs.[34]

The ancient Sanskrit architectural texts universally advocate for a standard *hasta* measurement of 24 inches and propose it as the primary unit for architectural calculations. Consequently, Mr. Harmanis' assertion that there are no errors in the manual calculation of the volume of *Vaḍuriyana*, a substance used in Sri Lankan architecture, using the hand scale, is deemed acceptable.

It's important to note that the analysis of *Vaḍuriyana* in the Purāṇa Maimata does not align with the views of sage *Maya*. Throughout the text, the name "***Mai***" is consistently used instead of "***Maya***." Furthermore, the concepts presented in the Sanskrit Mayamata and the *Purāṇa Maimata* are not entirely congruent. Consequently, there

32. Ibid.,142p.
33. Appuhami, H., Y. A. (2017). *Vāstuvidyā hevat Gṛhanirmāṇaśilpaya*. MD Gunasena Company, 57p.
34. Appuhami, H., Y. A. (2017). *Vāstuvidyā hevat Gṛhanirmāṇaśilpaya*. MD Gunasena Company, 57p.

is no discrepancy in considering *Vaḍuriyana* as the hand size of an individual from the middle-class. Upon individual calculation, the volume of *Vaḍuriyana* varies from one person to another.

In the Viśvakarmapakāṣa and Vāsturatnāvali texts, it is advised to consider the hand scales of four individuals - the head of the household, the senior wife, the senior son, and the main worker – when determining the scale of a household. The Vaijayantatantra discusses four types of hasta, calculated from one hand of a person, with each hasta corresponding to a specific distance on the hand.[35] The term ***"Hastaṁ Caturdhā***" from the Vaijayantatantra should be analyzed in conjunction with the quotation from Viśvakarmaprakāṣa to gain a comprehensive understanding. However, it has been noted that Mr. Harmanis quoted the Vaijayantanta verse without a thorough analysis. Additionally, references to four-cubit varieties of 31 inches, 27 inches, 25 inches, and 24 inches are not found in the verse, leading to the conclusion that analyzing the term ***"Hastaṁ Caturdhā"*** in conjunction with the quotation from Viśvakarmaprakāṣa is the more accurate approach[36]

The measurement unit based on the hand of a *Vaḍuriyana* individual is explicated. It is noted that the terms "Riyana" and "*Vaḍuriyana*" have been employed to denote the hand due to discrepancies in translating the Sanskrit "Hasta" and Pali "*Hattha*" into Sinhala. It is suggested that a 24-inch measuring scale, divided into eight *yava* seeds, be adopted as a standard for the hand, referred to as a "*riyana*" or cubit, rather than a "*Vaḍuriyana*."

In contemporary Sri Lankan architecture, conflicting viewpoints exist regarding the capacity of the conservatory. One contention posits that a "hasta" measures 18 inches, rather than 24 inches. This discrepancy arises from the translation of the terms "*hattha*," "*hasta*,"

35. Nandasena, M. (Ed.). (1983). *Vaijayantha thantraya*. University of Kelaniya,10 -11p.
36. Appuhami, H., Y. A. (2017). *Vāstuvidyā hevat Gṛhanirmāṇaśilpaya*. MD Gunasena Company,51p.

and "*ratana*" into English, where 18 inches equate to an English cubit. While it is not inaccurate to equate "hasta," "*hattha*," or "*ratana*" with an 18-inch cubit in English, it is imperative to emphasize that defining the scale of "*Hasta*," "*Hattha*," or "*Ratana*" as 18 inches is wholly erroneous.

In the Sinhala language, there exists a rich collection of architectural literature. Mr. Dayaratne Athukoralage has outlined various forms of *Vaḍuriyana* utilized in ancient Sri Lanka. The term *Vaḍuriyana* encompasses different units of measurement.[37]

The 33 or 32-inch *Vaḍuriyana* was employed in constructing residences for high-caste government officials, lineage members, prime ministers, and ministers, as well as in the design of temples and churches, according to Mr. Athukoralage's research. The 31-inch *Vaḍuriyana*, also known as the Standard *Vaḍuriyana*, was the prevalent measurement scale used in general home design. *Vaḍuriyana* measuring 30, 29, or 28 inches was considered by Dayaratne Koralage to be suitable for standard caste housing. [38]However, the source of this information remains unspecified.

Results

It has been indicated that in certain regions of the southern province of Sri Lanka, the standard measurement of a *Vaḍuriyana* is considered to be 34 inches. This finding can be seen as a compilation of varying perspectives from individuals involved in traditional architectural practices. Mr. Vijaya Sri Jayasinghe has further categorized Mr. Dayaratne Koralage's analysis into five parts.[39]

37. Koralage, D. (2000). *Vidyātmaka padanamak mata vāstu śilpaya*. Author publication,38p.
38. Ibid., 37p.
39. jayasinghe, V. Sri. (2005). *Vāstuvidyā Ratnaya*. Malpiyali Publications, Dankotuwa,32p.

01. 33 Inch *Vaḍuriyana* -
Utilized in the construction of temples, monasteries, pagodas, religious, and public buildings.

02. 32 inches *Vaduriyana* -
Also referred to as *Rajariyana* and employed in the construction of royal residences and ministerial buildings.

03. 31 Inch *Vaḍuriyana* -
The standard measurement used in the construction of houses by the general populace.

04. 29 inch *Vaḍuriyana* -
Suggested for houses of the lower caste.

05. 28 Inch *Vaḍuriyana* -
Deemed ideal for constructing animal enclosures.

It should be noted that the author has not cited any primary or secondary sources to substantiate the classification of these five types of *Vaḍuriyana* or carpenter's cubit.

In his analysis, Mr. Dayaratne Koralage established the construction method of *Vaḍuriyana* as described in Purāṇa Maimata by making certain assumptions. He measured the distance from the end of the elbow to the end of the middle finger as 19 inches, with the arm's volume calculated at 08 inches. Additionally, he allocated four and a half inches for four times the length of a finger ring, resulting in an overall length of thirty-one and a half inches for *Vaḍuriyana*.

However, it is essential to note that Mr. Koralage's approach is not only irrational but also lacks practical or scientific merit. According to the English system, the standard volume of a cubit is 18 inches, and a *viyata* or span measures 09 inches, not 08 inches. Furthermore, the average size of a finger ring is commonly measured as an inch. Consequently, based on English measurement scales, the scale of *Vaḍuriyana* mentioned in Purāṇa Maimata amounts to 31 inches. Nevertheless, it is not advisable to adopt the English measurement

system to determine the indigenous format for establishing the scale of the standard measuring unit.

In the Purāṇa Maimata, *Vaḍuriyana* is referenced as a variable measurement scale, unique to each individual. Providing a specific volume for *Vaḍuriyana* is impractical and unscientific. It is more appropriate to correlate *Vaḍuriyana* with the hasta mentioned in Sanskrit architectural works, which is equivalent to a scale constructed based on the *aṁgula*.

Mr. Dayaratne Koralage utilizes a standard *Vaḍuriyana* of 31 inches for his computations. He suggests 31.5 inches as the volume of *Vaḍuriyana* in Purāṇa Maimata. However, he does not cite a specific source for the 31-inch *Vaḍuriyana* used in his calculations.[40]

In the discourse regarding standard measurement scales, Vijaya Shri Jayasinghe advocates for the adoption of 32 inches as the definitive standard, citing the *Vaḍuriyana* scale, which measures thirty-one and a half inches, as a basis for this proposition. Additionally, Wawala P. Mr. Premadasa has endeavored to validate the *Vaḍuriyana* scale as 31 inches, although this assertion has been made by misinterpreting the references in the Viśvakarma Prakāṣa.[41] It is noted that the Mānāṁgula, comprising six *yava* or barley corns, is denoted as Brahma, as also referenced in Mr. Hermanis' work. Notably, the Viśvakarma Prakāṣa does not refer to this Mānāṁgula as Brahman. It is emphasized that the nomenclature of Brahma does not inherently signify the superiority of the unit of measurement.[42] Furthermore, Wawela P. Mr. Premadasa's assertions, attributing these recommendations to the Viśvakarma Prakāṣa, lack specific citation. The recommendation is posited for the adoption of the mānāṁgula, constituted of seven *yava* or barley corns, as the unit of measurement in architectural construction. Additionally, the mānāṁgula, derived from six *yava* seeds, is designated as Viṣṇu,

40. Koralage, D. (2000). *Vidyātmaka padanamak mata vāstu śilpaya*. Author publication,39p.
41. Premadasa, W., P. (2019). *Vāstu Sāra Darśana*. Sarasavi Publications, Nugegoda,37p.
42. Ibid., 38p.

while that from eight *yava* seeds is termed Maheśvara, with the latter being the highest magnitude. It is elucidated that the architectural sources define the mānāṁgula, comprising six *yava* seeds, as *Adhama*.[43]

The interpretation provided by Wawela P. Mr. Premadasa regarding the volume of a cubit made of six, seven, and eight *yava* seeds is not in alignment with the generally accepted convention. It is widely acknowledged that 12 inches constitute a *viyata* or span, and two spans make a cubit.[44] Mr. Premadasa's multiplication of the numbers six, seven, and eight by three to describe them as three varieties does not correspond to any known analysis in primary sources. The accumulation of six, seven, or eight *yava* seeds equates to an inch, and 24 inches make a hasta. It is important to note that each cubit or *riyana* measures 24 inches, and variations in the size of the seed only affect the inch scale, not the 24 inches of a hasta.

Mr. Premadasa has highlighted a discrepancy in Viśvakarma's recommendation regarding the length of a hasta, stating it to be 18 inches, a reference not found in the Viśvakarma Prakāṣa. Despite this, he asserts the superiority of this 18-inch measurement, equating it to a modern 18-inch standard. Additionally, the 103rd verse is cited to support the claim that the ancient *Maimataya* scrutinizes the concepts of the sage Maya.[45] However, it is noted that the verse uses the term Mai instead of maya. This interpretation aims to affirm the sage's endorsement of the *Vaḍuriyana* measuring scale.

Conclusion

Regarding the analysis of the 42nd verse of the Purāṇa Maimata, Viśvakarma prescribes the volume of a cubit to be 18 inches. Subsequently, the measurement of *viyata* or spans is to be added, although no specific reference to the *viyata* scale is provided. It is stated

43. Appuhami, H., Y. A. (2017). *Vāstuvidyā hevat Gṛhanirmāṇaśilpaya*. MD Gunasena Company,52p.
44. Premadasa, W., P. (2019). *Vāstu Sāra Darśana*. Sarasavi Publications, Nugegoda,41p.
45. Ibid., 44p.

that the diameter of the middle finger's middle ring is approximately one and a half inches. Nonetheless, it is stipulated that a standard 31-inch *Vaḍuriyana* should be constructed based on the aforementioned 18-inch hasta. Assuming the middle ring of the middle finger measures one and a half inches, the 18-inch measurement equates to 27 inches.

The specific scale of *viyata* has not been defined. According to the standard English measurement, a span is considered to be nine inches. Additionally, an additional four inches are included. Mr. Premadasa indicates that one inch is equivalent to one and a half finger joints. Hence, four inches would be approximately 06 inches.

Therefore, 27 + 09 + 06 - 42 inches constitute a *Vaḍuriyana*. Accordingly, if the span is measured as 08 and 07 inches, the volume of the *Vaḍuriyana* can be calculated as 41 inches and 40 inches. Mr. Premadasa states that the volume of the hasta is 18 inches, and the volume of a *viyata* is 09 inches, which becomes 33 inches when the last six inches are added. If the *viyata* measures 08 inches, the volume of the *Vaḍuriyana* is 32 inches. In light of this, it is necessary to point out that the method utilized by Mr. Premadasa to indicate the volume of *Vaḍuriyana* is not of an academic nature.

In support of the measurement scale of *Vaḍuriyana* being 31 inches, two statements from Mr. Senarath Paranavitana and Mr. Anandakumaraswami have been referenced. Mr. Senarath Paranavitana, in his work "Stūpaya," asserts that the volume of a *Vaḍuriyana* is 30 inches.[46] These conflicts with the previously mentioned measurement. Additionally, the University Hela Vadan Ruwan dictionary interprets the volume of a cubit as approximately half a yard. The arm, defined as the part of the arm below the wrist, is also discussed in relation to these measurements. Mr. Wilhelm Geiger[47] has conducted an analysis based on 18 English inches in the Commentary on Weights and Measures.

46. Senarath, P. (n.d.). *Stupaya*, 5p.
47. Geiger, W. (1960). *Culture of ceylon in mediaeval times*. Otto Harrassowitz, Wiesbaden,80p.

In the context of architectural planning and measurements, the resolution of the conflict between *Riyana* and *Vaḍuriyana* can be achieved through the calculation of the *mātrāhasta* scale. This scale is determined based on the measurement of a cubit on the human hand and the measuring arm using rice seeds or *yava* seeds as the unit of volume for the Riyana or cubit. Hasta or Riyana is utilized for all measurements such as the length and width of a house in architectural planning. Notably, there is no reference to *Vaḍuriyana* in vāstuśāstra sources. In Sri Lankan house planning, the recommended measure is the Riyana, as opposed to the *Vaḍuriyana*. Consequently, even if the scale of a *Vaḍuriyana* or carpenter's cubit is 31 or 32 inches, its use as a unit of measurement in houses is not endorsed. It is essential to note that adopting the standard *riyana* measurement scale of 24 inches represents a more precise and scholarly criterion.

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