IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Impact Factor: 7.53

Volume 4, Issue 3, January 2024

An Evolution of Fishery Technology Innovation for Sustainable Resource Management

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Abstract*: While working on the management of fishery practise, it is crucial and essential to turn commercial or financial fisheries towards maintainability. People need to adapt and understand the significance and relevance of sustainable management. In fisheries, more projects are anticipated for MSY (Most Extreme Sustainable Yield) than for MEY (Most Extreme Financial Yield). Satchel seining, long-lining, gear boats, big fishing nets, and fishing during the breeding season close to marine animals that are in danger can also protect birds, sea turtles, and other fish species. Due to the progress of fisheries innovation, the ability to manage food to realize a stable supply of seafood is maintained by terrible fishing methods that cannot be replaced. However, depending on the region, the need for creative work (research and development) in fisheries development varies due to the availability of fish resources, ecological issues, and differences in consumer preferences for seafood. This study uses data on permits granted to examine trends in advances in fishing technology as an indication of changing research and development requirements. To account for differences in R&D needs, we use a decay research structure that classifies fisheries advances into three groups: collecting, hydroponics and new.*

Keywords: Fishery, technology, sustainable, management, environments

I. INTRODUCTION

Fish and other aquatic products are essential to a healthy diet and are generally an important food source for many people. Because marine fisheries are temporary, harvesting and storage conditions have a large impact on stocks. give Moreover, the fisheries Isa product is in a region where data asymmetry plays a large role, similar to where the article starts. Demand for seafood is expected to continue to increase in the future due to population growth in agricultural countries and rising per capita consumption in China and other emerging countries. The analysis estimates her per capita supply of food fish in China, India and Brazil by 2025, the target year for global improvement in maternal, newborn and infant nutrition set out in the Rome Declaration on Nutrition. is expected to increase her by 19.5%. 11.7% and 32.3% respectively. This trend is expected to dramatically increase consumer interest in fish and seafood.

India has a variety of water resources and supports a sizeable fishery in the country. With an elite currency zone (EEZ) of 2.02 million km2 and a continental shelf of 530,000 km2, India has 8,118 km of coastline. India also has vast water bodies with over 740,000 hectares of water and more than 1,90,000 km of inland springs. There are 1.24 million hectares of brine available for hydroponics, but only her 165,000 hectares have been developed. An estimated 7.6 million tonnes of fish were produced by Indian fisheries in 2009 (Indian Authority 2010). The marine subsector produced 2.99 million tonnes, or about 39% of the total fish stock. Historically, fish have been an important source of animal protein for her over one billion people worldwide. Marine and inland fisheries provide 66% of the total food supply. The remainder comes from hydroponics (FAO, 2002). Sustainable fishing means keeping enough fish in the oceans, protecting the environment, and ensuring that the people who depend on fishing can continue to work in the industry. Sustainable fisheries management cannot be achieved without recognizing that the long-term goals of fisheries management are equivalent to conservation goals. Freshwater hydroponics, inland fisheries, and beach hydroponics all served as representatives of the balance known as inland fisheries. It was mostly known as an inland fishery. Nearly 5% of the fish produced worldwide comes from India.

Fisheries management is a broad phrase that describes the process of keeping track of fish stocks that have been overfished. Fisheries management pertains to a variety of fish species that exist in varied settings and contain various political structures, clientele groups, and local and social customs.

1.1 What Is Fishing Limit?

In general, a vessel (or fleet) may set limits on fishing activity (vessel, potential effort) or returns (potential catch) for an indeterminate period of time. When examining limits, fisheries researchers typically focus on the relationship between catch (days fished, number of nets used, etc.), fishing mortality, and MSY. There is an oversupply catch limit when total mortality exceeds MSY. The number of vessels (or total propulsion), typical fishing days, and yields are usually limited by fisheries managers for conservation purposes.Limits are regularly measured by financial specialists in light of the prospective fishing produce and enhancing net advantages.

1.2 Creation of Gujarat's Marine Fishing Area:

Gujarat's marine fishery is divided into three distinct sub-areas: (I) traditional inshore fishing using non-automated conventional gear; (II) the automated sub-area using minimally mechanised and motorised boats; and (III) remote ocean fishing using maritime vessels. The cornerstone of Indian fisheries, which account for 67% of the current fish production, has been the use of boats without any kind of motorization. The small mechanised and powered boats make up around 32% of the total marine catch, whilst deep-sea vessels have only had the chance to make up about 1% of it. Over a period of thirty years, the Indian marine fisheries area gradually transformed from a resource-based diversion to an industry, mostly because to the support of the State and the development of specialised techniques. The nation's marine fish production increased thanks to the introduction of automation and the development of the armada, rising from 0.53 million tonnes in 1951 to 2.96 million tonnes in the years 1996–1997, the highest creation revealed to date (Anon-2002). The creation has reached a certain degree, and the reaping efforts, particularly in the inshore seas, have almost reached a point of immersion. In addition to making due with the inshore resources in a sustainable manner, the endeavours should pack in the pelagic assets of the inshore and seaward regions for further development in marine fish creation. Without creative state intervention and technological backing, it is a daunting task for Indian anglers in the current crossroads to tackle the remote ocean and high ocean assets to their full potential. Without a question, the declaration of the EEZ presents an opportunity for the Indian fishing sector to fully maximise its asset potential.

1.3 Customary Management of Fisheries:

Fisheries management in general, like the science that underpins it, is "poorly focused on target populations and consequently fails to represent the impacts of biological systems that lead to reduced species richness and biodiversity." , and the contemplation of fishing has been misshaped. The industry as "the only genuine customer and de facto owner of living marine assets." Stock assessment researchers worked mostly in government laboratories and thought their findings could help fisheries.The majority, if not all, of the connection between the researchers and the science that identified the difficulties was minimised by these researchers, who also ignored protection issues. Even though commercial fish stocks were declining, this occurred, and surprise, several legislators had signed agreements restricting preservation.

II. STATUS OF MARINE FISHERIES ASSETS

The assets of the marine fisheries as an illustration of accessibility and dispersion. Follow a typical example of tropical waterways in India. The fisheries asset is made up of a wide variety of animal kinds that coexist in the same fishing area (between 15 and 70 species at the extremes and about 1000 types of shellfish). More than 200 finfish and shellfish species with significant economic value are caught in the mum-species fishery. A significant assortment includes pelagic groups such as sardines, anchovies, mackerel, karangids, Bombay duck, ribbonfish, rodfish and fish. Schools of bottom fin fish including sharks, beams, sciaenid's, roosts, silver gizzards, lizards and catfish. Scavengers such as penades. The abundance of these stocks varies by location and season, with mackerel supporting a significant fishery along southwest and southeast drifts, and large pelagic fish more common in island regions. Especially roosting in bay-at-way, pork straights and wedge banks are common, but Bombay duck and non-penai shrimp constitute a respectable

DOI: 10.48175/IJARSCT- 15586T

fishery along the northwest coast. Oil sardines, mackerel, bombay duck, ribbonfish, karangids, roosts, crows, shrimps and cephalopods are some of the species/bunches that contribute to his annual catch of over 100,000 tons.

2.1 Sustainability:

A typical internationally recognized goal of asset management is sustainable improvement, accepted in UNCED 1992. A fundamental principle governing the sustainable development of fisheries is that they should be managed in a way that does not encourage overfishing. In addition, fishing operations should be set to influence bio resource composition, efficiency, productivity and organic diversity.Concerns regarding the manageability of Indian fisheries are raised by the overall stagnation in marine fish creation during the past ten years.

The important problems that need to be solved to conquer stagnation and decrease in marine fish creation in India are distinguished as:

• Open access, unregulated fisheries. Excessive capitalisation and an unwarranted burdensome limit.

• Unreasonable fishing pressure on species with deteriorating patterns in their perpetual catch rates in coastal zones up to around 50 m below the surface.

• Reduction in the area that a dynamic fisherman or boat can access in the shoreline waterways to direct fishing activities.

• A lack of motivation among corporate visionaries to expand fishing into deeper waters.

• By reducing the cross section size and bringing about disposals, disposes of/unpredictable mistreatment of adolescents/sub-adults of several economically significant species.

• Damage to Benthic Organisms and Benthic Ecosystems by Shrimp Fishing Vessels constant clearing of an area resembling this one, frequently wiping off the food chain of species that can be used for industrial purposes.

• Dissipate and intra-sect oral disputes between different classes of fisherman, particularly between elite and automated groups of anglers, and Seaside Fishery Assets of India - Preservation and

• Sustainable Usage also among individuals engaged in seaside hydroponics and beachfront specialty fishing.

• Reap promotion after gathering losses.

• Degradation of the biological system, which affects the efficiency and the carrying capacity. threats from natural disasters and changes in the environment. Fisheries management without participation is absent

III. MATERIAL METHOD

We used the degradation study structure to identify changes in factors associated with approval of mechanized fishing licenses. For decay analysis he uses three specific groups of techniques: gathering techniques, hydroponics techniques, and new item techniques. Three criteria were used to classify licenses issued in the field of fishing technology. The specific need for fishing technology (NEED), the importance of fishing technology in all licenses issued (FISHERY), and the scope of research and development activities (SCALE).

Dividing the amount of each specific group of fishing technology licenses granted by the total number of fishing technology licenses issued yields the percentage of the specific fishing technology licenses granted within the total, which defines the demand marker. It's a way. This indicator increases when the number of specific fishing technology licenses issued grows faster than the total number of fishing technology licenses issued. This indicates that the developers are concentrating their research efforts on these specific technical areas. Additionally, the fishing marker is defined as the total number of fishing technology licenses issued divided by the total number of licenses issued, giving the percentage of all fishing technology licenses issued within the total number. This indicator increases when the total number of licenses issued for fishing techniques grows faster than the total number of licenses issued. This suggests that developers are concentrating their research efforts on advancing fishing technology.

Finally, the SCALE pointer is described as being the most comprehensive of all licenses issued, covering a range of research and development projects. Assuming all licenses are fully granted, SCALE increases. As the SCALE score increased, the number of licenses issued for the advancement of the fishery increased due to an increase in research and development activities in general. Here, we propose a degradation technology that uses the collected patented technology as a specific license for fishing technology (see Table 1). This corresponds to the view of Ang et al. Produces a logarithmic mean division record (LMDI). Total number of fisheries technical permits issued (FTECH) and all of the licences granted (All out) are deducted from the number of gathering technology licences permitted (Reap), as in Condition (1).

$$\boldsymbol{HARVEST = HARVEST\ FTECH \times FTECH\ TOTAL \times TOTAL = PRIORITY \times FISHERY \times SCALE}$$

According to An et al. I got equation (2) using the logarithm function. Whereωt

$$(\mathbf{HARVEST}^{t} - \mathbf{HARVEST}^{t-1})/(\mathbf{InHARVEST}^{t} - \mathbf{HARVEST}^{t-1})$$

$$\mathbf{HARVEST}^{t} - \mathbf{HARVEST}^{t-1} = \mathbf{HARVEST}^{t-1}$$

$$= w_i^t in\left(\frac{PRIoRITY^t}{PRIoRITY^{t-1}}\right) + w_i^t in\left(\frac{FISHERY^t}{FISHERY^{t-1}}\right) + w_i^t in\left(\frac{SCALE^t}{SCALE^{t-1}}\right)$$

As a result, changes in demand (1st term), fisheries (2nd term), and scale (3rd term) reduce the number of permits granted to Gathering Progress (CROP) (3rd term). The term "tin work" is used as the additional weight of fabric in determining the estimated number of licenses required to collect innovation. Further change the LMDI in review. We define this ratio as the percentage increase in the number of issued licenses over the base year (t0).We alter Condition (2) to in order to breakdown the change proportion (3).

$$change\ ratio^{\,t,t_0} HARVEST = \frac{HARVEST^t - HARVEST_0^t}{HARVEST_0^t} = \frac{\Delta HARVEST^{t,t_0}}{HARVEST^{t_0}}$$

$$= \omega_I^t\ in\left(\frac{PRIORITY^T}{PRIORITY^{T-1}}\right) \times \frac{1}{HARVEST} + \omega_I^t\ in\left(\frac{FISHERY^{\,t}}{FISHERY^{\,t-1}}\right) \times \frac{1}{HARVEST}$$

$$+ \omega_I^t\ in\left(\frac{SCALEL^t}{SCALEL^{t-1}}\right) \times \frac{1}{HARVEST}$$

The findings of the disintegration analysis can reveal the relative change over a range of time periods, which is one advantage of using the change proportion. In this paper, we suggest a patent decay system to acknowledge the shift in importance between the requirement for clear advances in fishing technology and the need for comprehensive advances in fishery technology.

IV. DATA

We used licensing authorised PATENTSCOPE information provided by the World Protected Innovation Association (WIPO). The PATENTSCOPE data set includes information on more than 56 million licences granted between 1978 and 2015. Table S2 in the supporting materials lists the information inclusion by country and time period.

In accordance with the Association for Monetary Co-activity and Advancement (OECD) directive, we decided on licensing for fisheries technologies. We used a patent dataset from 1993 to 2015 because PATENTSCOPE information inclusion for Japan, a prominent fishing technology trend-setter, started after that year (see Table S2). In keeping with Fujii, as well as Fujii and Managi, We categorized technology groups using only basic IPC codes to avoid including patent information twice in each technology group.

It is important to note that access to patent information is limited. Access to patent information is available if the target country has a patent registration system that all emerging countries do not have. Therefore, looking up patent information is not a good way to judge how advanced these countries are.

V. RESULT AND DISCUSSION

5.1 Pattern in Fishery Technology Licenses Conceded

The state-protected Innovation Bureau of the People's Republic of China has issued 50,914 fishing technology licenses in China (see Table 2). China, South Korea and Japan handle 67.75% of the world's fishing technology licenses issued, with China having the largest supply (42%). National characteristics have had a significant impact on the pattern of licenses granted. In Korea and Japan, the percentage of harvesting licences is greater than 50%, although China has a sizable percentage of hydroponics technology licences.

Country and Region	Fisheries Technology Patents		Breakdown by Technology Type (%)		
	Number of Patent Granted (items)	Share (%)	Harvesting	Aquaculture	Products
China	60,110	44.08%	44%	76%	5%
Korean	16,880	15.16%	59%	50%	6%

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Volume 4, Issue 3, January 2024

Japan	16,313	13.69%	60%	56%	6%
World	131,160	200.00%	40%	64%	6%

Table 1: Patents on fishing technique issued in nations in North East Asia between 1993 and 2015.

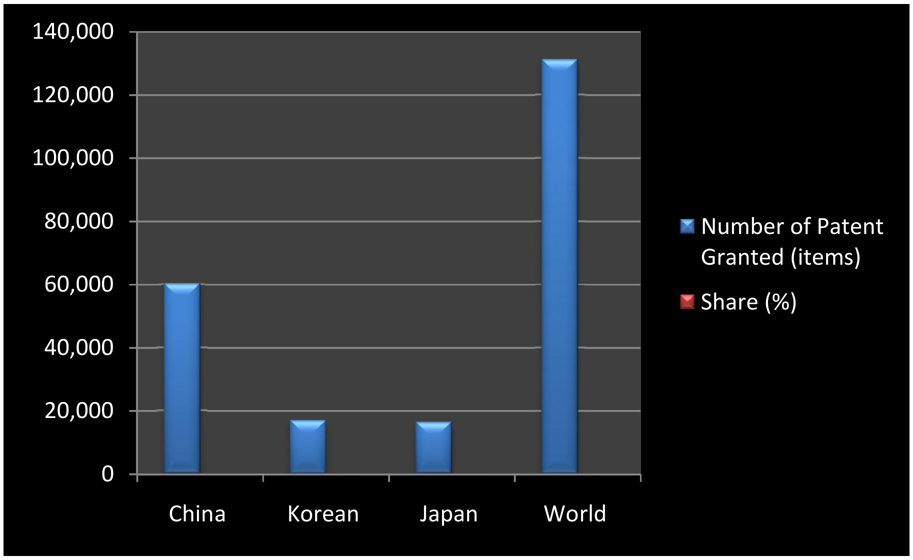

Figure 1: Patents on fishing technique issued in nations in North East Asia between 1993 and 2015

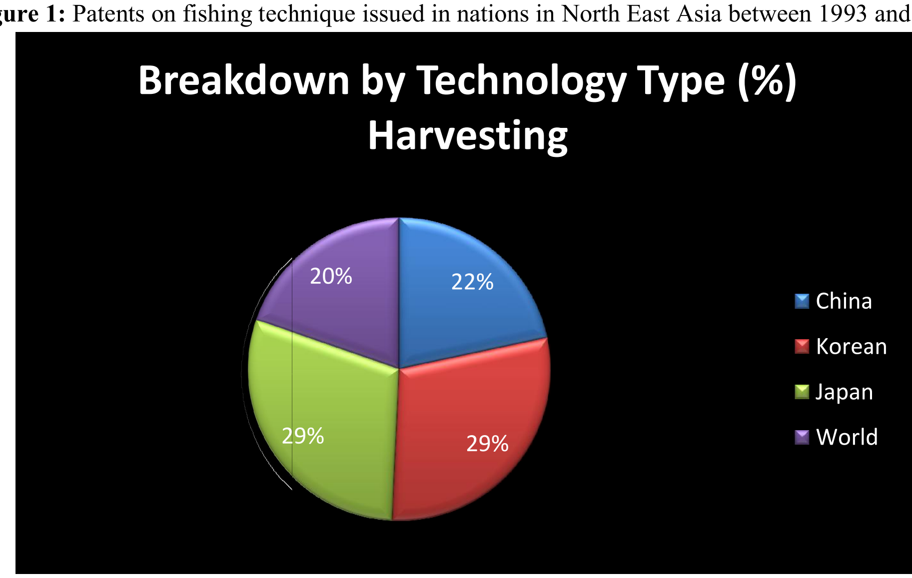

Figure 2: Patents on fishing technique issued in nations in North East Asia between 1993 and 2015

In each of the three mechanical groups, The number of fishing technology licenses issued has grown rapidly (see Table 1). This rapid development has been driven by an increase in licenses issued in China. In particular, the number of hydroponics licenses issued has increased significantly recently. One way he interprets the findings is that China's patent filing rules changed in 2001 and 2009, making it easier for Chinese companies to apply for patents thanks to sponsorship programs.

5.2 Results of Decomposition Analysis

Figures 1-3 show Results of degradation analysis of granted explicit fishing technology licenses. The graph shows the different types of licenses available for purchase depending on the type of trapping technology. The rise in Figures 1-3 shows the evolution of the number of collection technology licenses issued for 1993. The bar graph shows the impact of the three negative factors on the rate of change in licenses eligible for ongoing collection, with the graph line showing the percentage. Changes to Permitted Collection Technology Licenses. The value of the drawn line and the number of bars match exactly. Tables 4-6 show the results of the national degradation survey. Useful resources also include patent portfolios in Figures S1-S3. We then examined whether the rate of technological progress varied across countries and over time.

5.2.1. Collecting Technology

Figure 1 shows the results of a decomposition analysis of licenses granted to capture innovation.From 1997 to 2004, collect licences increased, remained largely stable until 2011, and then significantly increased a short while thereafter. The degradation analysis reveals that an increase in the demand for fishery advancements as well as an increase in R and D activity served as the primary drivers of the growth in collect licences from 1997 to 2004. (see bar graph in Figure 1). Gathering licences in Korea quickly increased during this time (see Table 3). The demand for gathering advancements, in contrast to the other two shattered variables, remained somewhat unaltered throughout the interim. This finding suggests that the licences granted for collecting innovations should follow a similar pattern to the licences granted for entire fisheries technologies (i.e., Collect/FTECH is largely stable). The rate of change is consistent from 2004 to 2012, while the factors that drive innovation in collect technology patents fluctuate, especially between 2009 and 2011. Following 2009, the demand for collection technology decreased while the demand for fisheries innovations increased, showing that the focus of R and D needs shifted from collecting breakthroughs to other fishery innovations. After 2012, this trend grew more grounded. It should be noted that a disintegration app can be used to detect these basic changes in the requirement and scale aspects.

Year	Priority of harvest tech	Priority if fisheries tech	Scale of R & D activity	Change of harvest patent
1993	-101	-110	-109	-110
1994	-103	-101	-102	-101
1995	-102	-112	-111	-112
1996	-104	-102	-103	-102
1997	-102	-107	-109	-107
1998	-105	-106	-105	-106
1999	0	0	0	0
2000	112	111	112	112
2001	110	109	110	110
2002	115	114	113	115
2003	112	113	115	112
2004	104	105	112	104
2005	105	109	116	105

Table 2: Patent decomposition studies for harvesting technology patents

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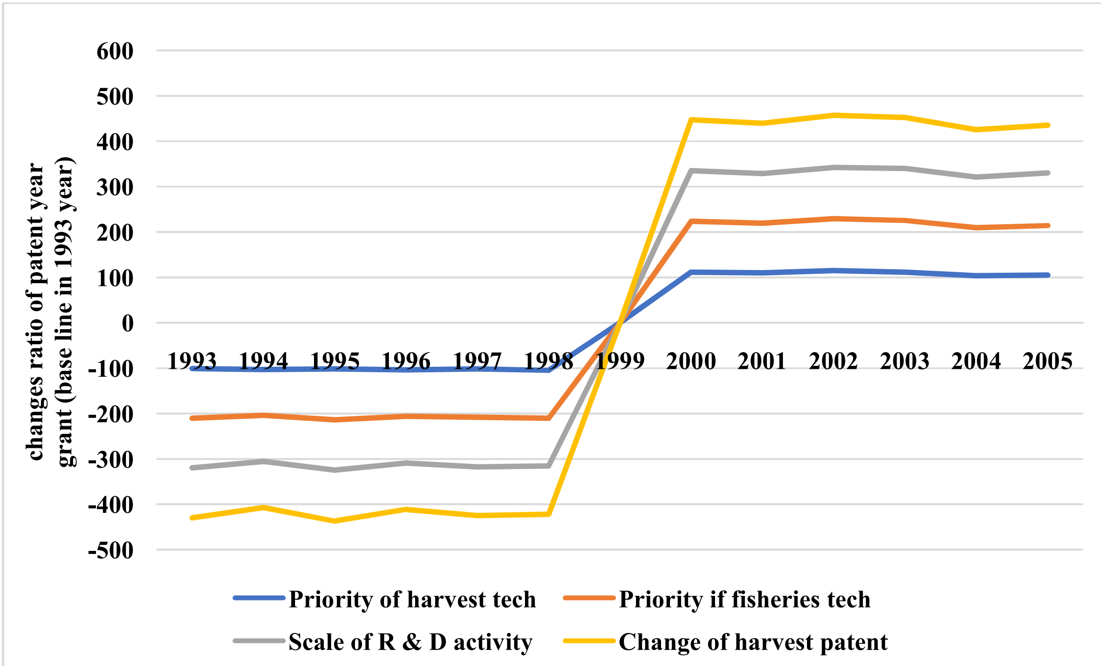

Figure 3: Patent decomposition studies for harvesting technology patents

Results for China and the rest of the world are shown in Table 4. This shows that adding the need for collection technology and the need for fishing technology yields little. This proves that the growth rate of collective licenses issued is the same as the growth rate of all licenses approved. As a result, the expanding scope of R&D in China and the rest of the world is undoubtedly responsible for the increase in collective licenses granted.

	Change in harvesting Tech	Decomposed Factors			Most Increased patent Technology (IPC)
		Priority of Harvesting tech	Priority of fisheries Tech	Scale	
China	2044	1304	1226	2019	Accessories for angling (A01K97)
Korean	117	1315	-203	560	Accessories for angling (A01K97)
Japan	99	229	276	-269	Reels (A01K89)
World	2425	-2588	3618	3389	Systems using the reflection of acoustic waves (G01S15)

Table 3: Analysis of the decomposition of harvesting patents issued between 1993 and 2015

Another discovery is that Japan and Korea exhibit different patterns of elemental breakdown. Because of the growth in demand and the shrinking scale of research and development, the number of collect licences granted in Japan increased. In the interim, Korea increased the number of gather licences granted as a result of an extension of the research and development scale, and the two requirements decreased. By focusing on the financial situation of various firms, these results can be understood. Since the 1990s, Japan's R&D activity has continued to decline due to continued financial sluggishness, while South Korea's 1990s and 2000s were driven by product intensification in the hardware and semi-guide markets. achieved rapid economic growth. During this time, Korea's use of patents increased, especially for inventions created by large hardware companies (e.g., Samsung and LG gadgets)

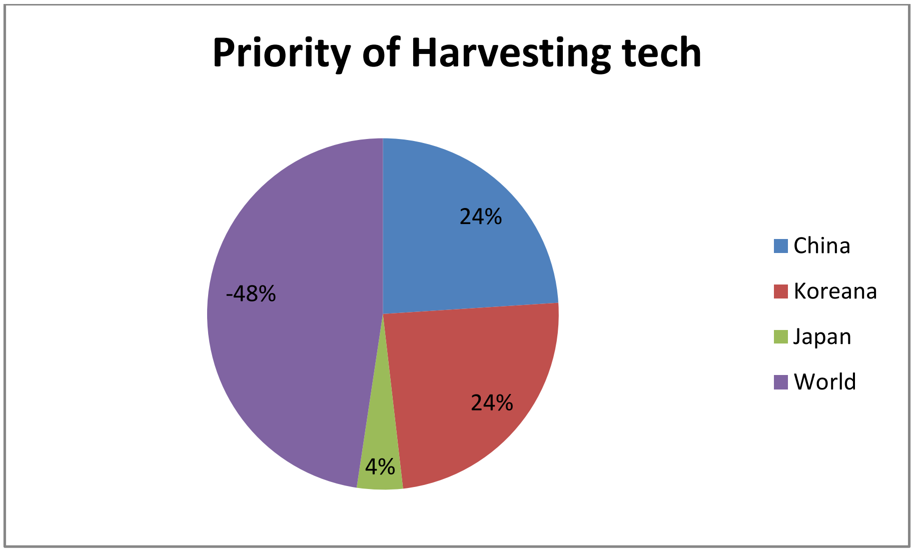

Figure: 4. Analysis of the decomposition of harvesting patents issued between 1993 and 2015

Thus, the general Research and development need for reap and fishing breakthroughs in Korea was reduced by dynamic advancement, as caught by licences in various advancements. While patent portfolios around the world were largely unaffected, China's patent portfolio increased the share of compute and reel technology extras (see Figure S1). In Japan, the reel patent share increased, but the use of extras for calculation was discouraged. Eventually, South Korea developed additional detectors and systems that make use of reflection over her other two discoveries.

VI. CONCLUSION

This study used data from licences granted between 1993 and 2015 to assess pattern and need changes in fishery advancements. We concentrated on the following three inventions: (1) collecting, (2) hydroponics, and (3) new item innovations. By using the LMDI degradation research, we were able to explain need shifts that were apparent in the licences covering the improvements in these three areas. The results that follow were obtained.

First off, from 1993 to 2015, Increased number of fishing technology licenses issued. Especially from 2012 to 2015, the number of licenses for hydroponic farming has skyrocketed. The main factors behind this development have been the growing scale of the research and development movement and the increasing demand in China for advances in fishing technology. One of the external factors driving R&D activity among Chinese innovators is the reform of patent filing rules and sponsorship structures in China. Indian Ocean fisheries. Overcapitalization, excessive restrictions, increased functional spending, and declining acquisition rates are problems that cause people to wander the streets in search of the right course and direction. Strategic interventions at national and public levels are urgently needed, in return for sustainable ambiguity of marine wealth and fisheries amid the challenges of globalization and global financial dimensions. Better employment opportunities for the community are ensured.Additionally, it is crucial to assist and collaborate with asset management initiatives inside the networks of fisherman themselves.

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