



Empowering Communities through Bamboo: A Success Story in Northeast India

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Abstract

Bamboo plays a pivotal role in shaping the region's socio-economic and ecological systems because it is an abundant natural resource in Northeast India. Traditionally embedded in local livelihoods, bamboo has gained renewed significance through sustainable utilization and policy support. This study examines the extent to which bamboo based industries contribute to entrepreneurship enhancement and sustainable economic transformation in the Northeastern states of India.

The research addresses how does bamboo cultivation and processing influence income generation and employment opportunities? and how do local initiatives in bamboo entrepreneurship contribute to social empowerment and sustainability?

A mixed method approach was adopted, integrating quantitative data from institutional reports with qualitative insights gathered through field surveys in selected bamboo clusters across Assam and Tripura. The findings indicate that bamboo based enterprises significantly improve household incomes and create employment, particularly for women and marginalized groups. Community led cooperatives have enhanced market access and skill development, though structural barriers such as inadequate infrastructure, limited financing, and fragmented value chains remain. Policy initiatives like the National Bamboo Mission have shown positive but uneven impacts across states.

Overall, bamboo centered interventions have demonstrated strong potential for inclusive growth, sustainable livelihoods, and ecological resilience. The study contributes to the discourse on resource based rural development and offers insights for designing replicable models of community empowerment.

Keywords: Bamboo Industry, Community Empowerment, Sustainable Livelihoods, Rural Development.

Introduction

Bamboo is one of the most versatile and renewable natural resources in Northeast India. The region accounts for a substantial share of India's bamboo reserves and supports a wide range of traditional and modern bamboo based activities (INBAR, 2022; Kakati *et al.*, 2022) ^[1,2]. Historically, bamboo has been closely associated with rural livelihoods, housing, handicrafts, and cultural practices (INBAR, 2022) ^[1]. In recent years, its importance has expanded due to growing concerns over sustainability, climate resilience, and inclusive economic development (INBAR, 2022) ^[1]. Bamboo has a multiple array of high value end uses as commodities. Bamboo can be used to make products such as laminated plywood, flat-pack furniture and activated charcoal (Aizuddin *et al.*, 2023; INBAR, 2022) ^[3, 1]. The huge variety of potential products gives producers a wide range of options, and increases their flexibility in times of market stress (INBAR, 2022) ^[1]. Bamboo's lightweight and linear-splitting nature makes it comparatively easier to process than timber. This provides farmers and entrepreneurs, many of whom are women, with opportunities to engage in initial processing, and this increases their share in value addition (INBAR, 2022) ^[1].

Bamboo's characteristics as a flexible, lightweight and easy to process plant provide equal opportunities for women to participate in a range of economic activities such as farming, manufacturing and value addition. Bamboo Industry enables women's broad economic participation, create job opportunities, diversify income generating opportunities and reduce overall income inequality (INBAR, 2022) ^[1]. Bamboo is gradually being recognized as a globally important biomass resource. Bamboo biomass can be used directly as fuelwood, modified into charcoal for cooking and heating, converted into gas for thermal and electrical energy generation. More than 38% of the world's population is estimated to rely on solid biomass for cooking. However, this wood is often harvested unsustainably and is a principal driver of deforestation in some countries (Kakati *et al.*, 2022) ^[2]. In contrast, bamboo can be harvested in a relatively short period and does not require replanting after harvesting, so it provides a continuous supply of material. Bamboo has great potential to generate thermal energy, as well as electricity, through gasification. It is locally sourced, grows fast and compares well to other forms of biomass for gasification. 1.2 kg of bamboo produces one kilowatt hour of electricity (Munardy,

2018; Qudrat-Ullah, 2023)^[4, 5]. Bamboo supplies millions of households across the world with employment and building materials. It is often used as a fast-growing alternative to timber or other resources, and its products can have a low carbon footprint across their lifecycle. Bamboo reduces pressure on forest resources and can replace cement and plastic in drainage pipes, housing and storage facilities (INBAR, 2022)^[1]. Bamboo is an excellent renewable resource and is often used as a fast-growing alternative to timber. Although taxonomically bamboo is a grass species, some kinds of bamboo grow over a meter a day and mature rapidly, becoming hard and wood-like within a small number of years. As well as being renewable, bamboo products can also have a low carbon footprint across their lifecycle (INBAR trade overview 2022)^[1].

The promotion of bamboo-based industries has emerged as a strategic pathway for enhancing rural incomes and employment while ensuring ecological balance (INBAR, 2022; Nirmala *et al.*, 2018)^[1, 6]. Government initiatives and policy interventions have further reinforced the role of bamboo as a driver of sustainable development. However, empirical evidence on the contribution of bamboo-based industries to livelihood enhancement and socio-economic transformation in Northeast India remains limited (Government of India, 2018; NEDFi, 2020)^[9, 7]. This study seeks to address this gap by examining the livelihood and sustainability impacts of bamboo-based industries in selected Northeastern states.

Overview of the Bamboo Industry in Northeast India

The global bamboo industry is undergoing significant growth, driven by sustainability initiatives, technological advancements, and increasing demand across various sectors. Around 1500 species of cane and bamboo can be found worldwide, with 900 species found in Southeast Asia, which accounts for 65% of the entire bamboo reserve (Salam 2008). In India, cane and bamboo products are traditionally made by tribal and non-tribal community since inception at low cost. The total bamboo bearing area in India is 1, 49,443 sq. km. Madhya Pradesh has the highest bamboo bearing area of 18,394 sq.km. Followed by Arunachal Pradesh with 15,739 sq.km. Maharashtra with 13,526 sq.km. And Odisha with 11,199 sq.km. (ISFR, 2021). As Madhya Pradesh has the highest bamboo bearing area, the tribal communities such as Gond, Baiga and Korku are highly skilled in craft made by cane and bamboo. To meet the demand of modern market the local artisans have skillfully harmonized their knowledge and techniques with new and innovative designs. Most of the cane and bamboo producing centre's are in Shahdol, Balaghat, Mandla and Seoni regions of Madhya Pradesh.

In the context of North East India, According to India State Forest Resource 2017 of Forest survey of India, The North Eastern states of India are home to approx 90 species of bamboo. 28% of land area is covered by bamboo in India out of which 66% of total bamboo produced in India is from the Northeast region (ISFR, 2017). According to ISFR, 2021 Arunachal Pradesh has the highest bamboo bearing area with 15,739 square kilometer followed by Assam with 10,659 sq. km. and Manipur with 8,377 sq.km (ISFR, 2021). Bamboo bearing forest in Assam is approximately 0.895 million Hecter or 5.7% of total bamboo forest. In case of culms the number is 2452 million which is 8.7% of total number of culms of the country making it 14.9 million tones or 8% of the country's total green bamboo weight (ISFR, 2017). As per the report of Directorate of Economics and Statistics (2020-

21), the GDP of Assam is lower than the GDP of India (Directorate of Economics and Statistics, 2021; Government of Assam, 2021). To improve the economy of the state entrepreneurship development along with innovative technologies and creation of livelihood with the help of skill development has been implemented in the state to achieve quality, reliable, sustainable and resilient infrastructure and industrial growth in Assam (NITI Aayog, 2018; National Bamboo Mission, 2019). The Bamboo industry in this region is indulged on generation of employment, empowerment of women and alleviation of poverty in rural areas (Das & Choudhury, 2014; Barooah & Pathak, 2020)^[27, 11]. The artisans of north eastern region of India are blessed with techniques and designs of cane and bamboo handicraft products contributing to cultural and economic sustainability (Singh, 2012; Bordoloi, 2019)^[13, 12]. Over the last few years entrepreneurs are performing excellent role in creating opportunities of employment for unemployed youth and training them with skills which enhances their confidence and self-dependence (Shah 2018; Baruah, 2017)^[14, 15].

Northeast India is endowed with diverse bamboo species and favorable agro-climatic conditions for bamboo cultivation (Das & Choudhury, n.d.; Manghnani, 2020)^[16]. States such as Assam, Tripura, Manipur, and Mizoram have traditionally depended on bamboo for subsistence and economic activities, particularly through cottage industries and informal production systems (Billand *et al.*, 2010; Mishra, 2007). The bamboo industry in the region includes handicrafts, furniture making, construction materials, agarbatti production, and emerging value-added products (Das & Das, n.d.; Manghnani, 2020)^[16]. Despite its potential, the industry has remained largely informal and fragmented, characterized by scattered production units and weak institutional coordination (Singha *et al.*, 2025; Baruah, 2007)^[19, 20]. Constraints such as inadequate infrastructure, weak market linkages, limited access to finance, and low technological adoption have restricted its growth (Das & Das, n.d.; Kakati, 2025)^[23]. Recent policy measures, particularly the National Bamboo Mission, aim to strengthen the bamboo value chain by promoting cultivation, processing, and entrepreneurship (Tiwari & Pant, 2018; Singha *et al.*, 2025)^[22, 19]. The effectiveness of these initiatives varies across states, reflecting differences in institutional capacity and local implementation (Baruah, 2007; Kakati, 2025)^[20, 23].

Review of Literature

The related literature provided insight into the various aspects of the problem defined for the study. The studies have been undertaken by scholars on aspects like problems and prospects, growth and development, policies and dimensions of sustainable development. As per the nature and scope of these studies, only the major works that have bearing on the entrepreneurship and sustainable development of cane and bamboo industry were reviewed.

Mitra (1998) has conducted a study on environment and sustainable development. It is observed from the study that the knowledge and experience of local people have to be preserved and utilized towards achievement of sustainable development goals. In hilly state like Arunachal Pradesh sustainable development can be achieved by developing tourism industry, handloom industry, food processing industry, cane and bamboo industry rather than development un-sustainable industries which leads in deforestation and over exploitation of forest resources.

Oltra and Jean (2005) the paper presents a framework for the

analysis of environmental innovation which is based on the evolutionary approach of technological change. This framework enables us to tackle the main features and peculiarities of environmental innovations, in particular of clean technologies. Our conceptualization is inspired from empirical case studies in the chemical and metallurgical industries. The crucial issue is to apprehend the impediments to the development and to the adoption of clean technologies in order to draw some policy implications. The current action plan on environmental technologies recently adopted by the European Commission brings out the fact that many different types of policy instruments need to be used to accelerate the uptake of environmental technologies, not only to take into account all the determinants of innovation and adoption of new technology but also in the context of wide stakeholder consultation.

Singh (2006) discovered an important gap between the supply and demand for bamboo. Low bamboo resource productivity, a lack of high-quality planting stock, inadequate stocking, excessive harvesting, improper harvesting methods, and a lack of scientific innovation in plantations are the primary causes of the gap.

Abrahamsson (2006) has evolved of the term "Sustainopreneurship" by merging entrepreneurship with ecological development. The concept of sustainopreneurship has emerged from sustainability entrepreneurship, ecopreneurship and social entrepreneurship to solve problems related to issues of sustainability. According to him the features of sustainable entrepreneurship are social responsibility, competitiveness, progressiveness, knowledge creation and usage, innovativeness and dynamism.

Salleh M.N. (2008) has found that the cane resources in the natural forest are in a depleting state and the problem is persistent worldwide. The study calls for institutional reforms to transform age old forest policies as well as establishment of Cane Development Corporation by government with private sector involvement for the development of this sector.

Gupta and Kumar (2008) proposed that utilization of bamboo in construction industry will contribute in sustainable development and protection of environment. Along with social and cultural growth bamboo industry has potential of sustainable development. The entrepreneurs in bamboo industry are able to develop themselves with the help of central government and state government schemes and sale their products in other countries.

According to Mishra (2010) adding value to bamboo in bamboo processing facilities might help reduce poverty and give bamboo craftspeople in isolated parts of Chhattisgarh. Women make up over half of the artisans, and the extra money they make is used to support their families. Using more training, skill development, and marketing, the extra money can be utilized to improve health and education, leading to a better quality of life. Bamboo could therefore be utilized as a raw material to create value-added goods that can provide jobs and revenue.

Rashid A. (2012) has found that, the availability of credit is one of the critical weaknesses in the industrial development of Garo Hills. The various financing indicators showed that despite banking facilities, the level of financial outreach is low in Garo Hills. The main constraints for banking and financial development are hilly trait of the districts, sparse population settlements, poor infrastructure, small size of market, lack of entrepreneurship, law and order conditions, peculiar land tenure system, low banking network, lack of simple, customize and flexible financial products to suit the

needs of the local population, poor loan recovery experience, lack of awareness of banking services and inadequate payment system.

Handique (2014) has proposed that cane and bamboo industry of Assam can be developed by improving the infrastructure facility and government policies that give financial support and skill development training. In urban areas of Assam cane and bamboo craft is an important sector for income generation which consists of cane and bamboo furniture, decorative items etc.

Shah (2018) ^[14] conducted a study on sustainable entrepreneurship and ecopreneurship and found that most interviewed entrepreneurs had little formal work experience. Very few of the entrepreneurs are selling their products with the help of intermediaries outside the state. The artisans of Tripura have used new innovative technology to improve their products and maintaining sustainable entrepreneurial practices.

According to Goh, *et al.* (2019) the countries where weather is hot and humid the bamboos are attacked by fungi which lead to degradation. Therefore treatment of bamboo is must to improve the durability of bamboo. The treatment generally eliminates the sugar and carbohydrate which attract fungi and insect but the treatment is insufficient for bamboo used in construction.

Sawarkar, *et al.* (2020) conducted a study on 27 commercial species of bamboo in India. In this study the area of application, turn over, export and support from state and central government were determined. It is found that India has bamboo forest more than China which is of great advantage and can export bamboo product all over the world but the bamboo entrepreneurs have to focus on products that have more demand in international market. Therefore with the help of sustainable development there is enormous opportunity for the bamboo entrepreneurs to expand their market in all over the world.

Therefore, it should be noted that the sustainable use of resources is essential to eliminate further degradation of the environment. The above cited reviews of literature have concentrated in one part or another area of sustainable development and cane & bamboo industry. No comprehensive study has been carried out in the state of Assam on sustainable development of cane and bamboo entrepreneurs of Assam.

Thus, keeping this in view, the study aims to fulfill the following objectives and hypothesis:-

Objectives of the Study

The study aims to:

- i). Examine the contribution of bamboo-based industries to income generation and employment.
- ii). Assess the role of bamboo entrepreneurship in social empowerment and sustainability.

Hypotheses

Bamboo entrepreneurship contributes negatively to social empowerment and sustainability.

Research Methodology

A mixed-method research design was adopted. Quantitative data were collected from institutional reports, government publications, and structured household surveys. Qualitative data were gathered through interviews and focus group discussions in selected bamboo clusters in Assam and Tripura.

A stratified random sampling method was used to select 240 respondents engaged in bamboo cultivation and processing. Statistical tools such as descriptive statistics, paired *t*-tests, and chi-square tests were employed to analyse income, employment, and participation outcomes.

Analysis and Discussion

The socio-economic profile of the respondents engaged in bamboo-based activities in Assam and Tripura. The distribution indicates that 55.0 percent of the respondents were male, while 45.0 percent were female, reflecting substantial participation of women in the bamboo sector. A majority of respondents (51.7 percent) belonged to the economically active age group of 30–50 years, followed by respondents below 30 years and above 50 years, each constituting approximately one-fourth of the sample. With respect to social composition, 43.4 percent of the respondents belonged to SC/ST communities, followed by OBCs (30.8 percent) and the general category (25.8 percent). This highlights the inclusive nature of bamboo-based livelihoods and their relevance for marginalised social groups. Overall, the socio-economic profile suggests that the bamboo industry plays an important role in supporting productive employment among socially and economically vulnerable populations.

Table 1: Income and Employment Analysis

Pair	Mean Difference	Std. Deviation	Std. Error Mean	t	Df	Sig. (2-tailed)
Income before – Income after	-44,310	10,720	692	-6.42	239	0.000

A paired *t*-test was conducted to compare income before and after participation in bamboo-based activities. The results indicate a statistically significant increase in income ($t = 6.42$, $p < 0.01$). Employment generation was also significant, with women accounting for over 45 percent of total employment in bamboo enterprises. The paired samples *t*-test shows a statistically significant difference in household income before and after participation in bamboo-based activities ($p < 0.01$).

Table 2: Social Empowerment and Sustainability

Test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.76	1	0.000
Continuity Correction	17.84	1	0.000
Likelihood Ratio	19.35	1	0.000

Chi-square analysis revealed a significant association between participation in bamboo cooperatives and access to skill training ($\chi^2 = 18.76$, $p < 0.05$). Respondents reported improved decision-making power and community participation. Bamboo-based activities also promoted sustainable resource use through regulated harvesting and plantation practices. This indicates a significant association between cooperative membership and access to skill training.

Major Findings of the Study

Based on the analysis and interpretation of primary and secondary data, the study arrives at the following major findings:

- i). Bamboo-based industries have a significant positive impact on household income. Statistical results confirm a substantial increase in income levels after participation in

bamboo-based activities, indicating their effectiveness as a livelihood enhancement mechanism.

- ii). The sector generates considerable employment opportunities in rural areas. Both men and women benefit from bamboo-based enterprises, with notable participation of women, highlighting the inclusive nature of the industry.
- iii). A large proportion of participants belong to socially marginalised groups, particularly SC/ST communities. This demonstrates the relevance of bamboo-based livelihoods for promoting social inclusion and reducing economic vulnerability.
- iv). Cooperative membership plays a crucial role in enhancing access to skill training and institutional support. Statistical association confirms that organised participation strengthens capacity building and social empowerment.
- v). Policy initiatives, particularly the National Bamboo Mission, have contributed positively to the development of bamboo-based industries. However, the impact remains uneven across regions due to differences in infrastructure, implementation capacity, and awareness.
- vi). Inadequate infrastructure and limited access to finance are the most severe constraints faced by bamboo-based enterprises. Fragmented value chains and insufficient market information further restrict productivity and value addition.
- vii). Sustainable harvesting and cultivation practices are not uniformly adopted. This poses risks to long-term resource availability and ecological balance.

Recommendations

In light of the findings, the following recommendations are proposed to promote the sustainable development of the bamboo industry in Assam and the wider Northeastern region:

- i). Integrated bamboo value chains should be developed by strengthening infrastructure for processing, storage, and transportation. Cluster-based development models can enhance efficiency and market competitiveness.
- ii). Access to institutional finance must be improved through targeted credit schemes, subsidised loans, and inclusion of bamboo enterprises under priority sector lending.
- iii). Skill development programmes should be expanded and tailored to local needs. Emphasis should be placed on advanced processing techniques, product design, and quality standards.
- iv). Cooperative and producer-based organisations should be promoted to improve collective bargaining power, market access, and knowledge sharing among artisans and entrepreneurs.
- v). Policy implementation should be decentralised and region-specific. Regular monitoring and impact evaluation of bamboo-related schemes are necessary to ensure equitable outcomes.
- vi). Sustainable cultivation and harvesting practices must be encouraged through training, certification, and incentives. This will ensure ecological sustainability and long-term raw material availability.
- vii). Market linkages should be strengthened through digital platforms, branding initiatives, and participation in national and international trade fairs.

Conclusion

The study concludes that bamboo-based industries possess significant potential to drive sustainable livelihoods and

inclusive economic transformation in Assam and other Northeastern states of India. Empirical evidence from the analysis confirms that participation in bamboo-based activities leads to improved income levels, enhanced employment opportunities, and greater social empowerment, particularly for women and marginalised communities.

However, the realisation of this potential is constrained by infrastructural deficiencies, limited access to finance, fragmented value chains, and uneven policy implementation. Addressing these challenges requires a coordinated and integrated approach that aligns economic objectives with social equity and environmental sustainability.

In conclusion, the sustainable development of the bamboo industry should be recognised as a strategic component of regional development planning. With appropriate institutional support, policy coherence, and community participation, the bamboo sector can emerge as a resilient, inclusive, and environmentally responsible contributor to the regional economy. The findings of this study provide valuable insights for policymakers, practitioners, and researchers seeking to promote resource-based sustainable development models.

References

1. International Bamboo and Rattan Organisation (INBAR). Trade overview 2022: Bamboo and rattan. INBAR; 2022. Available from: <http://www.inbar.int>
2. Kakati U, Sakhiya AK, Baghel P, Trada A, Mahapatra S. Sustainable utilization of bamboo through air-steam gasification in downdraft gasifier: Experimental and simulation approach. *Energy*. 2022;254:124XXX.
3. Aizuddin K, Lai KS, Baharum NA, Yong WTL. Bamboo for biomass energy production. *Bioresources*. 2023;18(1).
4. Munardy DT. Life cycle assessment and techno-economic analysis of electricity from community-based bamboo gasification in a rural and remote island of Indonesia [dissertation]. 2018.
5. Qudrat-Ullah H. Bamboo gasification for sustainable energy and rural development. In: Handbook of renewable energy and sustainable development. Springer; 2023.
6. Nirmala C, Bisht MS, Laishram M. Bioactive compounds and value addition in bamboo: A review. *International Journal of Food Science & Technology*. 2018;53(3):534–544.
7. NEDFi (North Eastern Development Finance Corporation Ltd.). Bamboo sector in North East India: Opportunities and challenges. 2020. Available from: <http://www.nedfi.com>
8. Forest survey of India. Available from: <http://www.fsi.nic.in>
9. NITI Aayog. Strategy for new India @75. Government of India; 2018. Available from: <https://www.niti.gov.in>
10. Das MK, Choudhury A. Bamboo and bamboo-based industries: Its economic prospects, potentiality, challenges and problems in North-Eastern region of India. IJSSR. Available from: https://www.ijssr.com/wp-content/uploads/journal/published_paper/volume-2/issue-6/IJSSR30752.pdf
11. Baroah P, Pathak R. Role of bamboo industry in rural employment and poverty alleviation in North East India. *International Journal of Rural Development Studies*. 2020;7(2):45–56.
12. Bordoloi R. Traditional bamboo and cane crafts of Northeast India: Cultural heritage and livelihood significance. *Indian Journal of Traditional Knowledge*. 2019;18(4):742–750.
13. Singh S. Bamboo handicrafts of North East India: Prospects and challenges. *Asian Journal of Home Science*. 2012;7(2):312–316.
14. Shah A. Role of entrepreneurship in employment generation and skill development in India. *International Journal of Research in Economics and Social Sciences*. 2018;8(5):89–96.
15. Baruah B. Entrepreneurship development and youth empowerment in Assam. *Journal of Entrepreneurship & Development Studies*. 2017;6(1):23–35.
16. Manghnani R. Bamboo and bamboo products. In: Cross-Border Value Chains. Academia.edu; 2020. Available from: <https://www.academia.edu/download/101840071/K880466.pdf>
17. Billand A, Demenois J, Garcia C, Lescuyer G. Assam project on forestry and biodiversity conservation. HAL Archives; 2010. Available from: <https://hal.science/hal-01690327/document>
18. Mishra SK. Recent trend of village and small enterprise sector: Exploring and exploiting its opportunities in the North Eastern Region of India touching upon its profile and barriers. SSRN; 2007. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=997310
19. Singha YM, Borkotoky DK, Devi SB. Sustainable local markets through public procurement of innovation: Comparative insights from Assam's handloom and Tripura's bamboo sectors. International Conference on Sustainable Systems and Social Management; 2025. Available from: <https://www.atlantispress.com/proceedings/icsssm-25/126020159>
20. Baruah S. Postfrontier blues: Toward a new policy framework for Northeast India. University of Hawai'i; 2007. Available from: <https://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/3521/PS033.pdf>
21. Das M, Das AK. Factors affecting success and failure of bamboo products in North-East region of India. ResearchGate. Available from: <https://www.researchgate.net/profile/Monikuntala-Das/publication/383464479>
22. Tiwari BK, Pant RM. Shifting cultivation: Towards transformation approach. North Eastern Regional Centre, Ministry of Panchayati Raj; 2018. Available from: <https://www.researchgate.net/publication/348436585>
23. Kakati BK. Organic farming in Northeast India: Barriers and prospects. *Organic Agriculture*. 2025. Available from: <https://link.springer.com/article/10.1007/s13165-025-00515-7>
24. Das M, Rahman F. Bamboo-based livelihoods and rural development in Northeast India. *Journal of Rural Development*. 2017;36(2):213–228.
25. Nath AJ, Das G, Das AK. Bamboo-based agroforestry systems and their role in rural livelihoods. *Forest Policy and Economics*. 2009;11(7):467–474.
26. Singh R, Kumar S, Dey A. Constraints in bamboo value chains in India. *Indian Journal of Forestry*. 2016;39(1):1–9.
27. Das MK, Choudhury A. Bamboo resources and socio-economic development in North East India. *International Journal of Scientific and Research Publications*. 2014;4(3):1–6.