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## Measurements In Rāmāyaṇam

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### ABSTRACT

The Ramayana is a foundational epic within the Indian Knowledge System (IKS), offering profound insights into ancient Indian philosophy, governance, ethics, and science. While it is traditionally revered for its moral and spiritual framework, the epic also preserves intricate details of ancient scientific practices, including highly structured systems of measurement (Pramāṇa). This paper presents a comparative study of the measurements applied in the Yuddha Kāṇḍa of Vālmīki's Sanskrit Rāmāyaṇam and Kambar's Tamil Kambarāmāyaṇam.

The study highlights how both texts utilize measurements related to distance (such as the Yojana), massive numerical multiples (tens to Parārdha), and the scaling of military forces to express grandeur and epic scope. While Vālmīki's original Sanskrit narrative maintains a direct, descriptive, and realistic approach to architectural and geographical dimensions, Kambar adapts these units using poetic imagination, symbolic exaggeration, and metrics unique to Tamil literary aesthetics (such as the Vellam). Furthermore, the paper examines how both traditions transcend physical metrics to measure abstract concepts like virtue, devotion, and Dharma. Ultimately, this comparative analysis demonstrates how these two monumental literary traditions preserve a shared cultural and scientific heritage while expressing it through distinct regional, linguistic, and poetic lenses.

**KEYWORDS:** Rāmāyaṇam, Vālmīki, Kambar, Indian Knowledge System (IKS), Comparative Literature, Yuddha Kāṇḍa, Measurements (Pramāṇa), Yojana, Vellam.

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## Introduction

The Ramayana is a foundational text within the Indian Knowledge System (IKS). The epic provides insights into IKS by illustrating key Indian philosophical concepts like Dharma and Ethics (righteousness), virtue, sacrifice, duty, justice, Socio-Emotional Learning, Governance and Justice, Environmental Awareness, Cultural Heritage and sustainable living. It serves as a framework for teaching societal values, shaping public discourse, inspiring interdisciplinary innovation and cultural revitalization within India. This paper focus on the concept of Measurements applied in Ramayana, focusing on the varied aspect of the Indian Knowledge System applied through Science and Technology in the then yuga comparing the Rāmāyaṇa by Vālmīki in Saṃskṛtam and Kambar in Tamil.

## Rāmāyaṇam of Vālmīki & Kambar

Dawn of the Poetry begun with Vālmīki, and hence he is mentioned as Ādikavi and his work Rāmāyaṇam, the Ādikāvya. Rāmāyaṇam is credited for translations in many languages across the borders. There are more than 300 versions of Rāmāyaṇam, translated into many major languages.

Kambar, a Tamil poet, has authored Rāmāvatara also familiar as Kambarāmāyaṇam. This work in Tamil is believed to be based on the original version in Saṃskṛtam by Vālmīki. Many deviations can be cited in the two works. Certain differences on measurements detailed in Yuddha Kāṇḍa of Vālmīki and Kambarāmāyaṇam are enlisted through this study.

In Valmiki's version, measurements related to distance, time, geography, warfare, and architecture are often presented in a direct and descriptive manner, reflecting the ancient Sanskrit epic tradition and its attention to realism and narrative structure. Kambar, while drawing from the same narrative foundation, enriches these measurements with poetic imagination, emotional depth, and symbolic exaggeration suited to Tamil literary aesthetics.

## Measurement Terminologies

The measure of the army, weapons, the days for the construction of the bridge, days of battle all are calculated variedly by units of measurements. Measurement is defined as the action of finding out the quantity, size, force, units like length, breadth, time, height, weight, amount of an object, etc. In Sanskrit, "measurement" can be expressed by several terms, including Pramāṇa (प्रमाण), which signifies measure or standard, Māpana (मापन), referring to the act of measurement, Parimāṇa (परिमाण), meaning a measure or quantity and Māna (मान), which indicates measure, quantity or even a unit. The ancient measurements method includes physical measurement such as length of a foot, width of a finger, distance of a step, Aṅgulas, Vitasti, yava, dhanur-graha, Hastā, Muṣṭi.

The details of measurements play a vital role in all genres of literature. Tamil literature classifies Measurements into 7 major types – எண்ணல், நிறுத்தல், முகத்தல், பெய்தல், நீட்டல், தெறித்தல், சார்த்தல். The measurements are then further classified into various types based on the army, commodities, numbers, seasons, etc.

## Measuring a Yojana

Yojana is an ancient measure of distance, where one yojana roughly equals to 8 to 10 miles. Its calculated thus : 1 angula is 3/4 inch; 4 angula-s are = one dhanu-graha - bow grip; 8 angula-s are = one dhanu-musti (fist with thumb raised); 12 angula-s are = 1 vitasti (distance between tip of thumb and tip of last finger when palm is stretched); 2 vitasti-s = 1 aratni -s (cubit); 4 aratni-s = one danda, (dhanus - bow height - 6 ft); 10 danda-s = 1 rajju (60 ft); 2 rajju-s = 1 paridesha (120 ft); 2,000 dhanus-s =



one krosha and also called gorata (4,000 yards); 4 krosha-s = 1 yojana - thus one yojana is 9 to 10 miles. The measurements wish a yojana to be of four Gavyūtis.

But the British Revenue measurement scaled it down to 5 miles and all the dictionaries say that one yojana is 5 miles. But traditionally it is held as 10 miles. More info on these measures can be had from The Artha-Śāstra of Kautilya - a republication of Penguin.

The city of Ayodhya in Vālmīki Rāmāyaṇam, is thus described calculating the Yojana -  
आयता दश च द्वे च योजनानि महापुरी । श्रीमती त्रीणि विस्तीर्णा सुविभक्ता महापथा ॥ १-५-७

[*ayata dasha ca dve ca yojanani mahapuri /shrimati trini vistirna suvibhakta mahapatha //*]<sup>1</sup>

*That glorious city with well-devised highways is twelve yojana-s lengthwise and three yojana-s breadth wise.*

### Multiples of Tens

Apart from Yojana, there are various measurements and the calculations from - Daśa (10), Śata (100), Sahasra (1000), Ayuta (10,000), Niyuta (1,00,000), Prayuta (10,00,000), Arbuda (1,00,00,000), Anyarbuda (10,00,00,000), Vṛnda (1,00,00,00,000), Kharva (10,00,00,00,000), Nikharva (1,00,00,00,00,000), Śaṅku (10,00,00,00,00,000), Padma (1,00,00,00,00,00,00 0), Amburāṣī (10,00,00,00,00,00,000), Madhya (1,00,00,00,00,00,00,000), Antya (10,00,00,00,00,00,00,000), Para (1,00,00,00,00,00,00,00,000), Aparā (10,00,00,00,00,00,00,00,000) and Parārdha (1,00,00,00,00,00,00,00,00,000). These should be recognized as multiplied by ten.

A hundred of a hundred thousand is called a koṭi by the wise. A hundred of a thousand koṭi is called a Saṅku. A hundred of a thousand Saṅku is known as a Mahāśaṅku. A hundred of a thousand Mahāśaṅku is here termed a Vrinda. A hundred of a thousand Vrinda is known as a Mahāvṛinda. A thousand Mahāvṛinda is called here a Padma. A hundred of a thousand Padma is known as a Mahāpadma. A hundred of a thousand Mahāpadma is termed a Kharva. A hundred of a thousand Kharva is termed a Mahākharva, and a hundred of a thousand Mahākharva is termed a Samudra. A hundred of a thousand Samudra is known as a Mahaugha.

The same measurements are termed in Tamil Literature as follows -

The terms of the calculations fall similar at places

சா.கணேசனின் தொகை அல்லது எண் தான அட்டவணை <sup>(3)</sup>		in	
1	ஒன்று (ஏகம்)	10,00,00,000	அற்புதம்
10	பத்து (தசம்)	1,00,00,00,000	நிகற்புதம்
100	நூறு (சதம்)	10,00,00,00,000	கும்பம்
1000	ஆயிரம்(சகசிரம்)	1,00,00,00,00,000	கணம்
10,000	பதினாயிரம் (ஆயுதம்)	10,00,00,00,00,000	கற்பம்
1,00,000	நூறாயிரம்(லட்சம்-நியுதம்)	1,00,00,00,00,00,000	நிகற்பம்
10,00,000	பத்து நூறாயிரம் (பிரயுதம்)	10,00,00,00,00,00,000	பதுமம்
1,00,00,000	கோடி	1,00,00,00,00,00,00,000	சங்கம்
		10,00,00,00,00,00,00,000	வெள்ளம் (சமுத்திரம்)
		1,00,00,00,00,00,00,00,000	அந்நியம்
		10,00,00,00,00,00,00,00,000	மத்தியம்(அர்த்தம்)
		1,00,00,00,00,00,00,00,00,000	பரார்த்தம்
		10,00,00,00,00,00,00,00,00,000	பூரியம்
		1,00,00,00,00,00,00,00,00,00,000	பிரமகற்பம்(முக்கோடி)

both the literatures.



### Army of Rāma

The army of Rāma consisted of gathered monkeys and other creatures of the forest. Nila, the son of Viśvakarmā, took the army by a path furnished with fruits and roots. The foremost monkeys gifted with prodigious prowess lead forth the army of Rāma like a host of terrible ocean, numbering hundreds and thousands. Gaja, resembling a hill, and the exceedingly powerful Gavaya, and the master of the monkeys Gavākṣa, like a haughty bull among kine, moves in the van of the monkey-host. Rṣabha, the foremost of the monkeys, goes protecting the right wing of the army; Gandha, irresistible like an elephant with the fragrant temporal juice trickling down, and the vehement Gandhamādana go protecting the left wing. King of bears, the long-armed Jāmbavān, Suṣeṇa and the monkey Vegadarcī, protects the force. Amidst the troop of monkeys, in the middle, King Sugrīva, Rāma and Lakṣmana, were environed by innumerable powerful and terrible monkeys.

एवं कोटिसहस्रेण शङ्कूनां च शतने च । महाशङ्कुसहस्रेण तथा वृन्दशतेन च ॥  
महावृन्दसहस्रेण तथा पद्मशतेन च । महापद्मसहस्रेण तथा खर्वशतेन च ॥  
समुद्रेण च तेनैव महौघेन तथैव च । एष कोटिमहौघेन समुद्रसदृशेन च ॥  
विभीषणेन वीरेण सचिवैः परिवारितः । सुग्रीवो वानरेन्द्रस्त्वां युद्धार्थमनुवर्तते ॥  
महाबलवृतो नित्यं महाबलपराक्रमः ॥ <sup>2</sup>

Rāma is thus backed by a thousand koṭī and a hundred Śaṅku, and a thousand Mahāśaṅku and a hundred Vrinda and a thousand Mahāvṛinda and an hundred Padma, and a thousand Mahāpadma and a hundred Kharva and an equal Samudra and an equal Mahaugha, by koṭīs of Mahaughas – resembling the sea, and surrounded by Vibhiṣana, the heroic as well as his counsellors, that Lord of monkeys, always engirt by a mighty force, and possessed of exceeding strength and prowess, will encounter you in battle.

Kambar describes the same ideology in his text as -

வீரிய விரைவி னெய்திப் பதினெழு வெள்ளத் தோடும்

மாருதி மேலை வாயி லுழிஞைமேல் வருவ தானான்

ஆரிய னமைந்த வெள்ள மத்தனை யோடும் வெற்றிச்

சூரியன் மைந்தன் தன்னைப் பிரியல னிற்குச் சொன்னான். <sup>3</sup>

அன்றியும் பதினெழு வெள்ளத் தரிதோடும் மரசன் மைந்தன்

தென்றிசை வாயில் செய்யஞ் செருவெலாஞ் செய்த தானான்

ஓன்றுபத்தாறு வெள்ளத் தரியொடுந் துணைவ ரோடும்

நின்றன னீல னென்பான் குணதிசை வாயி னெற்றி <sup>4</sup>

இம்பரி னியைந்த காயுங் கனியுங்கொண் டிரண்டு வெள்ளம் வெம்புவெஞ் சேனைக் கெல்லா முணவுதந் துழல விட்டான். <sup>5</sup>

The measurement of one Vellam (வெள்ளம்) in Tamil is the highest count figuring to 10,00,00,00,00,00,00,00,00,000 which is counted as Aparā in Sanskrit. Kambar describes that the army of Śrī Rāma comprising of 17 Aparā under the guidance of Hanumān, 17 Aparā under the control of Śrī Rāma, 17 Aparā under the guidance of Aṅgada, 17 Aparā by Nīla and 2 Aparā deputed for food preparations. The total army therefore consisted of 70 Aparā.

70 x 10,00,00,00,00,00,00,00,00,000 = 7,00,00,00,00,00,00,00,00,000



## The City of Lanka

Lankā, is guarded and protected by many Rākṣasas, guarding the four wide and giant gates and their doors firmly established and furnished with massy bolts. The Count of the Rākṣasas in the entrances of Lankā, is measured in Ayuta, Prayuta, Niyuta, Arbuda and Koṭis. \_

### 1. Ayutam

An Ayuta is an ancient method of measurement in Sanskrit Literature. The value of Ayuta is 10,000. एकं दश शतमस्मात् सहस्रमनु चायुतम् ॥<sup>6</sup> Ayuta refers to a Thousand years of Brahmā.<sup>7</sup> न युतं नञ्समासः । दशसहस्रसंख्या । इति हेमचन्द्रः ॥<sup>8</sup>

### Eastern Gate

अयुतं रक्षसामत्र पूर्वद्वारं समाश्रितम् । शूलहस्ता दुराधर्षाः सर्वे खड्गाग्रयोधिनः ॥<sup>9</sup>

Vālmiki describes - An Ayuta of Rākṣasas, 10,000 in number, dart-handed, hard to subdue, and all fighting at the front with their swords – protect the Eastern gate.

“கீட்டிசை வாயிலின் வைகுங்கிழவர்

ஈட்டமு மெண்ணிரு கோடி யென்பரால்”<sup>10</sup>

Kambarāmāyaṇam describes that the Eastern gate of Lankā was guarded by an army of 16 crores (8 x 2 Crores) of Rākṣasas.

### 2. Niyutam

नियूयते बहुसंख्या प्राप्यतेऽनेनेति । नि + यु + क्त । लक्षम् । इत्यमरः । ३ । ५ । २४ ॥

शतं महस्रमयुतं नियुतं प्रयुतं मतम् । स्त्री कोटिरर्वुदमिति क्रमाद्दशगुणोत्तरम् ॥ इति रत्नकोषः । इति भरतः ॥ दशलक्षम् । यथा –

एकं दश शतञ्चैव सहस्रमयुतन्तथा । लक्षञ्च नियुतञ्चैव कोटिरर्वुद एव च ॥

वृन्दः खर्वो निखर्वश्च शङ्खपद्मौ च सागरः । अन्यं मध्यं परार्द्धञ्च दशवृद्ध्या यथोत्तरम् ॥ इति

वाचस्पत्यम् लक्षसंख्यायां २ दशलक्षसंख्यायां ३ तत्संख्येषु च

“शतं सहस्रमयुतं नियुतं प्रयुतं मतम् । स्त्री कोटि-रर्वुदमिति क्रमाद्दशगुणोत्तरम्” इति रत्नकोषः ।

“एकं दश शतञ्चैव सहस्रमयुतं तथा । लक्षञ्च नियुतञ्चैवकोटिरर्वुद एव च । वृन्दः खर्वो निखर्वश्च शङ्खपद्मौ च सागरः । अन्यं मध्यं परार्द्धञ्च दशवृद्ध्या यथो-त्तरम्” पुराणम् ।<sup>11</sup>

### Southern Gate

नियुतं रक्षसामत्र दक्षिणद्वारमाश्रितम् । चतुरङ्गेण सैन्येन योधास्तत्राप्यनुत्तमाः ॥<sup>12</sup>

A lakh of Rākṣasas with a fourfold force, and with the flower of the soldiery - protect the southern gate.

தென்றிசை வாயிலின் வைகுத் தீயவர்

என்றவ ரெண்ணிரு கோடி யென்பரால்<sup>13</sup>

According to Kamba Rāmāyaṇam, the southern gate of Lankā was guarded by an army of 16 crores of Rākṣasas.

### Western Gate

प्रयुतं रक्षसामत्र पश्चिमद्वारमाश्रितम् । चर्मखड्गधराः सर्वे तथा सर्वास्त्रकोविदाः ॥<sup>14</sup>

A Prayuta of Rākṣasas, bearing swords and shields, and skilled in arms, protect the Western gate.

மேற்றிசை வாயிலின் வைகும் வெய்யவர்க்கு

ஒற்றமு முளவவர்க்க கிரண்டு கோடி மேல்<sup>15</sup>



### Northern Gate

न्युर्बुदं रक्षसामत्र उत्तरद्वारमाश्रितम् । रथिनश्चाश्ववाहाश्च कुलपुत्राः सुपूजिताः ॥  
शतशोऽथ सहस्राणि मध्यमं स्कन्धमाश्रिताः । यातुधाना दुराधर्षाः साग्रकोटिश्च रक्षसाम् ॥ 16

### 3. Arbuda

An Arbuda of Rākṣasas protects the Northern gate. And car-warriors and horsemen-persons honoured and sprung from noble lines – by hundreds and thousands, and irrepressible goblins and Kotis of Rākṣasas, protect the garrison.

An Arbuda is a measurement denoting 1,00,00,000. नियुतं प्रयुतं तस्मादुर्बुदन्युबुदे अपि । 17

வடதிசை வயங்கொளி வாயில் வைகுவோர்

இடையில் ரெண்ணிரு கோடி யென்பரால் 18

The southern gate of Laṅkā was guarded by an army of 16 crores of Rākṣasas.

### Conclusion

Ramayana can be related to measurement in several ways viz., mathematically, architecturally, geographically and morally. A comparative study of measurement in the Valmiki Ramayana and the Kamba Ramayanam reveals that both epics use measurement not merely as a mathematical or physical concept, but as a literary and cultural device to express scale, grandeur, morality, and human experience. The study also shows that ancient systems of measurement—such as yojanas, seasonal calculations, and spatial descriptions—played an important role in shaping the understanding of movement, landscape, and heroic action in both texts. At the same time, the epics extend the idea of measurement beyond the physical world to include the measurement of virtue, devotion, courage, and dharma.

Thus, measurement in both Ramayanas functions at two levels:

1. As a practical element connected with space, time and structure and
2. As a metaphorical tool that communicates ethical and spiritual values.

The comparison highlights how two great literary traditions preserve a shared cultural heritage while expressing it through distinct linguistic, poetic and regional perspectives. Ancient Indian measurement systems were not fully standardized across regions and periods. Different versions of the Ramayana and later commentaries sometimes use different conversions. To conclude, the measurements differ upon the creativity of the writers and the publishers. The study focused on the two books on the literature considering the few points on measurements.

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- [2.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ.
- [3.] Samarāṅgaṇasūtradhāra
- [4.] Śabdakalpadruma

### Footnotes

- [1.] Srimad Valmiki Ramayanam – Balakandam – Sec 5; Sloka - 7
- [2.] Ibid – Yuddha Kandam – Sec 28; Sloka - 38 to 41
- [3.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ. – Pg.462
- [4.] Ibid
- [5.] Ibid
- [6.] Samarāṅgaṇasūtradhāra – Chap 9 – 46 – 49



- [7.] Śivapurāṇa.2.3.14  
[8.] Śabdakalpadruma  
[9.] Srimad Valmiki Ramayanam – Yuddha Kandam – Sec 3 ; Sloka - 24  
[10.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ. – Pg.271  
[11.] Śabdakalpadruma  
[12.] Srimad Valmiki Ramayanam – Yuddha Kandam – sec 3 – Sloka - 25  
[13.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ. – Pg.270  
[14.] Srimad Valmiki Ramayanam – Yuddha Kandam – sec 3 – Sloka - 26  
[15.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ. – Pg.270  
[16.] Srimad Valmiki Ramayanam – Yuddha Kandam – sec 3 – Sloka - 27, 28  
[17.] Samarāṅgaṇasūtradhāra - Chap 9 – 46 – 49  
[18.] கம்ப ராமாயணம் – யுத்த காண்டம் – முதல் பகுதி – வை.மு.கோ. – Pg.270