CURRENCY PRINTERS' DAY

JOURNEY SO FAR AND BEYOND

Feb 3, 2023

BHARATIYA RESERVE BANK NOTE MUDRAN PVT. LTD.
(Wholly owned subsidiary of Reserve Bank of India)

G20 भारत 2023 INDIA

Azadi Ka Amrit Mahotsav

EDITORIAL

It is an incredible idea to celebrate February 3, the Foundation Day of the Bharatiya Reserve Bank Note Mudran Pvt. Ltd. (BRBNMPL) - one of the largest banknote producers of the world with the highest levels of productivity. It is one of the few banknote producers in the world who has a fully integrated raw material supply chain. Its volumes are humongous and its quality is commendable. Money in the form of banknote has seen a number of competitions, especially in the past few decades. Still banknote holds an elite position as a medium of exchange and value of storage where it does its job anonymously and efficiently. Therefore, it is only apt to celebrate that day, as 'Currency Printers' Day'.

Celebration of Currency Printers' Day is relevant and appropriate to ensure the successful sustenance of this form of payment and to bring all those associated in this endeavour of banknote production on the same platform. BRBNMPL is taking the lead in carrying out this task by celebrating the day with lectures, quizzes, marathons, 'rangoli' competitions, publication etc. All these activities are based or inspired by the banknote ecosystem.

The theme for this year's Currency Printers' Day is, "Future of Currency Printing -Opportunities and Challenges."

'Journey So far and Beyond' focuses on the banknote industry, with special focus on India and BRBNMPL. It contains messages from the leading personalities in the industry and articles by inspired industry practitioners duly pepped up with the history of BRBNMPL and photo essays of this premier organisation's wonderful journey of about three decades. The editorial team working under the guidance of the Managing Director and the senior management of BRBNMPL have strived to make it a publication for 'store value for prosperity', as these messages, essays, articles and photos shall bring out the hidden, hitherto untold personal emotions of the reader.

Wish all fellow banknote professionals, enthusiasts and their family Godspeed and good luck in the coming years.

EDITORIAL TEAM
Dr. N Krishnaswamy | S Srikanth | Arjun Kumar P | Jebaraj V | Sajith P S

CURRENCY PRINTERS' DAY

3rd February

Celebrated on the Occassion of Foundation Day of
Bharatiya Reserve Bank Note Mudran Private Limited

Logo Description

CPD, which stands for Currency Printers' Day is inspired by the configuration of cylinders and papers.

Space enclosed by the Squircle design is treated with fine line design created using Spirograph, symbolising the background security design elements used in Currency and other documents.

Colours used in Logo:

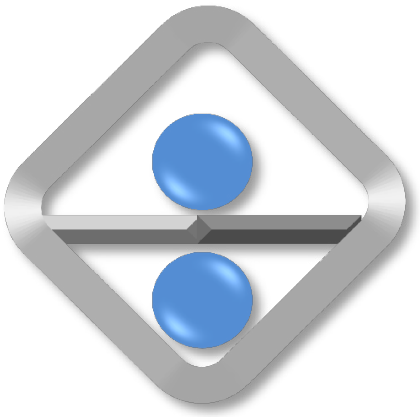
a. Blue: Represents Trust, Security and confidence;
b. Green: Currency ecosystem in nurturing and ensuring sustainability;
c. Orange: Represents Vibrancy, Dynamism and Agility;

The font resembles the wood cut typeface which is inspired by the work of Johannes Gensfleisch zur Laden zum Gutenberg (generally called the father of art of printing), a German inventor and craftsman who introduced letterpress printing with his movable-type printing press.

Rollers symbolise process of printing and paper processed through a symbolic printing cylinders getting printed in a safe and secured environment. Green Roller with a green paper represents that we use sustainable material and bring out a vibrant and sovereign product.

Wheel: It is represented in ancient temple architecture. It is a wheel of life which keeps eternally rotating. It represents timelessness, perpetual consistency and reliability.

Squircle: A squircle is a shape intermediate between a square and a circle. It represents that Currency ecosystem operates within a secured and closed environment. The shape has been treated to have relief effect, to represent the tactility achieved by intaglio printing which is exclusively used in Currency Production.



VISION, MISSION AND CORE VALUES

VISION

To be a trusted global leader in designing, manufacturing and supplying currencies, security products, and services, converging on self-reliant India mission, by leveraging on contemporary technologies and human potential of BRBNMPL.

MISSION

BRBNMPL will operate in Indian and global markets, catering to the needs of central banks and monetary authorities of the world for meeting the requirements of currency management ecosystem by designing, producing and supplying currencies, security products and services. BRBNMPL will focus on maximizing economy, efficiency, quality, security and effectiveness in providing its services to the satisfaction of all stakeholders.

The organization will achieve its mission by:

- Ensuring high-quality designing and production of currencies to instil public confidence as per the mandate from the central bank;
- Using state-of-the-art technology;
- Adopting world-class practices in people and innovative process management;
- Deploying highly reliable systems for product security and confidentiality;
- Focusing on local manufacturing using feasible integration strategies; and
- Caring for society and the environment.

CORE VALUES

Ethics: Upholding and maintaining the highest standard of integrity, honesty, loyalty, and reliability through openness, trust, and accountability.

Human Possibilities: Reliable, responsive, open-minded, humble, participative, collaborative, and providing result-oriented leadership for the realization of human potential.

Professional Excellence: Being responsible, innovative, and efficient in appreciating and meeting the expectations of all stakeholders.

Well-being and Happiness : To foster a diverse, joyful, and inclusive ecosystem on and off the workplace

Environment and Sustainability : Being socially and environmentally responsible.

Message

from eminences on the occassion of Currency Printers' Day

T RABI SANKAR

DEPUTY GOVERNOR & CHAIRMAN

I congratulate BRBNMPL, or shall we go easy on our tongue and call it RBI Mudran, for 28 years of distinguished service to the nation and for its unwavering commitment to making available the highest quality of banknotes. The Company has risen to the occasion in the face of every challenge, be it in the aftermath of withdrawal of Specified Bank Notes in 2016 or more recently during the Covid pandemic. The successful execution of the backward integration strategy through setting up the Banknote Paper Mill and the Ink Manufacturing Unit has materially reduced our reliance on imports. As a result of these initiatives, the nation has not only saved valuable foreign exchange but also become more self-reliant in currency printing with critical raw materials, design and production, all being produced under the single umbrella of RBI Mudran.

Celebrating the Foundation Day as "Currency Printers' Day" is a thoughtful gesture as it acknowledges the valuable role of the currency system in our society and economy. As part of the celebrations, several events are planned involving multiple stakeholders to spread awareness about the history of currency printing and its technological evolution. The release of this e-magazine on this occasion is a good beginning and I hope it will promote inclusiveness within the currency ecosystem and encourage exchange of ideas and developments related to innovations in currency production.

Despite rapid advances in digital payments, cash continues to serve a critical function as a medium of exchange for millions and millions of people from all walks of life across the country. To retain its trustworthiness, RBI Mudran has to continuously focus on innovation, indigenisation and export orientation. I wish the RBI Mudran family all the very best on the occasion of Currency Printers' Day and in all its future endeavours.

MANAS RANJAN MOHANTY

MANAGING DIRECTOR

यथा ह्येकेन चक्रेण न रथस्य गतिर्भवेत् |
एवं परुषकारेण विना दैवं न सिद्धाति ||

which means, "like Chariot cannot move with one wheel, we cannot attain our destiny without hard work or effort. There is no alternative for hard work. To excel in life, one must put in the effort".

Considering the colossal contribution of BRBNMPL to the currency ecosystem and to express respect to printers, from this year onwards our foundation day is being celebrated as Currency Printers' Day. The zeal with which BRBNMPL Team is working towards the celebration of first Currency Printers' Day (CPD) is nothing short of a miracle.

The efforts put by the team in bringing up the first issue of e-magazine "Journey So Far & Beyond" is remarkable. This e-magazine covers the essence of Currency Printers' Day i.e., creating awareness about the significance of currency printing, providing forum to discuss, share and disseminate the ideas and experiences within the currency ecosystem, to promote and collaborate exchange of ideas, to discuss and prepare for future challenges and opportunities and finally to promote inclusiveness within the currency ecosystem. I am sure this e-magazine will provide insight about various facets of currency printing. CPD will be a platform to share experiences and to keep abreast with the latest developments in the currency ecosystem.

Currency printing is facing challenges from technological developments and the alternate payments systems. It is time for the ecosystem to sustain and grow and the only way forward is to work hard, learn and innovate. Therefore, I would like to conclude by quoting Dale Carnegie and would request BRBNMPL family to ponder over it

"Inaction breeds doubt and fear. Action breeds confidence and courage. If you want to conquer fear, do not sit home and think about it. Go out and get busy."

I am confident BRBNMPL team will continue to excel through relentless, innovative and contineous journey.

YEZDI MALEGAM

DIRECTOR

I extend my warmest greetings to all members of the staff on our Founder's Day. We have been entrusted with the task of producing the major portion of the currency notes issued by the Reserve Bank of India. This is a great honour but also a great responsibility. The currency notes circulate throughout the country and are handled by everyone of our vast population. The quality of the notes in a sense has national implications and we have the responsibility that at all times these notes reflect the highest quality. We also need to note that we are a monopoly supplier and this imposes on us the responsibility to ensure that we produce the notes at the lowest possible cost. In both these areas we have performed admirably and I have every confidence that we shall continue to do so in the future.

Dr. A G KULKARNI

DIRECTOR

I am extremely happy to know that BRBNMPL is organizing Currency Printers' Day on the 3rd of February. I am very pleased with this well thought initiative, which I think is a great opportunity to facilitate promotion and exchange of ideas and for innovation in this area. My association with BRBNMPL goes back to 2012 when I was appointed as a Board member. The last decade of my association has been a rich and a rewarding experience of my life. Guided by its visionary leadership and managed by a team of very dedicated and hard-working people, BRBNMPL has become one of the best currency production organizations with state-of-the-art technology and very efficient management systems.

The organization has done a yeoman service to the country in 28 years, and I believe that it will continue to achieve many milestones. I have witnessed unquestionable, dedicated service right from the leadership to down the line shop floor technicians. Promotion of installation of currency paper mill and creation of facilities for production of inks indigenously has led to backward integration, thereby making the country self-sustaining in the area of currency production. BRBNMPL under the aegis of RBI has ambitious plans of setting up Learning & Development Centre and Currency Research & Development Centre. I am confident that under the present leadership, the team can achieve these and many others goals. I am delighted to be a part of this event and also this journey with you all. On this occasion I wish to compliment the present leadership of BRBNMPL for this great idea which I think is only the start of some very rewarding work.

Thank you and best wishes.

Maj.Gen. DEVEDRA KAPUR(Retd.)

DIRECTOR

I convey my heartiest greetings to all ranks of BRBNMPL on the 'Foundation Day' that has been aptly designated as 'Currency Printers' Day'. BRBNMPL is presently the Numero Uno in the field of currency printing due to the professional excellence in productivity, distribution, operational efficiency and innovation.

Notwithstanding the recent launch of Central Bank Digital Currency (CBDC) and the other technological innovations, currency shall continue as the dominant medium of financial transactions amongst the masses. The present team of BRBNMPL has with clarity selected this theme as 'Future of Currency Printing – Challenges and Opportunities'. The VUCA (Volatility, Uncertainty, Complexity and Ambiguity) environment, that we face has been aptly identified and it is heartening to see that effective measures have largely been put in place.

I am certain that in this kaleidoscopic and fast changing environment, professional excellence shall be the order of the day. With the new challenges, there shall automatically be creditable opportunities to create a niche in the sphere of currency printing.

On the Currecny Printers' Day, I wish all ranks and families of BRBNMPL, the very best. May you continue to prosper and create an indelible positive mark for your progenies to emulate.

JAI HIND

THALIKERAPPA S

MANAGING DIRECTOR

I am happy to know that Bharatiya Reserve Bank Note Mudran Private Limited is releasing an e-magazine on its Foundation Day i.e. on February 03,2023. I understand that the e-magazine primarily has the focus on the "BRBNMPL's journey so far and beyond" and also, the e-magazine talks about 'Future of Currency Printing – Challenges and Opportunities'.

BRBNMPL is one of the largest producers of currency notes in the world. BRBNMPL in its journey achieved many highest benchmarks / highest standards since its inception. The thought process / decision of BRBNMPL to release its e-magazine on the occasion of its Foundation Day and celebrating it as Currency Printers'day is highly appreciable.

The e-magazine will definitely "a knowledge bank and a learning document" and useful for the people / organisations who are associated with the currency eco-system across the globe.

My best wishes on this most important occasion.

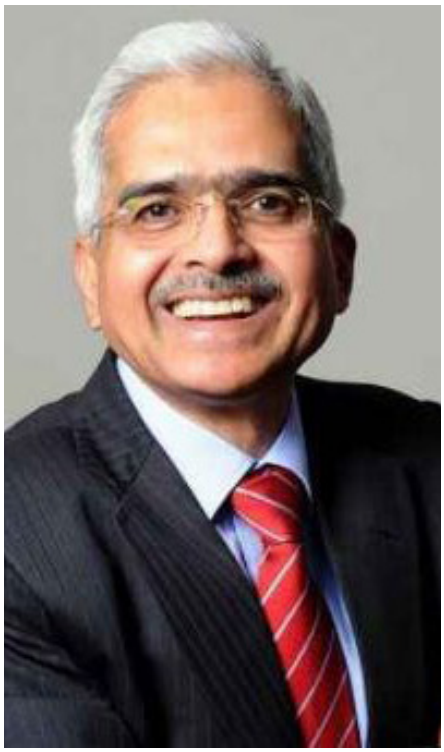
ANTTI HEINONEN

CHAIRMAN OF THE BANKNOTE ETHICS INITIATIVE,
FORMER DIRECTOR - BANKNOTES OF THE EUROPEAN CENTRAL BANK

First of all, congratulations on your achievements in the area of banknote printing and of the respective raw materials. Establishing an annual "Currency Printers' Day" on your Foundation Day is a great example of raising awareness about the significance of banknote printing in these turbulent times. Banknotes have once again shown globally their importance as a store of value in crisis situations and the great efforts of the banknote industry are worth to celebrate. I wish all the best for the 1st Currency Printers' Day and every success in the years to come.

VERSED STATEMENT

The Wise Show us the way ....



SHAKTIKANTA DAS
GOVERNOR

"Success of any institution depends on the quality of people which includes attitude, skills and discipline. Technology will have to be up-to-date, latest and forward looking.."
- During Dedication of Varnika to the nation

T RABI SANKAR
CHAIRMAN

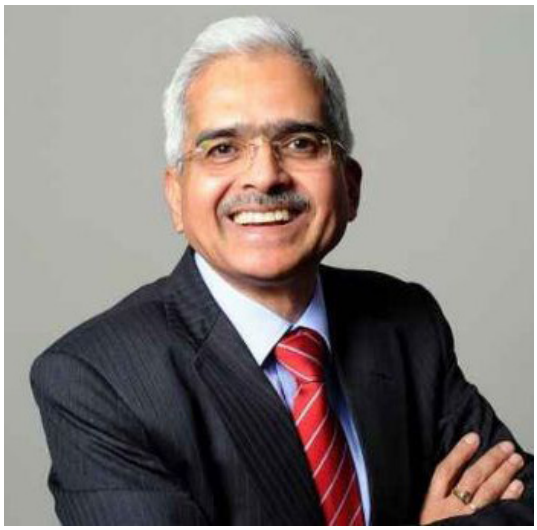
"Self-reliance for security features is very low. We have to develop our own ecosystem for innovation and R&D."
- During Foundation stone laying ceremony Currency Research and Development Centre

B P KANUNGO
THEN CHAIRMAN

"Product quality is a primary consideration in a sovereign product like currency in which people repose their trust."
- During Key Note Speech during 26th Foundation Day of BRBNMPL

DEDICATION OF VARNIKA TO THE NATION

GOVERNOR'S SPEECH ON MARCH 28, 2022



Governor welcomed Shri Jose J Katoor, Executive Director, RBI, Shri Manas Ranjan Mohanty, Managing Director, BRBNMPL and Shri K.G. Viswanathan, Managing Director, BNPMIPL and all dignitaries, participants and team BRBNMPL. He expressed that he is highly inspired by the presence of so many dignitaries.

He mentioned that in any organization or for any development in human society or in any activity – whether it is a cultural, social, manufacturing or any economic activity, interrelationship between a group and people is very important for the progress of human society. Therefore, he is enthused by the presence of team BRBNMPL and dignitaries from various organization for this important occasion, which actually reflects that if we work together, we can ensure that this decade belongs to India and we can take India to greater heights.

He stated that currency printing is a sovereign function and it is a very special activity. Currency note represents the presence of the sovereign of the country and sovereignty is represented by the constitution of India and will of the people. Reserve Bank of India derives its identity from banknote. Common man generally identifies RBI as an organization that prints and sends banknotes to public.

Considering the importance, just printing the note is not enough. Making paper, achieving self-sufficiency, reduction of cost are equally important activities. In this regard, he expressed his delight to see this Ink Manufacturing Unit - Varnika which has come up and he is extremely privileged to launch and dedicate it to the nation on behalf of BRBNMPL. He congratulated and complimented the team for their excellent work done and appreciated all the human resources for their role.

Governor mentioned about the contribution of BRBNMPL during two important situations and challenges which the currency ecosystem had to go through. One is a remonetisation exercise in 2016 when notes are to be printed on a war footing and supplied to people. The other one is recently during Covid 19 pandemic wherein despite risks to individual health and safety, all work together to ensure that currency system of the country did not suffer any shortage of cash. RBI Regional Offices, banks and currency printing units worked together to ensure this. At this poignant moment, he remembered the people who fell prey to Covid. He appreciated BRBNMPL for discharging its duty with great merit and ability during these challenging instances.

He emphasized that important feature is to move towards self-sufficiency apart from paper and ink. Self-sufficiency is not just important for the sake of it but cost reduction is an important objective behind it. He also indicated that costing has to be done properly. In many organizations, several costs are hidden and pushed under the carpet or classified under different heads. However, cost reduction has to be genuine and effective which is the real intention of self-sufficiency. Apart from that in an emerging geo political scenario, it is always better to be cost effective, self-sufficient and also should be in a position to export our product abroad. However, export of security products such as paper and ink

involves strategic security issues which are to be examined critically in consultation with security agencies.

He expressed his delight to note that Varnika is one amongst the three global manufacturers who possess the capability and competency to produce the Colour Shift Intaglio Ink. He is also happy to note that varnish plant is commissioned and producing various types of varnishes from December 2020. He made a mention that in the last 8 to 10 years, import dependency in BRBNMPL has gone down from 92% to 8%, which is remarkable. He emphasized that the exercise should continue and we should aim for 100% indigenous supply so that we can do away completely with import dependency.

In-house facility for manufacturing Colour Shift Pigment is a work-in-progress and the internal target is set for 2023. But he would like to come back and launch this manufacturing facility sometime in 2024. It is a challenge/responsibility given to BRBNMPL and he is sure that BRBNMPL will live up to the occasion.

Going forward, the main focus should be on Research and Development and innovation. Quality of people and their dedication also needs a greater focus. The success of any institution depends on the quality of people which includes attitude, skills and discipline. He stressed that technology and process sophistication also

needs a greater focus. Technology will have to be up-to-date, latest and forward looking.

Governor, summed up the speech with six actionable focus points which he had elaborated in the speech:

Continuous focus on

1. R&D and innovation
2. Quality of notes and life and longevity of banknotes
3. Improving design and security features of banknotes
4. Plant maintenance: It is not a mundane activity. It involves plant discipline and maintenance which is essential for machine efficiency, machine output, productivity, cleanliness, safety standards in all processes to ensure safety of people, machines, infrastructure, quality of notes.
5. Quality of Human Resource policies
6. Cost-efficiency

He expressed that he had more time for interaction with officers and staff which could give him a better understanding about the activities that are being carried out. He concluded his speech stating that Varnika should self-improve continuously and should become a pride for the nation. He conveyed his best wishes to all for all future endeavors.

LEARNING AND DEVELOPMENT CENTRE

GOVERNOR'S SPEECH ON MARCH 28, 2022

Governor welcomed Shri Jose J Katoor, Executive Director, RBI, Shri Manas Ranjan Mohanty, Managing Director, BRBNMPL and Shri K.G. Viswanathan, Managing Director, BNPMIPL and all dignitaries, team BRBNMPL, women troupe who rendered invocation song. He stated that he is extremely delighted and it is a privilege to lay foundation stone for Learning and Development Centre (LDC) of BRBNMPL and currency manufacturing ecosystem. It is a momentous and auspicious day that augurs well for the occasion, for the LDC to be successful. It is also an important milestone in the history of BRBNMPL and RBI. He mentioned that currency printing is special, like banks are special.

Though banks are same as any other company, because they deal with depositor's money which is regulated by RBI where safety of money is a primary objective banks are considered special. Similarly, printing of banknotes and currency notes is a special and sovereign activity. Banknote is a piece of paper that contains lot of trust. Irrespective of the denomination, a piece of a banknote represents trust of constitution, trust of democracy, trust of political system and trust of economy. Value of money is very critical and important for the economy. Therefore, representation of sovereign and value is equally critical for the economy. It is therefore not like any another activity. It requires not only safety, quality and security it also

involves acquisition of knowledge accompanied by lot of learning and development of the product, process and the printing technology. Currency ecosystem has to constantly develop and enrich the quality of banknote, paper, ink and printing processes. Being a special activity, it requires continuous learning. In this background, establishment of LDC role of entire currency production ecosystem (all stakeholders) and the idea and initiative to set up LDC is a collective effort of entire ecosystem. LDC will go a long way to benefit the entire ecosystem of printing of banknotes. Continuous learning is essential in every field of human life. Particularly, for a special sector like currency production, continuous learning is very important because the world is changing, technology is changing and the economy is changing.

Change is an inherent feature of human society and history. In modern times, in this fast moving world, rate, pace and speed of change in technology, process and nature of economy is rapid. End of February 2022, nobody expected that the global economy to have such crisis which is due to Ukraine war and earlier due to Covid pandemic. Even in the technology front, constant innovations are taking place. Today's technology may become outdated tomorrow. Any organization which is today not investing in technology, in improving quality of manpower and knowledge, that institution will lag behind. Technology and people are two important components that needs a special focus. People here means knowledge, skills, their readiness to tune with changing times, ability to work proactively and try to anticipate the problems and the challenges and shall try to remain ahead of the curve and not just to sink with the curve. In this background, as continuous learning is very important, he appreciated the initiatives of entire currency ecosystem. He emphasized that focus should be on the quality of note, security features quality of every product that goes into the making note, security and integrity of our currency manufacturing system and innovation. He stressed that we should put efforts to do something in India which is first of its kind in the global currency ecosystem.

Earlier, even for designing of banknotes, India was dependent on foreign designers. In 2016, new Mahatma Gandhi (MG) series notes were designed indigenously in the Mysuru design facility which is a big achievement He once again emphasized that the Indian currency ecosystem will have to internally brainstorm, to design and develop something related to currency printing which is first of its kind in the world and set a benchmark for all the countries including advanced countries. Even in an advanced nation like USA, paper is getting outsourced. In India also we were importing paper till 2016, but now we are increasingly becoming self-sufficient. So continuous learning to ensure quality and security with a specific focus on innovation, human life.

So continuous learning to ensure quality and security with a specific focus on innovation, process and product should be set as important objectives. He expressed his happiness noting that Academic Advisory Council (AAC) is already in place to guide LDC, which can draw inspiration from outside. He made a specific mention that nobody can claim they know everything. The moment somebody thinks knows everything, that is a beginning of stagnation and decline of knowledge. Therefore, we should have open mind to listen and learn from others, and from

the experiences. Apart from the original ideas, we should also observe the developments that are taking place elsewhere in the world and try to assimilate and synthesize them. While security features in a banknotes are very important, physical security being provided by CISF team is also very important. He congratulated the CISF team for their prompt, alert and high quality security services. He noted that this LDC already has a roadmap and timeline is set.

He insisted that implementation of LDC (not just a civil construction, but also including manning it with required expertise and knowledge) should be done in a time bound manner. While appreciating the efforts of setting up LDC and manufacturing plant for colour shift pigment, he advised that setting up a state-of-the-art adversarial testing facility should be the next milestone. Adversarial testing will be to challenge our features which is similar to the ethical hacking followed in IT sector to verify the robustness. He concluded his speech expressing his happiness for laying foundation stone for LDC and wished all the success and congratulated entire currency ecosystem and team BRBNMPL for their efforts. He stated that he is pleased and proud to launch this LDC and over the years this centre will emerge as Centre of Excellence in the currency ecosystem.

CURRENCY RESEARCH AND DEVELOPMENT CENTRE

CHAIRMANS' SPEECH ON JUNE 22, 2022

Shri T. Rabi Sankar, Deputy Governor, Reserve Bank of India laid foundation stone for the Currency Research and Development Centre (CRDC) proposed to be established as a society of RBI at the campus of BRBNMPL, Mysuru. This centre will be involved in conducting adversarial analysis and the currency research pertaining to currency manufacturing. During his address, he emphasised that considering the evolving alternate payment systems, the demand of paper currency may reduce. Therefore, it is essential for the currency eco system to rethink and reposition itself to continually improvise and adapt to the changing environment within the system and externally by appropriately allocating resources and efforts in Research and Development. Under these circumstances, this centre will play an influential role in the way Currency management system will evolve going forward.

He highlighted that we can be proud about the great set up our country has to produce and distribute currency. Resilience of the system in terms of its efficiency in taking up any challenge is proven during pandemic and remonetisation. However, self-reliance for security features is very low. We have to develop our own ecosystem for innovation and R&D. We have a massive role to play to nurture and develop the currency eco system in the next 10 years. In this regard, within the tight timelines, maximum leverage will have to be exercised within the currency ecosystem and through collaborations with the Indian scientific institutions to ensure that critical and strategic materials are synthesised and/or produced through this centre. With the creativity and initiative that prevails in the ecosystem, CRDC can evolve as global centre for research and innovation.

CELEBRATION OF 26TH FOUNDATION DAY

EX-CHAIRMENS' SPEECH

The 26th Foundation Day of BRBNMPL was celebrated on 3rd of February 2021. On the occasion, Shri Bibhu Prasad Kanungo, Deputy Governor, Reserve Bank of India and Chairman, BRBNMPL addressed the employees through video conferencing. The highlights of his address are given below:

Chairman extended his warm greetings and best wishes on the occasion of the Foundation Day of BRBNMPL and congratulated BRBNMPL Team for building a formidable global reputation as a banknote printer over the 26 years of its hoary existence. He observed that BRBNMPL is the pride of the nation and RBI should be thankful to BRBNMPL Team for its steadfast dedication and unwavering commitment in producing and supplying banknotes during demonetisation and pandemic.

Demand for cash and evaluation of resources:

He observed that in recent years, India has made rapid strides in digitisation in payment systems, especially with respect to retail payment. However, given the state of our financial literacy, the financial stability considerations and for reason that cash provides anonymity, cash and digitisation will go side by side though India is expected to become a less cash society in future. So the demand for cash will continue. In the near future new design notes are expected to be introduced and the old series notes will have to be withdrawn. Therefore, the demand for cash is expected to increase and BRBNMPL has to evaluate its resources suitably.

Cost consideration and Quality:

Chairman observed that cost efficiency is an important aspect and all wasteful expenditure must be avoided. However, he emphasised that product quality is a primary consideration in a sovereign product like currency in which people repose their trust. In our quest for cost reduction and spoilage management, quality cannot be compromised in any manner.

Standardisation and Quality:

Chairman made a mention about the recommendations of Group of Experts constituted for standardising the systems, processes, quality

control mechanisms in place across the Note Printing Presses, Paper Mills and Ink Manufacturing Units. He further mentioned about the recommendations of the MIS committee constituted for reviewing the accounting and reconciliation of raw materials consumed and end product. He advised BRBNMPL to implement the recommendations of both the committees in a timely manner.

Atmanirbhar Bharat and backward integration:
He referred to the honorable Prime Minister's speech at RBI in 2015 wherein he had emphasized that under make in India initiative, RBI should take the lead in ensuring that India starts the manufacturing of paper and ink that are used for printing currency notes. It was only after that the process of setting up of IMU gained momentum. Chairman further emphasized that keeping in mind our national goal of Atmanirbhar Bharat and our security considerations, we must achieve self-sufficiency in production of all critical raw materials in-house. If not, the same should be developed and sourced within the country. Therefore, we should examine what needs to be produced within BRBNMPL.

Collaboration and Innovation:
Chairman mentioned that there is a need to create an ecosystem that focuses on promoting collaboration with industry, academia etc. and coordinate exchange of ideas and development related to innovation in currency production that can facilitate and foster innovation.

Setting up of Research Facility:
Chairman highlighted that India being one of the largest producers of banknotes, shall need to take steps to develop security features of its own and become research hub for security features. Instead of selecting features that are being offered by the industry to choose from, we should be in a position to demand security features which are tailor-made to our requirements. He emphasized that in order to achieve this objective, it is important that research and analysis be carried out dynamically in a structured manner. He also emphasized the need for carrying out analysis of robustness of security features (i.e. adversarial analysis) on a continuous basis. A committee constituted for formulating currency research policy and establishing a currency research centre has since submitted its report to RBI and the central bank is taking steps to set up a research facility. The research centre has to be set up by BRBNMPL at the earliest which has to be manned by professionals to do cutting edge research on security features and adversarial analysis.

Establishing a Training Centre:
Chairman emphasised that for any organisation, one of the most important assets is its dynamic and motivated manpower. He suggested BRBNMPL to have policies that carefully balance the needs of the organisation and the expectation of the employees. He stressed that the knowledge being an important resource for the organisation, BRBNMPL shall have learning objectives as a part of their strategy for motivation to compensate the intellectual needs of the employees.

ARTICLES

CURRENCY PRINTING
OPPORTUNITIES AND CHALLENGES

MANAS RANJAN MOHANTY
MANAGING DIRECTOR

"Before printing was discovered, a century was equal to a thousand years", said Henry David Thoreau, an American essayist, poet, and philosopher. The invention of printing has led to the development of human potential at an increased pace. Since its invention in the 6th century printing has evolved fast. From wood block printing to digital printing to latest 3D printing, printing evolved with ceaseless breakthroughs in technology."

Currency printing is a highly specialized form of printing. Currency printing involves processes that are not part of commercial printing process. Intaglio printing process and simultaneous printing of front and back of a sheet are few of them. It also involves machinery which uses cutting edge technology and is only manufactured and supplied by few companies in the world. Correspondingly, the human potential involved in currency printing is specialized and trained in these special processes and operation of such distinct machineries. Further currency printing operates in a very confined supply chain system where the raw materials including the security features that go into the currency is secured and protected.

In India, Paper Currency Act of 1861 gave Government the monopoly of note issue and since establishment of RBI in 1935, Reserve Bank of India is issuing notes, except the one-rupee notes which the Government of India continued to issue till 1994.

Currency printing has evolved considerably since Chinese started using paper money in 13th century. During the initial days of currency, it was counterfeiting that was driving the innovation. Initial banknotes carried Government guarantee to redeem the banknotes in specie. Realizing not all the banknotes circulated would be redeemed, governments began issuing banknotes exceeding the value of the gold and silver in their treasuries. Thus, currency literally became paper money.

With the advent of paper money, with no option of redeeming gold or silver from Government, authenticity of currency became paramount for the public trust. Thus, currency printing started evolving with the intention of making it easy for the general public to identify and difficult for the counterfeiters to duplicate. Currency designs became more and more sophisticated, use of color were more exotic. Initial currencies had signatures and embossed seals which were difficult to reproduce.

Special paper and inks were employed in the making of banknotes. Special security features that are difficult to counterfeit were introduced into banknotes. French Assignat, for example, included watermarks in their paper. The American colonies often printed banknotes on paper infused with mica particles. Sometimes high-denomination banknotes were printed in multiple colors, counting on separate passes through the press needed for the application of each color to be too complicated for most counterfeiters to duplicate.

Several well-known early Americans applied their skills to outwitting counterfeiters. Paul Revere, a renowned silversmith (and early American patriot) engraved plates for Colonial banknotes. Benjamin Franklin, a printer by trade, came up with the idea of using tree leaves to print a vignette on the backs of

banknotes, based on the observation no two leaves have exactly the same pattern of veins, thereby making the duplication of a banknote impossible. Impressions used were entered into a book, which could then be consulted for comparison whenever a doubtful banknote was encountered.

Other innovative techniques included special ways of cutting the paper surrounding the printed surface of a banknote, applying script to the inside of the banknote, and in modern times, embedding metal strips or threads in

the paper – a process now employed in the currency of most countries. Some French Assignat were printed with printed selvages, which were then cut in a wavy pattern from the banknote, given the same serial number and filed. Suspicious banknotes could then be compared with the selvage on file to see if the printing on the selvage edge of a questionable banknote exactly mated with the printing on file to determine authenticity. The Bank of England printed its pound-value banknotes in pairs, leaving three edges rough and one edge smooth. Different denominations had small, easily missed indents cut at selected points along the unfinished right or left edges.

The next innovation in banknote making was the employment of elaborate engravings. This technology was brought to a high level in around 1840, by the American Banknote Company (ABC), which assembled teams of the best engravers of the time to hand-engrave banknote plates. Different engravers etched each part of a banknote, some specializing in portraits, while others engraved letters, numbers, etc., producing master plates used to make printing plates. Although outwitting counterfeiters was the primary objective behind printing advances, necessity was also a force. By the mid-19th century, paper money was becoming more acceptable to people as a media of exchange. Expanding commerce and the industrial revolution saw a commensurate leap in the size and volume of financial transactions. Paper money filled the gap.

The next major innovation incorporating security features in banknotes was the insertion of one or more metallic threads in paper used for printing banknotes. Although the technique was patented in 1848, Great Britain was the first country to issue banknotes with the device one-hundred years later in 1948. When held up to light, the thread, which usually is embedded from top to bottom, stands out as a black line through the note.

Nearly all modern banknotes incorporate multiple anti-counterfeiting devices. Some, especially high-denomination notes, may have as many as fifty such elements, some obvious, some secret. These range from multiple alphabetical fonts, differing sizes and shapes for letters and digits in serial numbers, to special inks that can only be seen under ultra-violet or infrared light. Heat transfers of optical variable devices (OVD) and/or holograms are also favored on modern banknotes.

“All modern banknotes incorporate multiple anti-counterfeiting devices. Some, especially high-denomination notes, may have as many as fifty such elements, some obvious, some secret.”

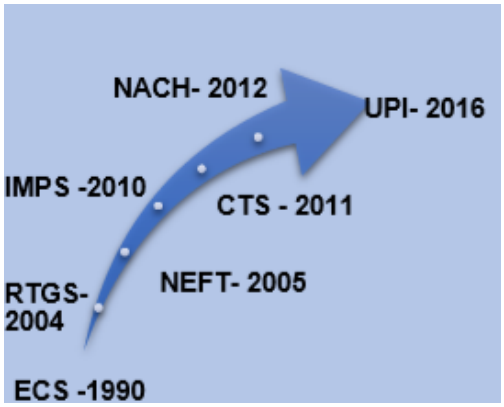
Australia pioneered the use of banknotes printed on polymer instead of paper. Not only do these banknotes have a longer life than paper banknotes, but by incorporating see-through windows in each note, they have proven to be almost impossible to replicate without expensive, special machinery.

Presently, currency printing has evolved into a large industry with several stakeholders like the state-owned currency printers and private currency printers, security feature suppliers, banknote paper and ink suppliers, specialized machinery and consumable suppliers with wide and varied interests.

As the technology for currency printing evolved, so did alternate forms of money based on alternate technologies. Banknote currency, as a form of money, itself, is facing challenge now. With the advent of advanced mobile communication networks like 5G, Internet and Digital storage capacity expansion, alternate forms of money like Crypto currency, Central Bank Digital Currency etc. Such alternative poses unique challenges to physical currency.

New developments in digital payment systems pose further challenge to banknote currency. Ease of transaction, accounting and

immediate settlement has led to the proliferation of alternate digital payment systems. Over the years several digital payment systems have been launched and became prominent in usage as shown:-



With the advent of crypto currencies, that are geared to bypass the established and regulated intermediation that play a crucial role of ensuring integrity and stability of monetary and financial eco-system, central banks were pushed to think about launching regulated digital currencies, now popularly known as Central Bank Digital Currencies (CBDCs). One of the effects of development of alternate technology is that the companies in the currency eco system shy away from making additional investments in research and development in the sector. This will in turn reduce the competitiveness of the sector as a whole and the industry's failure will become a self-fulfilling prophesy.

Also, as the industry starts losing its prominence, skilled and able manpower look elsewhere for a fruitful career. This again affects the development of industry.

"Cash is backed by the government and has got safe storage value where in it can be stored for use in future and is fungible. In addition, cash gives privacy to transactions like no other instrument can."

Any industry requires a good eco system for development and innovation. Like for an automobile industry, the car maker cannot make all its parts and at the same time drive innovations and cut costs in these parts. Similarly, as far as the industry is thriving, the security feature developers, printing machinery manufacturers and consumable suppliers will develop and expand their offerings and completion. Once the industry slows down, these ecosystems stops growing, limiting the options and opportunities.

These factors ultimately lead to increase in cost of printing currency. Not only the printing, its storage, distribution, withdrawal of soiled notes from the market, its destruction; the entire cash cycle becomes costly. The Government who is also a stakeholder in the currency ecosystem starts looking for alternatives. In spite of all these, Cash is still used extensively as is evident in the graph showing the currency in circulation in chart 1.

This is called the currency paradox, while alternate form of money and transaction increases, the money in circulation is also increasing. This has several reasons. Cash has exchange value. It is the easiest form of money to transact. The transaction is immediate and final. It doesn't require any other instrument or communication network to affect the transaction. Cash is backed by the government and has got safe storage value where in it can be stored for use in future and is fungible. In addition, cash gives privacy to transactions like no other instrument can.

Currency is more likely to co-exist as an alternate form of money and exchange rather than going extinct. If you see the present requirement of currency, it is related to the GDP growth of nation, Inflation, Replacement of Old notes, Interest rate and Digitization. Here digitization is still one among the factors that is deciding the currency requirement. Also, if we look at other advanced economies like Europe, Cash is still the most used payment instruments at POS as shown in the chart 2.

The dwindling ecosystem provides opportunity for more collaboration and innovation. As several players exit the industry, the existing players can collaborate and create stronger institutions with bigger capacity to produce high quality banknotes.

This also provides opportunities to build global institution catering to multiple. One of the biggest opportunities is the growing demand for new and improved security features, as governments and central banks look to stay ahead of the latest counterfeiting techniques.

These challenges also open up opportunities to drive innovation by investing in learning and development and strengthening knowledge ecosystem in currency sector.

Sustainable printing practices earlier were optional. But with the rise in awareness among people, they have become necessary. Currency printers can lap up this opportunity to make their products more green, and produce sustainable and environmentally friendly banknote. This includes the use of alternative materials, such as plastic, as well as the development of recycling and disposal methods for used banknotes.

Overall, banknote printing is a constantly evolving field that is facing a range of challenges and opportunities. By staying abreast of the latest developments and working to improve the security and efficiency of the process, the industry can continue to meet the needs of governments, central banks, and the public.

Chart 1

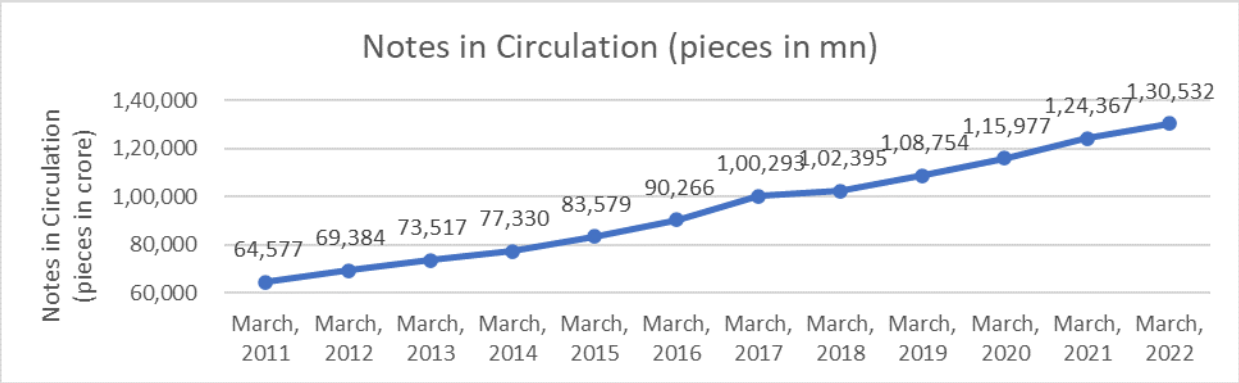
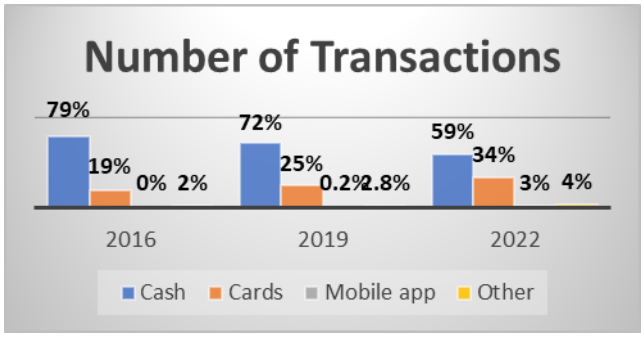
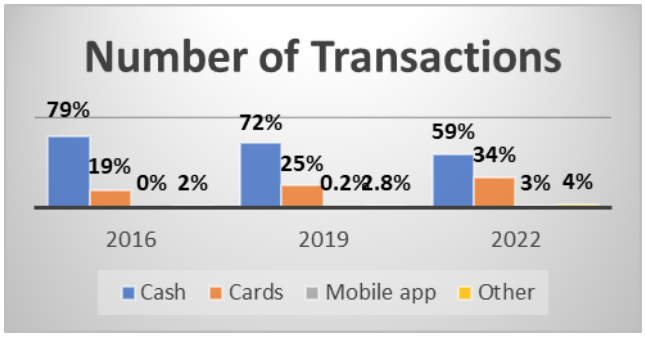


Chart 2





Share of payment instruments used at the POS in terms of number and value of transactions, 2016-2022, euro area.

Sources: ECB, calculations based on De Nederlandsche Bank and the Dutch Payments Association (2020, 2022) and Deutsche Bundesbank (2018,2022). Notes: "Other" includes bank cheques, credit transfers, loyalty points, vouchers and gift cards and other payment instruments. Percentage may not add up to 100% due to rounding.

IN GOD WE TRUST,
EVERYONE ELSE BRINGS DATA

SANAT HAZRA
DIRECTOR

The domain of statistics consists of a set of theory and practice which includes data collection methods, analysis methods, and interpretation. This field has grown to the point where it finds application in every kind of situation in which difficult decisions must be made, based on observation. Statistical methods are essential to the initiation and maintenance of total quality control. The validation of an assumption or hypothesis can be established only when the data can be demonstrated to confirm result. This confirmation can only come from the successful completion of a well-designed experiment based on statistics. Statistical methods, coupled with other techniques/tools and other sources of information and observation, are essential to maximize quality and efficiency of a process resulting in a significant cost savings. Furthermore, improving efficiency becomes a critical factor in saving costly resources, critical energy and carbon foot print.

Two most essential factors of data collection are – reliability and dimension-ability. The approach to describe data in various ways has always been invaluable.

In recent years, these techniques are becoming more important because ever growing huge number of data being collected from almost all areas of the processes. With the onslaught of Big Data, the need to make sense out of mountains of information has led to the development of formalized ways of structuring, describing, interpreting and visualizing data. To make valuable and intelligent decisions, as well as to understand the world around us, we must become familiar with these primary methods of analyzing and presenting data.

For any industries, from space research to pizza parlor, statistical tools are religiously used every day monitoring of performances, measuring variabilities and predicting future. Statistical Process Control (SPC) implementing Six Sigma and Toyota's Total

Quality Management tools have been a corner stone for all manufacturing operations. Across industries, a very significant progress in bringing process reliability, quality improvement and cost reduction has been achieved by application of these valuable tools. Six Sigma is also a method to achieve breakthrough improvements and performance. One must learn and diligently apply these techniques to make an analysis of the factors affecting process variabilities, efficiency and cost.

The benefits of statistical analysis can be summarized into four objectives:

* To validate hypothesis
* To investigate the past
* To control the present
* To predict the future

Essentially to understand what cause provokes what effect, by what means and at what frequency in space and time.

Data and information visualization is concerned with showing quantitative and qualitative analysis so that one can see and easily understand the pattern, trends, variation, outliers in space and time - in a way that raw data and or texts - do not allow. Today visual data, statistical charts, graphs and graphics, are very common, conveying an increasingly complex range, size and scope of modern technology, science and statistical analysis easier for humans to understand.

The key benefits of data visualization are:

* Easy to understand – picture says thousand words;
* Complex interaction of variabilities can be visually explained;
* Real time data

"Today visual data, statistical charts, graphs and graphics, are very common conveying an increasingly complex range, size and scope of modern technology, science and statistical analysis easier for humans to understand."

In addition to data visualization, a complex dynamic dashboard can also be developed from real-time data capturing from all functions of the organization to monitor key deliverables in an integrated performance metrics on a daily basis. This has been a very powerful tool and a backbone of all advanced manufacturing companies practicing data driven decision making process. The benefits of this thinking and practice have generated a significant competitive advantage for these companies.

Therefore, it is not enough for any organization just to capture masses of data without any meaningful analysis and interpretation. Six Sigma enhances product quality and speed of production through robust process and optimizations. It is an absolute necessity for all industries to implement Six Sigma and/or TQM process to stay relevant, lean, fiercely competitive and comfortably profitable. One must embark in this journey without any further delay.

Today, we still keep trusting God, everyone else brings visual data.

"The clarity and excellence in thinking is very much like clarity and excellence in the display of data. When principles of design replicate principles of thought, the act of arranging information becomes an act of insight."

- Edward R. Tufte

CURRENCY ECOSYSTEM

SHRI SANJEEV PRAKASH,
CGM, DCM, RBI

As addressed during the inaugural session of lecture series on January 24, 2003 by Shri Sanjeev Prakash, CGM, DCM, RBI.

A very Good afternoon to all of you!

Shri Manas Mohanty ji, MD, BRBNMPL, senior officers at the Bengaluru, Mysuru and Salboni units and friends. It is a privilege for me to address the Officers and Staff today on the topic, "Currency Ecosystem - Strategizing for Transformation" as part of the lecture series which has been institutionalised as a part of Currency Printers Day celebration.

At the outset, I would like to commend and compliment the staff of BRBNMPL for rendering 27 glorious years of committed service to the country. From a humble beginning to the stratospheric heights that the organisation has reached at present, is a glowing testimony to the professionalism pillared on perseverance and dedication of the employees, both past and present, and the dynamism of its management.

I also congratulate the BRBNMPL leadership in particular the MD, Shri Mohanty, for conceptualising celebration of "Currency Printers' Day" on February 3 to mark the birth anniversary of Johannes Gutenberg whose invention of letterpress printing in the 15th century led to mass-spread of literature throughout Europe and served as a precursor to the renaissance, reformation and humanist movements.

It is a matter of pride for all Indians that BRBNMPL has continuously evolved to match and exceed the global performance benchmarks since its inception and has been setting industry standards in terms of productivity, distribution, operational efficiency and innovation. We are aware that about 60% of our currency demand is being met by BRBNMPL keeping the quality and efficiency parameters centre stage.

I also compliment the current management of BRBNMPL on setting up of Varnika with an annual ink manufacturing capacity of 1,500 MT. It underlines their vision, commitment and a drive in marching towards achieving twofold goals of higher cost efficiency and reduced import dependency.

Having said that, it is easy to rest back on the achievements, the accolades and the laurels earned especially in an industry which is a virtual monopoly. But great companies focussed on transformation do not lie idle. They constantly innovate-try to achieve productive and economic efficiency and both these are very much within the realms of possibilities for BRBNMPL and I am well aware that you are always striving for the same.

In my address today, I would like to focus on few new developments in the banknote industry that we need to be mindful of and strategize accordingly.

Knowing the Unknowns

First things first. In the wake of the onslaught of retail digital payments, mushrooming of cryptocurrencies and piloting of CBDC by more than 100 central banks, what is the future of physical currency? Would the cash survive this onslaught and if yes, for how long? Should we be bothered? Yes, of course – it is a 'bread and butter' issue for us.

To my mind, at least in the foreseeable future, Cash would remain relevant. There is a good reason for that. Cash is one of the most robust and resilient payment tool available which is used across people from varied economic, social and demographic background. The ubiquity and anonymity are another important drivers for use of cash.

We have seen a definite dip in the growth trajectory for the currency in circulation, a direct measure of demand for banknotes, over the past two years in India. Last Financial Years the growth was sub 10% for the first time in a decade. This FY, the growth so far (until Jan 20) is around 4.5 %, which I feel may remain about 7% at the max. The trend in cash usage is similar across other jurisdictions in the world- be it the US, Europe, Africa or any other country. But there is still a growth and not a decline. Our internal projections also suggest a decline in the pace of growth of cash. You might not witness a steep growth in indent for fresh banknotes from RBI but it would continue to at least be at the current level consistently, at least in the medium term.

As you are aware the cash demand sky rocketed during the pandemic as people started to hoard cash. This is not an isolated event. Every crisis – whether the Y2K crisis at the turn of the century, the Global Financial Crisis(GFC) in 2008 or the pandemic in 2020 has witnessed an upsurge in the increase in currency in circulation. The motivation for people to hoard cash differed on each occasion- fear of inability to access ATMs and bank account as computer systems could stop working in 2000, possible insolvency of the banks during the GFC, physical inaccessibility of branches and ATMs during the pandemic. As the effects of pandemic have subsided and people have become more confident about the availability of cash when needed, the household have possibly started to gradually reduce physical currency held by them. Apart from an uptick in use of digital modes of payment, this is probably one reason why the growth in currency in circulation in the recent times has been marginal.

The question then one may ask- whether the pandemic was the last crisis world would see? Answer we all know is an emphatic NO.

So, what I am saying is that people would still require cash for transactional and storage value needs and the Central banks would need to keep pumping in this value. The doomsday for cash and for print works if at all, therefore, is a long-long-time ahead.

That said, we must contemplate what we could do over a longer time horizon when the domestic indents plateau out or actually decline. Can we find newer markets? As you are aware, a lot of smaller nations across Asia and Africa completely depend on other countries for their currency needs. Can we ramp up production, bid for these quantities on a global basis and start competing? We must start thinking on these lines quickly and act at the slightest window of opportunity. I understand that SPMCIL has competed with Chinese print works and won tenders for supplying couple of denominations of Nepalese Rupee. Definitely, BRBNMPL can do better.

Quality of banknotes

RBI had conducted a public survey during 2019-2020 which, among others, sought opinion of the public about the new series of banknotes vis a-vis the older series. While the general public was largely satisfied with the quality of the newer series of banknotes, a significant proportion, especially in visually impaired category, was not very happy with the same. The dissatisfaction among the general public largely emanated on account of problems in distinguishing between fake and genuine banknotes, identifying/recognizing different denomination of notes and especially the condition of Rs. 2000 notes. The VIR category were mainly dissatisfied with the size of the new notes, identification of fake and genuine notes and ease in identifying different denominations based on the geometrical pattern inserts on the banknotes.

While with a limited survey like this we cannot be certain about the wider public opinion, I feel that as we work towards releasing the new series of banknotes, it is imperative for us to be cognizant of the public perceptions and assimilate these feedbacks into our future work.

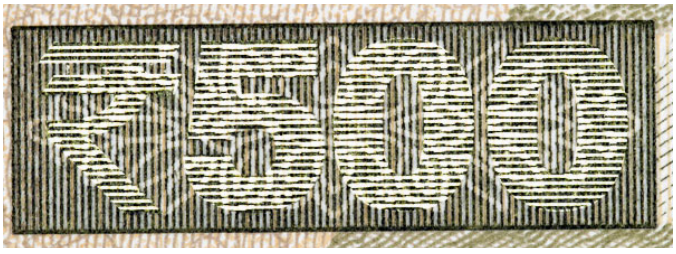
Security and Design Features

As we are aware, the banknotes represent the ethos and aspirations of our nation. It is therefore, extremely important that our banknotes are eclectically designed with robust security features. I am aware that the ultimate form and design has to undergo through a long process of approvals nevertheless the staff involved with the process at the base level- whether in BRBNMPL or at RBI- have to be mindful of the ultimate objective. As we work towards launch of a new series of banknotes over the next 18 months, we must ensure that while the security features are robust in terms of their ability to be not easily counterfeited, they also have to be easily discernible to the naked eye to enable the common man to transact with them confidently. We have to be mindful about the design elegance of the banknotes, robustness of the security features.

In this regard, it is heartening to note that the vision for setting up of a full-fledged Currency Research and Development Centre (CRDC) is gradually being realised. The operationalization of Adversarial Analysis Laboratory(AAL) in Phase I of the project at the BRBNMPL campus in Mysuru late last year is a path breaking achievement whereby advanced investigations into

counterfeit banknotes and robustness of the security features of our banknotes can now be conducted. The Laboratory would also be able to study the latest trends in counterfeiting & reprographics, liaison with law investigating agencies and aid and assist RBI in strengthening the security features on its banknotes. Once fully operational, CRDC would be able to develop robust security features for Indian banknotes indigenously and may at a later date start exporting security features to other central banks.

For the CRDC to be effective, a lot of engagement with the technical experts from BRBNMPL would be necessary as they possess the domain knowledge in this area. RBI plans to enter into technical collaboration for skill training of the officials at the AAL and CRDC this purpose. I believe that when fully operational, CRDC would be a crowning glory for RBI and BRBNMPL as it would elevate the country substantially in the hierarchy of nations that possess the technical skills and expertise in developing the security features for their banknotes.

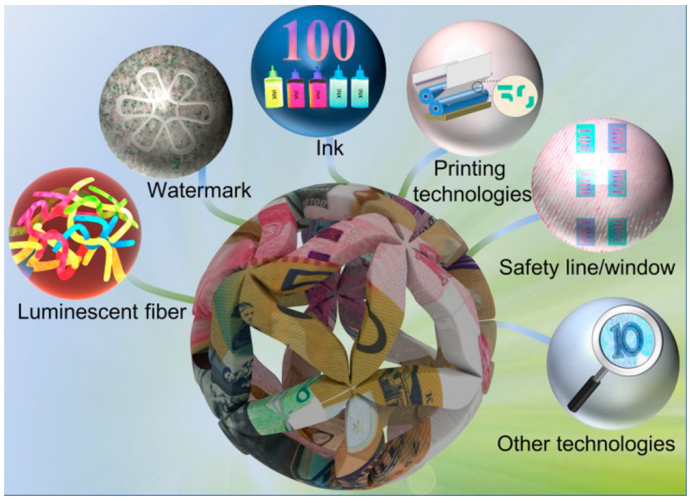


Sustainability Practices

The last, but the most important issue that I wish to highlight, is about the use of sustainable practices in the currency ecosystem. Sustainability as a concept has been best defined by the United Nations Brundtland Commission as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'.

We are witnessing unprecedented climatic changes and weather events across the world over the last 2-3 years. Hitherto feared climate risk has crystallised for real with extreme heat, unseasonal rains, melting glaciers and harsher winters become commonplace. The Paris Accord on Climate Change which sought to limit global warming to well below 2, preferably to 1.5 degree Celsius compared to pre-industrial levels, is on the verge of failing as the global temperature rise has already reached close to 1.5 degrees. Against this backdrop of gloom, it is incumbent upon each individual and each organisation to make whatever little contribution we can, in fighting the ill effects of climate change.

As we all know, cash ecosystem generates significant carbon footprint in all phases in the cash cycle- whether in production, distribution or disposal. Within the RBI, we are attempting to mainstream sustainability in currency operations. We are trying to move up the value chain insofar as the disposal of soiled



note briquettes is concerned. We have commissioned research for finding industrial use of the briquettes rather than them being used for incineration or in landfill.

I have seen the Enviro-Quality Policy of BRBNMPL which seeks to meet the environmental needs by using eco-friendly material, conservation of natural resources and management of waste materials. I also observe that you have ISO 14001 certification for achieving the intended outcomes for the environmental management system. This is definitely a step in the right direction. I have also seen significant greenery and afforestation endeavour in your campus. But the question is, are we doing enough? Can we do better? Can we like environmentally responsible companies, set ourselves a goal for transition to net zero? For that, we would need to begin from the base. We can consider doing a baseline audit of our carbon/ greenhouse emission and set small goals. May be reducing the water usage or electricity usage by a certain percentage. Or let us say, using renewable sources of power for a certain percentage of operations. Can we get our vendors, suppliers and transporters to also commit to reducing their carbon footprint? I know the wish list is daunting but we have to make a start. In this endeavour you must also include the Paper Mill venture, which I suppose has a larger carbon footprint than perhaps you generate.

Conclusion

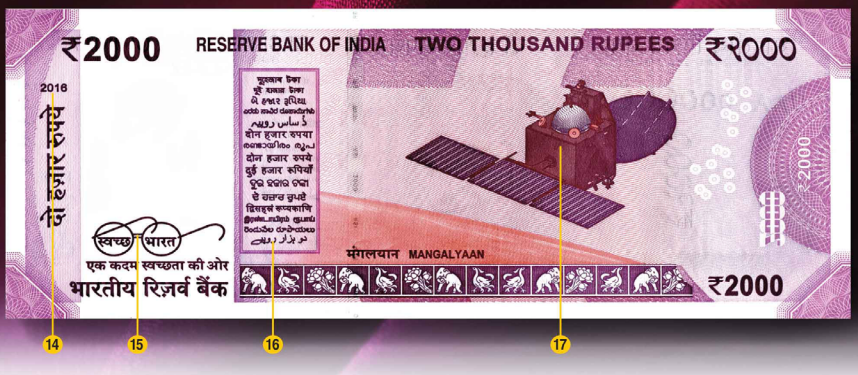
These are the certain ideas that I wanted to share with you today. People are the real asset of any great organisation and the same is true for BRBNMPL as well. The organisation has built a great legacy for itself over last quarter of a century and I am sure with the current crop of people it would continue to lead India's march towards achieving self-reliance in printing banknotes in the coming years.

I once gain congratulate all of you on the upcoming foundation day and thank Shri Mohanty and the team for inviting me to share my thoughts as part of this lecture series.

Now your bank notes in a new design

RBI issues ₹2000 note in a new series

Actual size



The Reserve Bank of India is introducing new design banknotes in the denomination of ₹2000 as part of **Mahatma Gandhi (New) Series**. The new denomination has motif of the *Mangalayan* on the reverse, depicting the country's first venture in interplanetary space. The base colour of the note is magenta. The note has other designs, geometric patterns aligning with the overall colour scheme, both on the obverse and the reverse. The size of the new note is 66mm x 166mm.

Features of the New ₹2000 Note:

Obverse:

1. See through register with denominational numeral 2000 can be seen when the note is held against light
2. Latent image with denominational numeral 2000 which can be seen when the banknote is held at 45 degree angle at the eye level
3. Denominational numeral 2000 in Devnagari
4. Portrait of Mahatma Gandhi in the centre
5. Micro letters 'RBI' and '2000'
6. Colour shift windowed security thread with inscriptions 'भारत', RBI and 2000. Colour of the thread changes from green to blue when the note is tilted
7. Guarantee Clause, Governor's signature with Promise Clause and RBI emblem towards right
8. Mahatma Gandhi portrait and electrotype (2000) watermarks
9. Number panel with numerals growing from small to big on the top left side and bottom right side
10. Denominational numeral with Rupee Symbol, ₹2000 in colour changing ink (green to blue) on bottom right
11. Ashoka Pillar emblem on the right

For visually impaired:

Intaglio or raised printing of Mahatma Gandhi portrait, Ashoka Pillar emblem, bleed lines and identification mark

12. Horizontal rectangle with ₹2000 in raised print on the right
13. Seven angular bleed lines on left and right side in raised print

Reverse:

14. Year of printing of the note
15. Swachh Bharat logo with slogan
16. Language panel towards the centre
17. Motif of *Mangalayan* - reflecting country's first venture in the interplanetary space

For more details on banknotes in the denomination of ₹2000 please visit: www.paisaboltahai.rbi.org.in

New design notes in other denominations will follow

MINISTRY OF FINANCE GOVERNMENT OF INDIA

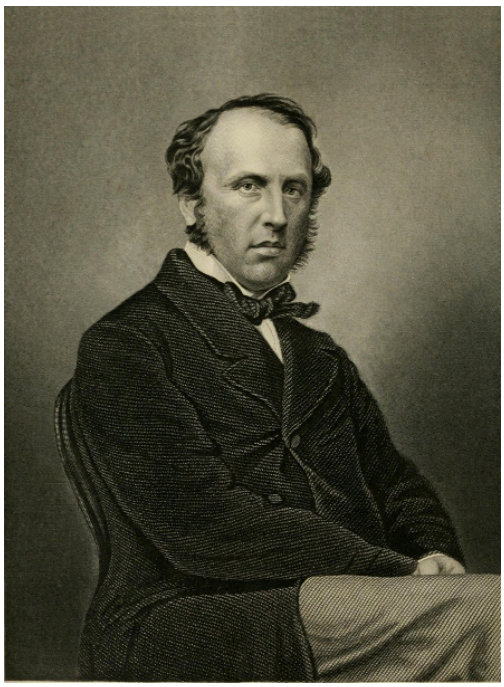
Issued in public interest by

भारतीय रिज़र्व बैंक
RESERVE BANK OF INDIA
www.rbi.org.in

THE BEGINNING
THE GOVERNMENT OF INDIA BANK NOTE

Dr. Rezwan Razack
Chairman - IBNS India Banknote Collectors' Chapter
Author: One Rupee One Hundred Years 1917-2017
co-Author: The Revised Standard Reference Guide to Indian Paper Money

Lord Canning was the Governor General of India from 1856 to 1862. After the Sepoy Mutiny in 1857, the British took over India from the East India Company. In August 1858, less than a month after Lord Canning proclaimed the victory of the British Arms, the Parliament passed the Government of India Act. This Act of 1858 transferred the East India Company's rule over India to the British. Lord Canning also held office as the first Viceroy of India from 1858 until his death in 1862.



Lord Canning
Governor General of India : 1856-1862

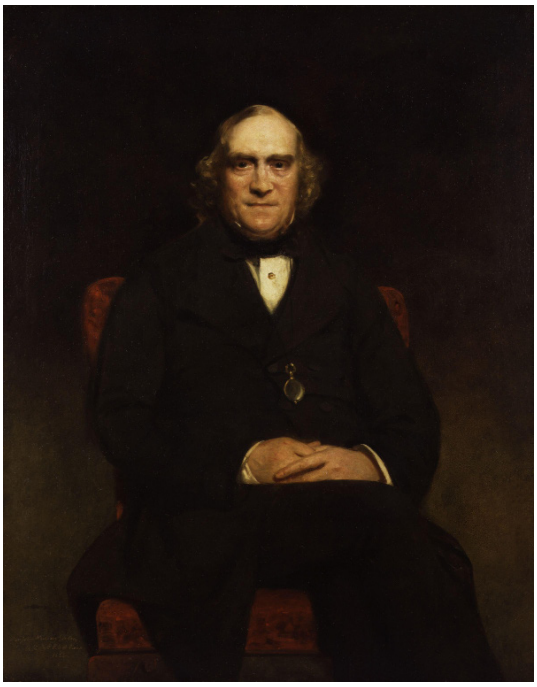
Some of the important events during Lord Canning's tenure include:

- Withdrawal of the Doctrine of Lapse, which was the root cause of the Sepoy Mutiny.
- Passing of the Indian Councils Act in 1861 which introduced portfolio system in India.
- Introduction of the Code of Criminal Procedure.
- Enactment of the Indian High Courts Act.
- Indian Penal Code Act.
- Bengal Rent Act.
- Introduction of Income Tax on experimental basis.
- Introduction of the Currency Act.

In August 1859, Queen Victoria sent Sir James Wilson to India as the Finance Member of the Council of India. Sir James Wilson resigned from the offices he held in England and also his seat in Parliament and then assumed office in India as the Finance Member.

Sir James Wilson was to establish the tax structure in India, initiate introduction of paper currency in India and he was to remodel the finance system in India. The original proposal was to be backed by reserves of coins valued at atleast one-third of the paper currency issued for circulation. This reserve was to be managed by an independent commission. The members of this commission could only be removed by the Secretary of State for India. Paper currency

in India owes much to the intellectual stimulus and personal dynamism initiatives of Sir James Wilson.



Sir James Wilson
Finance Member of the Council of India

Sir James Wilson's financial plan was designed to permit temporary expansion or contraction of currency in order to accommodate variations without change in coin reserves. The system that was put in place was rigid. Issued paper currency was to be backed entirely by coin reserves with restricted fiduciary issues of 4 crore Rupees against Government securities. He wanted to have the paper currency notes printed in India. However, Sir James Wilson was in office only for a year and he died in 1860.

Sir Samuel Laing succeeded Sir James Wilson as the Finance Member of the Council. With the untimely death of Sir James Wilson, the responsibility of issuing paper money in India was transferred to Sir Samuel Laing. He substantially modified Sir James Wilson's original proposals before implementing it. Sir Samuel Laing believed that India did not have the necessary expertise and facilities to print paper currency notes in India. Hence the print order to produce paper currency notes for India was given to the Bank of England.

The Bank of England contacted Sir Wyndham Spencer Portal, owner of the Laverstoke Paper Mill, who were the manufacturers of watermark


MR. S. LAING, THE NEW FINANCE MINISTER IN INDIA.—FROM A PHOTOGRAPH BY JOHN WATKIN.

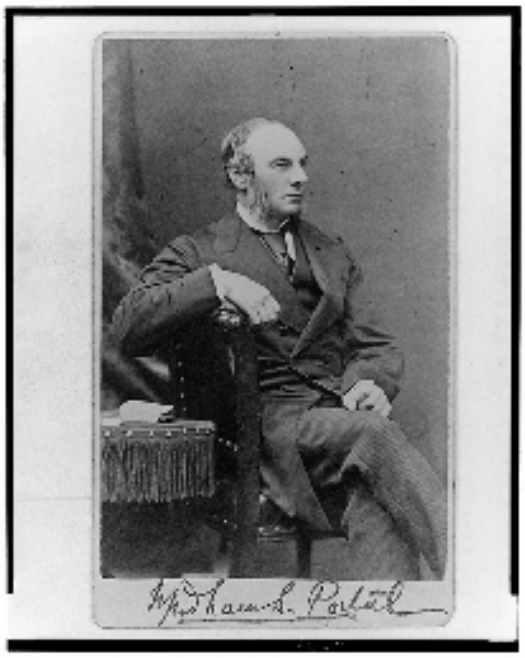
Sir Samuel Laing
Finance Member of the Council of India

paper for notes of Bank of England and also for some presidency banks in India that were issuing notes. In 1860, M/s. Portals won the contract to manufacture watermark paper for printing notes for India. M/s. Portals instantly re-organised their paper mill, erected a new building and added more machinery to cope with the increased production of watermark paper.

The paper mill of M/s. Portals at Laverstoke produced hand-made and moulded paper in the mould-making department established at the mill. The Bank of England introduced moulded paper for their own notes, also made by M/s. Portals. This paper was produced at the Portals Laverstoke mill by the Smith & Brewer's process of creating opaque moulded watermark. Later, the Bank of England acquired the exclusive right to use the process. The Bank of England established a mould office of its own in 1850. Subsequently the moulds were prepared in its premises and the paper was manufactured at Portals

mill situated at Laverstock. Since the travel time between the Bank of England and the Portals mill was time consuming, the mould-making department of the Bank of England was transferred to Laverstock under an agreement. The paper with shadow watermark began to be produced from there. The first banknotes of the Bank of England on this new watermark paper were issued in 1855. The same type of moulded watermark paper was used for printing notes for India.

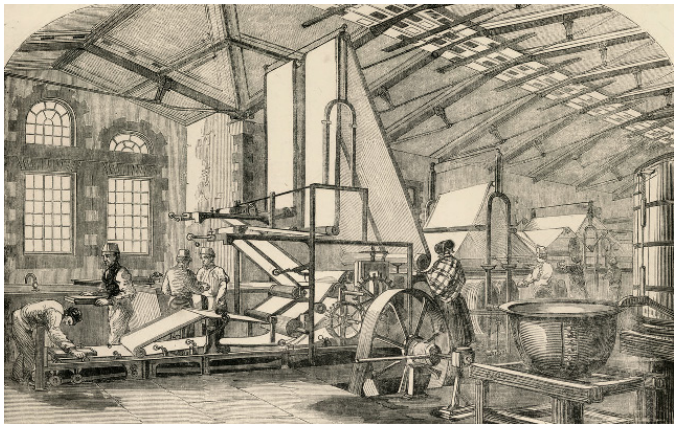
The trials and patterns for Government of India banknotes commenced in 1859 itself



Sir Wyndham Spencer Portal
Owner of Paper Mill at Laverstoke

for 5 Rupees and 10 Rupees. Trials and pattern notes of 5 Rupees with the portrait of Queen Victoria were printed. However notes of this denomination were never issued for circulation.

The patterns of Government of India banknotes were similar in design to notes of the Bank of England. They were uniface, printed in black ink on moulded watermark paper. The most interesting part of these Government of India notes with portrait of Queen Victoria is the facsimile signatures in the



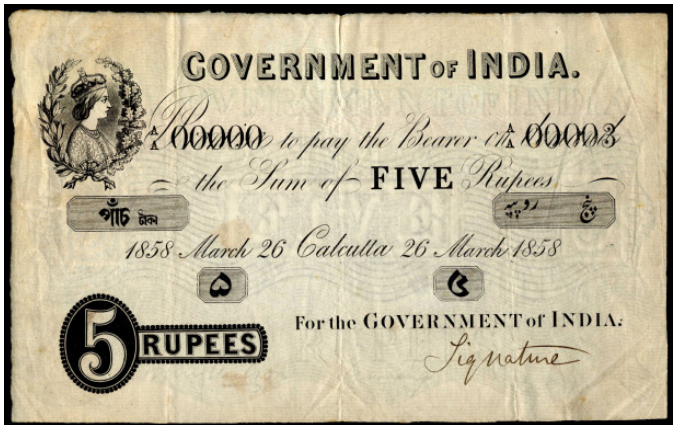
watermark. The signatures of both Sir James Wilson, the Finance Member and Lord Canning, the Governor General of India appear in the watermark of the first issue of Government of India notes with portrait of Queen Victoria. Even though Sir James Wilson died in 1860, his facsimile signature remained in the watermark when the notes were issued in 1861.

The first prototype of paper money made for India was presented by Sir James Wilson during his historical speech on 25th December 1859 at the Governor General's Camp, Meerut. It was a 10 Rupees prototype developed by the Bank of England, with watermark similar to notes of Bank of England. The text on the banknote was modified for India. The watermark of the specimen note had 'GOVERNMENT OF INDIA' along the top edge, 'TEN' in the centre and 'RUPEES' below it. It was initially proposed to have 2 alphabets as the prefix to the note serial number to distinguish it with its unique number. In addition to English, the denomination was printed in 2 native languages to have it's reach among people. Over the next few years, several changes were carried out in the initial design before finally introducing the first banknotes in India.

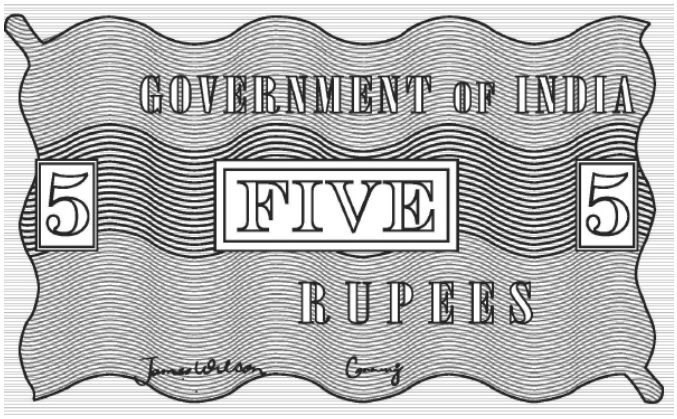
In his speech on 3rd March 1860, Sir James Wilson the originator of paper currency in India says: "In short, to abstract so much coin from the mere mechanical purpose of the circulation, supplying its place with convertible paper, would be exactly the same in effect

Bank of England – Five Pounds
Printed on watermark paper of Government of India 5 Rupees

Government of India – 5 Rupees – Trial
dt. 26 March 1858; circle of issue Hull or Calcutta*;
signed Specimen with serial number A/A-00000 and A/A-99999;
in manuscript 8th October 1860, W. S. Portal

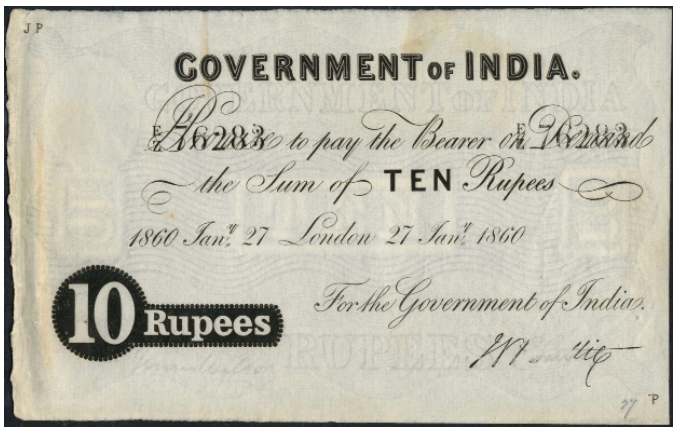


Government of India – 5 Rupees – Pattern*
dt. 26 March 1858; circle of issue Calcutta;
manuscript Signature



Watermark of 5 Rupees
facsimile signatures: James Wilson and Canning

*Trial notes and Pattern notes of 5 Rupees of Government of India banknotes with portrait of Queen Victoria were printed. However, notes of this denomination was never issued for circulation.



Government of India – 10 Rupees – Trial
dt. 27 January 1860; circle of issue London,
signatory W. P. Gattie, Chief Cashier, Bank of England

as if suddenly, in the centre of the Maidan, a rich silver mine had been discovered which produced silver at little or no cost." Supreme Legislative Council Proceedings, Vol.VI, p.250.

The Paper Currency Bill was passed in 1861 as Act XIX which came into effect in July 1861. This Act bestowed the Government of India the monopoly of banknote issue in India, thereby bringing to an end the note issues of private banks and presidency banks. The Act prohibited issue of all negotiable instruments - bank cheques and drafts excepted, by every other corporate body, person or persons. The private banks and the presidency banks thereby discontinued issuing their own currency notes.

Queen Victoria
20 June 1837 - 22 January 1901

The early banknotes issued by the Government of India featured Queen Victoria's portrait. These notes were not signed and were sent to India by ship to be delivered in India towards the end of 1861. The notes were issued in the denominations 10, 20, 50, 100, 500 and 1000 Rupees. The lowest denomination was 10 Rupees. Considering the value and purchasing power of the Indian currency in the 19th Century, these were fairly high value denominations. Paper currency in the 19th Century were rarely used by the general public. They were mostly used for collecting revenue and remitting funds for commercial and official purposes.

One of the biggest challenges faced when paper money was introduced in India was the geographical diversity of the country. In order to successfully implement circulation of paper money, India was divided into various Circles of Issue for the paper currency and notes were Legal Tender and payable only within the circle of issue. The initial notes were issued from the circles Calcutta, Madras and Bombay representing the three presidencies. The prefix used in the serial numbers of notes of each of these circles were 'A' for Calcutta circle, 'B' for Madras circle and 'C' for Bombay circle. The issued notes have varying dates in the months of May, June, July and August of different years between 1861 to 1865.

Initially the presidency banks were appointed as agents to promote the circulation of these notes in view of their existing infrastructure. The Act of 1861 authorised the presidency banks to enter into agreements with the Secretary of State for becoming agents for the issue, payment and exchange of promissory notes of the Government of India. The presidency banks were given a fee of 0.75% as agents. The currency office first established its office in the Bank of Bengal building in Calcutta on January 3, 1862. The Comptroller-General of Accounts at Accounts Department, Calcutta was the Head Commissioner of Issue and the Accountant Generals of Madras & Bombay were Commissioners. The agency agreements with the presidency banks were terminated in 1867. The currency department stood as an extension of the mint till 1870 when the paper currency department was separated from the department of mint. The management of paper currency was subsequently entrusted to the Mint Masters, the Accountant Generals and the Controller of Currency.

The initial set of British India notes facilitated inter-spatial transfer of funds. As a security precaution, notes were cut in half. One half of the note was sent by post. On confirmation of receipt of the first half of the note by the recepient, the other half was then despatched by post for encashment.

The challenge in circulating and redeeming these notes over vast expanses of the Indian sub-continent led to the concept of currency sub-circles, where these notes were legal tender. In order to enhance the reach of paper money, various sub-circles were established under the 3 primary circles:
1864 : Allahabad, Nagpore* and Lahore were sub-circles of Calcutta.
1865 : Kurrachee was a sub-circle of Bombay.
1865 : Calicut, Trichinopoly, Vizagapatam were sub-circles of Madras.
1868 : Akola was a sub-circle of Bombay.
1879 : Coconada was a sub-circle of Madras.
1882 : Rangoon.
1901 : Cawnpore was a sub-circle of Calcutta.
* Nagpore was first a sub-circle of Calcutta and later in 1868 it was a sub-circle of Bombay.

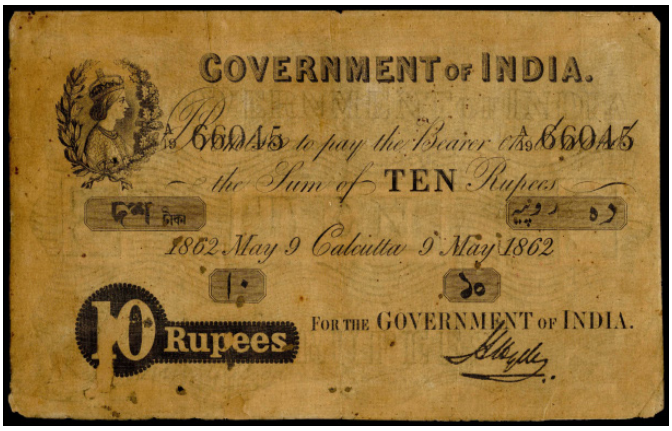
The name of sub-circle was super-inscribed by an overprint or a stamp on the note, its placement varied from circle to circle.

In 1910 after universalization, there remained only 7 main circles of issue – Bombay, Calcutta, Madras, Rangoon, Cawnpore, Kurrachee, and Lahore. All sub-circles were abolished.

In the top left corner was a profile Portrait of Queen Victoria in between floral wreath. The words 'GOVERNMENT OF INDIA' was centered in one line on top. The serial numbers with a prefix of one alphabet and two numerals were on either side of the promise text. The denomination is in words in panel below the promise text on either side with Bangla on the left and Persian on the right. Below that the circle of issue is centered between mirrored dates printed on either side. Below that is the denomination in numerals in a panel, Persian on left panel and Bangla on right panel. The name of the sub-circle is by a superinscription or an overprint and its placement may vary in individual instances. The sub-circle is printed on the right side of the note in addition to the main circle below the central denomination panel. The signature was hand stamped at the time of issue below 'For the GOVERNMENT OF INDIA'. The notes were signed by two signatories in case of sub-circles. The denomination panel is on lower left in numeral and words. These notes were printed in England. The first notes were dated '8 July 1861'. The note measures 21.5 cm x 13 cm.

Watermark of 10 Rupees

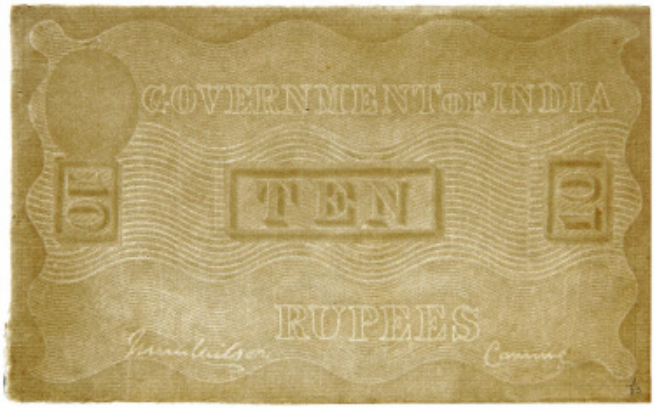
The watermark has wavy lines in the central promise text panel extending towards the margins. Within the wavy lines the words 'GOVERNMENT OF INDIA' in bold letters was centered in one line on top, below it is the denomination in words and in numerals in a rectangle on either sides and the word 'RUPEES' below it. On the lower two ends were two facsimile signatures - on the right was the signature of Lord Canning, the Governor-General, and on the left was the signature of Sir James Wilson, the Finance Member of



10 Rupees with Portrait of Queen Victoria Calcutta circle; dt. 9 May 1862; signed by H. Hydes

the Council. Sir James Wilson died in 1860, and his facsimile signature was retained in the watermark in the notes issued in 1861. In notes issued in subsequent years, the facsimile signature of Sir James Wilson was replaced with that of Samuel Laing in the watermark.

The notes issued at the currency offices remained in circulation till they were encashed. These notes could be redeemed only at the place of issue or within the circle of issue. To make the issue more secure, the notes were registered at the time of issue and recorded at the time of redemption. This method enabled the issue office to account for each and every note that was in circulation. These notes could be redeemed only at the place of issue or the headquarters of that circle in silver coins.



Government of India – watermark of 10 Rupees facsimile signature – James Wilson and Canning

10 Rupees

RR Type No.	Signature	Circle of Issue	Prefix
RR-2.1.1	H. Hydes	Calcutta	A
RR-2.1.2	H. Hydes + C. W. Clerdin	Calcutta or Allahabad	A
RR-2.1.3	H. Hydes + L. Berkeley	Calcutta or Lahore	A
RR-2.1.4	J.A. Ballard as Commissioner	Bombay	C

10 Rupees with Portrait of Queen Victoria
'Bombay' circle, dt. '9 June 1862', signed by
'J. A. Ballard' as 'Commissioner'
Red Seal reads 'Bank of Bombay'

20 Rupees

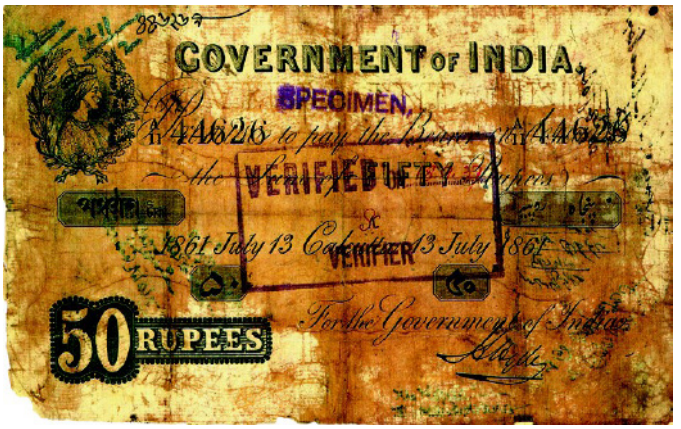
RR Type No.	Signature	Circle of Issue	Prefix
RR-2.2.1	H. Hydes	Calcutta	A
RR-2.2.2	H. Hydes + C. W. Clerdin	Calcutta or Allahabad	A
RR-2.2.3	H. Hydes + L. Berkeley	Calcutta or Lahore	A
RR-2.2.4	J.A. Ballard + S. K. Lambert	Bombay or Kurrachee	C
RR-2.2.5	C. Wilson (Acting Commissioner)	Madras	B

20 Rupees with Portrait of Queen Victoria
Calcutta circle, dt. 11 July 1861, signed by H. Hydes

20 Rupees with Portrait of Queen Victoria
Calcutta circle, Lahore sub-circle; dt. 15 May 1862;
signed by L. Berkeley and H. Hydes

20 Rupees with Portrait of Queen Victoria
Calcutta circle, Allahabad sub-circle; dt. 13 May
1865, signed by C. W. Clerdin and H. Hydes

20 Rupees with Portrait of Queen Victoria
Bombay circle, Kurrachee sub-circle; Sind Circle
of Issue in oval seal across Kurrachee;
dt. 10 June 1864, signed by S. K. Lambert and J. A.



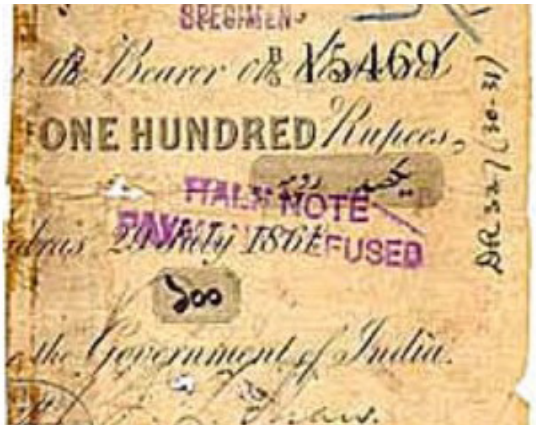
50 Rupees with Portrait of Queen Victoria
Calcutta circle; dt. 13 July 1861; signed by H. Hydes

50 Rupees

RR Type No.	Signature	Circle of Issue	Prefix
RR-2.3.1	H. Hydes	Calcutta	A

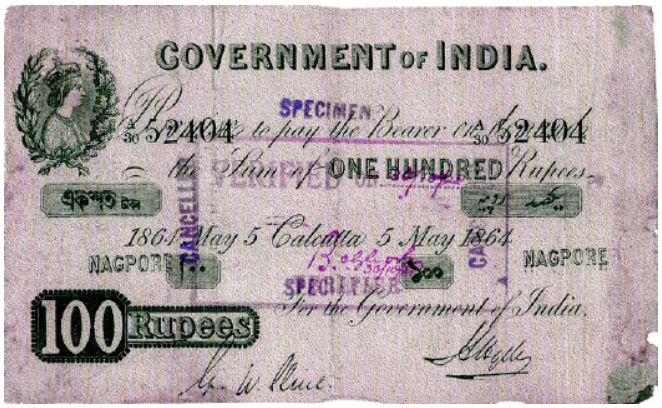
100 Rupees

RR No.	Signature	Circle of Issue	Prefix
RR-2.4.1	H. Hydes	Calcutta	A
RR-2.4.2	H. Hydes + R.A. Sterndale	Calcutta or Nagpore	A
RR-2.4.3	H. Hydes + G. W. Cline	Calcutta or Nagpore	A
RR-2.4.4	H. Hydes + L. Berkeley	Calcutta or Lahore	A
RR-2.4.5	J.A. Ballard – Commissioner	Bombay	C
RR-2.4.6	Signature not read (Signed as Commissioner of Issue)	Madras	B
RR-2.4.7	J. L. Shaw (Signed as Officiating Commissioner of Issue)	Madras	B
RR-2.4.8	C. Wilson (Signed as Acting Commissioner)	Madras	B



100 Rupees with Portrait of Queen Victoria
half note : Madras circle; dt. 29 July 1861;
signed by J. L. Shaw as 'Officiating Commissioner of Issue'

100 Rupees with Portrait of Queen Victoria
Two half notes dt. 20 May 1865 and 17 July 1861;
Calcutta circle; signed by H. Hydes



100 Rupees with Portrait of Queen Victoria
Calcutta circle, Nagpore sub-circle, dt. 5 May 1864,
signed by G. W. Cline and H. Hydes

500 Rupees

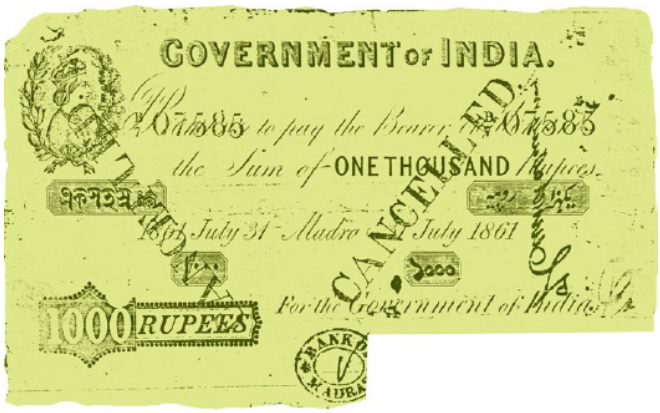
RR Type No.	Signature	Circle of Issue	Prefix
RR-2.5.1	Half note, sign cut	Calcutta	A

1000 Rupees

RR Type No.	Signature	Circle of Issue	Prefix
RR-2.6.1	H. Hydes	Calcutta	A
RR-2.6.2	Signature cut	Madras	B

500 Rupees with Portrait of Queen Victoria
Two half notes dt. 18 July 1861,
Calcutta circle

1000 Rupees with Portrait of Queen Victoria
Calcutta circle; dt. 25 May 1863; signed by H. Hydes



1000 Rupees with Portrait of Queen Victoria
Madras circle; dt. 31 July 1861; signature cut; seal
Bank of Madras

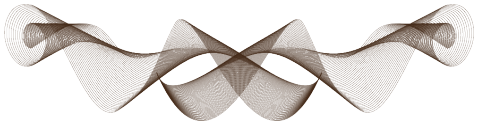
Anyone could apply to obtain the notes on demand against the exchange of Indian silver Rupees, silver bullion, or foreign silver coins evaluated at its bullion value, provided they were of a minimum value of Rupees two thousand. The currency notes constitute a liability of the Government. The issuing offices were needed to redeem the notes in silver coins. On receipt for redemption, they were NOT reissued and were cancelled by either perforating them with the word PAID or CANCELLED or defacing them with similar stamps. The signature and a portion of the top left hand serial number were often cut or punched out. These cancelled notes were audited, preserved for seven years and then destroyed in incinerators. The notes were destroyed only at the office of issue where they were originally registered after verification and after accounting for them in the note registers. This practice was discontinued in favour of re-issuing notes in a serviceable condition after 1915.

Instances of forgeries of the Government of India notes with portrait of Queen Victoria were brought to the notice of the Government after the notes were issued and in circulation. There were also concerns expressed about the quality of paper as it was noticed that the paper was prone to get damaged easily with repeated handling, re-issuing and in the weather conditions in India. Hence, it was necessary to change the design of the notes and improve the quality of paper.

The Bank of England took up these concerns with M/s. Portals. Thereafter, the paper was made more sturdy and the watermark changed to prevent further forgeries. The watermark was made more intricate and distinctive for notes of different denominations. It now had wavy lines towards the borders and the value of the note was placed in the centre with the word 'INDIA'. The watermark also included a manufacturer's own code towards the lower side. This kind of watermark closely followed that of the notes of the Bank of England. This was the beginning of Government of India's uniface notes with underprints from 1867. The underprints were initially in green and subsequently in red.

Bibiliography:

- The Bank of England archives.
- The British Library archives.
- Nasik Press, India.
- The Revised Standard Reference Guide to Indian Paper Money.
- Paper Currency of India – P. L. Gupta.
- Mr. Bazil Shaikh, India.
- Mr. Alkesh Arora, India.



Vignette of Queen Victoria – used on the notes
Manuscript reads 'Bank of England note for India'

FUTURE NEEDS OF CURRENCY SECTOR

Anti-Microbial Banknote Paper - An Indigenous Development

ANANTH HEGDE

Indian Banknote industry was dependent on western countries for requirement of Banknote Paper till 2016. Backward integration towards indigenization of manufacturing facility for banknote paper was always a necessity for the country's economic growth and making country self-reliant in the sector. Setting-up of Bank Note Paper Mill India Private Limited (BNPMIPL), a joint venture between BRBNMPL (RBI) and SPMCIIL(Goi) played a crucial role in the Indian history which came as a boon during demonetization period and Covid 19 era for the country, where BNPMIPL catered the country's major demand of bank note paper. BNPMIPL has set up the facility with an annual capacity of 12000MT paper and achieved a production up to 135% of the installed capacity within a span of 7years by proactive approach towards process rationalisation, automation, skill development of its employees, reduction in wastages, reduction in machine downtime etc. The Company has the capability and competence in the designing of watermarks, manufacturing of mould cover, pulping process of cotton fibres, banknote paper manufacturing and effluent treatment to make the facility as a zero effluent discharge unit.

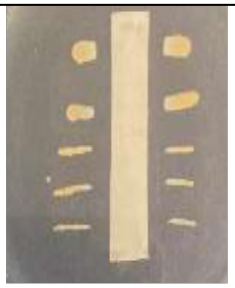
Reserve Bank of India (RBI) ensures adequate circulation of banknotes across the country1. Banknotes are exchanged for goods, groceries, services etc. amongst the public during circulation in various conditions raising the alarm towards hygiene of banknotes. Due to bad hygiene conditions, banknotes act as a media for growth of micro-organisms. As per annual report of RBI in the year 2021-20221, the number of banknotes in circulation were 116, 124 and 130 billion pieces for the years 2020, 2021 and 2022 respectively. Quantum of banknotes in circulation, with a population of 121.1 crores (census 2011), 137.4 Crores (projected in Census 2011) which is expected to grow to 151.8 Crores (projected for 2036)2, would be handled by vast public of different demographic regions, varied culture leading to exposure to numerous unhygienic conditions like sweat, saliva, contaminated body liquids, contaminants in vegetable/ meat market, oil, grease, dirt, soil, etc. The banknote act as a carrier of these innumerable micro-organisms and foreign dirt. Such bacterial deposit reduces the circulation life of banknotes making it unfit at the short time when exposed to such handling conditions.

Summera Rafiq et. al.3, Agersew Alemuand et. al.4, EK Elumalai et. al.5, Pradeep et. al.6, and various other authors indicate that banknote paper is contaminated with various bacteria species like Salmonella, Escherichia coli, Pseudomonas, Bacillus, Klebsiella, Streptococcus etc. and numerous other virus and fungal species. The need to combat the growth of these micro-organisms is a challenge posed on the currency sector of the country. The need was further experienced during the corona pandemic in the year 2020. Many research institutes and banknote producers conducted various experiments to prevent the possible transmission of the viruses and bacteria through bank notes during its circulation.

Banknote paper act as a carrier for various micro-organisms as it is handled by vast number of people in various geographic/ demographic conditions. To control the transmission of micro-organisms through banknotes, anti-microbial coating is required to be incorporated in banknotes which can be impregnated during banknote paper manufacturing. In this study various antimicrobial additives are being added along with sizing agent on the surface of the banknote paper. Various anti-bacterial/ anti-fungal agents like silver nanoparticles, benzalkonium chloride, cyclodextrin, bronopol and silver nitrate were used for experimentation at various concentrations along with the sizing agent. As a part of research and development, BNPMIPL has initiated a project for development of antimicrobial additive for banknote paper in collaboration with ICAR-CIRCOT (Indian Council of Agricultural Research -Central Institute for Research on Cotton Technology), Mumbai. Antimicrobial additive is being applied on cotton-based paper along with the sizing agent and is being evaluated for resistance towards various bacterial species like Staphylococcus aureus, Klebsiella pneumoniae and fungal species like Chaetomium globosum, Aspergillus niger. Zone of inhibition is being used to measure the susceptibility of the bacteria towards antimicrobial additive.

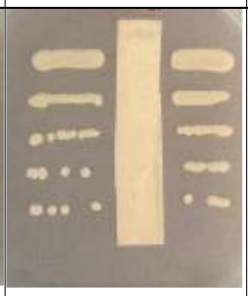
Retro-fitment module is being chosen to incorporate antimicrobial additive, which can be impregnated in master-sizer along with the sizing agent at the time of paper manufacturing. Various anti-bacterial/ anti-fungal agents like silver nanoparticles (AgNP), benzalkonium chloride (BKC), cyclodextrin (CD), bronopol (BNP), and silver nitrate (AgNO3) were tried at various concentrations along with the sizing agent. Antimicrobial additive with sizing agent were coated at an optimized dosing to have 2 – 2.5 gsm coating over the paper surface. Treated paper was subjected to various micro-organism and evaluated the effect on the paper as mentioned below:.

Table-1: Antibacterial activity of treated paper against S. aureus

Sr. No.	1	2	3	4	5
Sample Description	Sizing Agent – Control Sample	BKC treated	BNP treated	CD treated	BNP + AgNp treated
Antibacterial Activity					
Zone of Inhibition(mm)	-	20	36	-	34

It may be observed that while all the four chemicals inhibit the attack of bacteria on the paper Sl.No. 3 and 5 are more effective compared to other two at 2 & 4.

Table-2: Antibacterial activity of treated paper against K. pneumoniae

Sr. No.	1	2	3	4	5
Sample Description	Sizing Agent – Control Sample	BKC treated	BNP treated	CD treated	BNP + AgNp treated
Antibacterial Activity					
Zone of Inhibition(mm)	-	18	38	-	28

Retro-fitment module is being chosen to incorporate antimicrobial additive, which can be impregnated in master-sizer along with the sizing agent at the time of paper manufacturing. Various anti-bacterial/ anti-fungal agents like silver nanoparticles (AgNP), benzalkonium chloride (BKC), cyclodextrin (CD), bronopol (BNP), and silver nitrate (AgNO3) were tried at various concentrations along with the sizing agent. Antimicrobial additive with sizing agent were coated at an optimized

Table-3: Antifungal activity of treated paper against Chaetomium globosum

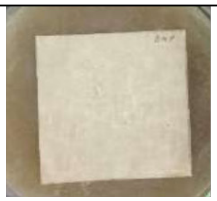
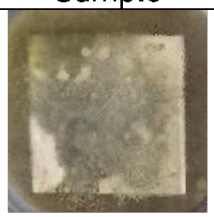
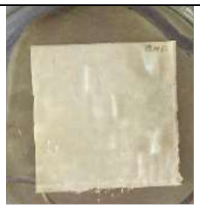
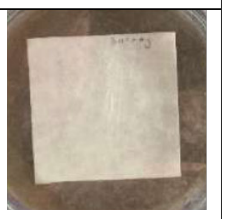
Sr. No.	1	2	3	4	5
Sample Description	Sizing Agent – Control Sample	BKC treated	BNP treated	CD treated	BNP + AgNO3 treated
Antifungal Activity					

Table-4: Antifungal activity of treated paper against Aspergillus niger

Sr. No.	1	2	3	4	5
Sample Description	Sizing Agent – Control Sample	BKC treated	BNP treated	CD treated	BNP + $AgNO_3$ treated
Antifungal Activity					

dosing to have 2 – 2.5 gsm coating over the paper surface. Treated paper was subjected to various micro-organism and evaluated the effect on the paper as mentioned below:.
Above study indicated that prominent additives which could be selected for scaling up for anti-bacterial activity would be BNP and BNP+ AgNp systems having maximum zone of inhibition visible through resistance to bacterial growth. In both the above cases the combination of BNP and BNP+AGNP is found to be more effective in preventing the bacterial attack. The same compositions were tried to assess the effectiveness of these chemicals on fungal attack on banknote substrate.

Above study indicated that prominent additives which could be selected for scaling up for anti-fungal activity would be BNP and BNP + AgNO3 systems visible through resistance to fungal growth. All the studies indicated that Bronopol (BNP) along with sizing agent is the promising formulation to have anti-bacterial and anti-fungal properties on banknote paper.

Conclusion:

By exposing paper to these various bacterial and fungal species, it was found that Bronopol is suitable for use along with the sizing agent in the formulation for anti-microbial properties on the banknote paper. Introduction of anti-microbial paper in currency sector shall reduce the transmission of microbes through banknotes as the medium and shall be free from pathogens. This shall support further in implementation of clean note policy of the Reserve Bank of India.

Acknowledgement:

BNPM acknowledge the support of ICAR-CIRCOT team of scientists at their Mumbai facility in conducting the study and finding an appropriate solution to the problem associated with the banknotes.

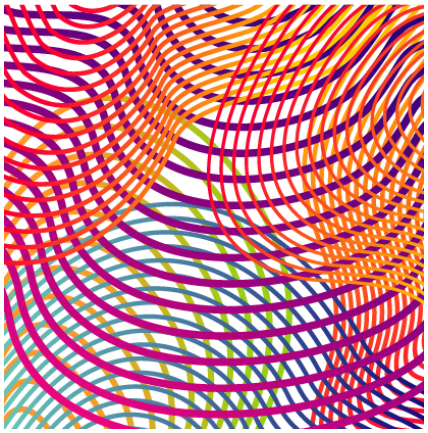
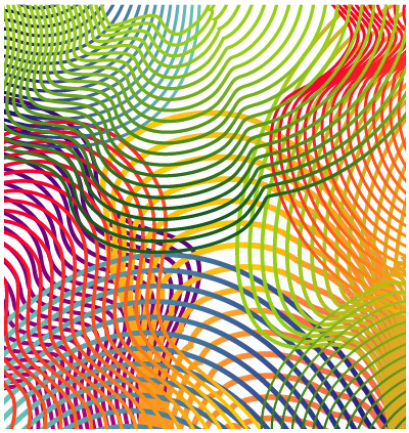
References:

1. RBI's Annual Report for the year 2021-2022, Section VIII -The Currency Management, p167 – 173, Source: https://www.rbi.org.in .
2. Census of India 2011, Population Projections for India and States 2011 – 2036, Report of the technical group on population projections, November, 2019, Source: National Commission on Population, Ministry of Health & Family Welfare, India.
3. Summera Rafiq, G.Vaijayanthi and SK.Jasmine Shahina, Prevalence and Health Implications of Microbial Load of Indian Paper Currencies and Coins, IAETSD Journal for Advanced Research in Applied Sciences, Volume 5, Issue 1, Jan/2018, p180-184.
4. Agersew Alemu, Microbial Contamination of Currency Notes and Coins in Circulation: A Potential Public Health Hazard, Biomedicine and Biotechnology, 2014, Vol. 2, No. 3, p46-53.
5. Elumalai EK, David E, Hemachandran J, Bacterial contamination of Indian currency notes (rupee), The International Journal of Occupational and Environmental Medicine 2012, Volume 3 (4), p204-205.
6. Pradeep NV, Anupama, Marulasiddaiah BS, Chetana M, Gayathri P, Maduri SN., Microbial contamination of Indian currency notes in circulation, Journal of Research in Biology, 2012, Volume 2(4), p377-382.

APPLICATIONS OF FLUORESCENT COMPOSITES

AS SECURITY FEATURE OF BANK NOTE TO OTHER DOMAIN

UDAYAN GUPT

Nanotechnology refers to the domain of science that focuses on designing, manufacturing and deploying structures, devices, and systems by manipulating atoms and molecules at the nanoscale. It has a variety of concepts for research and implement it in various fields for a better future. The principles of luminescence and fluorescence phenomena in nanotechnology are fascinating. These concepts have fascinated the domain of science since long. Luminescent materials exhibit unique features at the nanoscale and their technological impact in a variety of areas has long drawn the interest of scientists to this field of study.

Counterfeiting is a growing global problem. Therefore, anti-counterfeiting techniques are vital, particularly for the protection of bank notes, because it is manufactured with the intention of being difficult to replicate and simple to confirm. One way to incorporate luminescent materials as luminescent security features is to print them with inks. Typical examples are bank notes that show luminescent parts as colours under UV light. Generally, it is prepared by the application of lanthanide compounds by different synthesis methods. It is being applied in different types of security features such as numbering, pictorial form, colour form, used as fibres, grains etc.

Fluorescence was first discovered in 1845 by Fredrick W. Herschel. He discovered that UV light can excite a quinine solution (e.g. tonic water) to emit blue light. British scientist Sir George G. Stokes first described fluorescence in 1852 and was responsible for coining the term when he observed that the mineral fluorspar emitted red light when it was illuminated by ultraviolet excitation. Stokes noted that fluorescence emission always occurred at a longer wavelength than that of the excitation light.

The rare earth elements, also called lanthanides, play an essential role in modern life through materials, electronics and medical use. It was known since the early 1930s that the salts of certain lanthanides are fluorescent. The reaction of lanthanide salts with nucleic acids was discussed in a number

of publications during the 1930s and the 1940s where lanthanum containing reagents were employed for the fixation of nucleic acid structures. In 1942 complexes of europium, terbium and samarium were discovered to exhibit unusual luminescence properties when excited by UV light. The distinctive character of the emission from lanthanide ions which are widely recognised for their exceptionally luminescence property under UV light or near IR light.

Lanthanide complexes are very precious and important materials to increase the fluorescent applications in various fields. Lanthanide-based Nano particles have shown great potential for use as luminescent materials. The successful use of highly luminescent rare-earth doped nanoparticles, combining the various properties of doping ions and the nanoparticle matrix, has ensured the expanded use of nanoparticles. As far as another application of lanthanide compounds is concerned it has numerous applications e.g., in cancer research, to detect biomolecules, in emissive display application, to detect x-ray, in integrated optical systems, in quantum dots, in hydrogen peroxide sensor, in virology, in medical imaging and many more. There are several ways of conducting this analysis by the use of fluorogenic enzyme substrates allowing fluorescence resonance energy transfer. In virology, traditional virus diagnostic procedures are being replaced by sensitive immunoassays with lanthanides. In the medical imaging field, several systems have been proposed that combine MRI capability with lanthanides probes.

A peculiar characteristic of lanthanides is that their excited states have long lifetimes. This property is therefore very useful for fluorescence imaging and multiphoton absorption. The longer lifetimes give clearer images in fluorescence imaging and stronger probabilities for multiphoton absorption. Apart from their use in imaging applications, they can also be used to detect biomolecules. By modifying the surface of the lanthanide nanoparticle, specific biomolecules can be

"Lanthanide complexes are very precious and important materials to increase the fluorescent applications in various fields. Lanthanide-based Nano particles have shown great potential for use as luminescent materials."

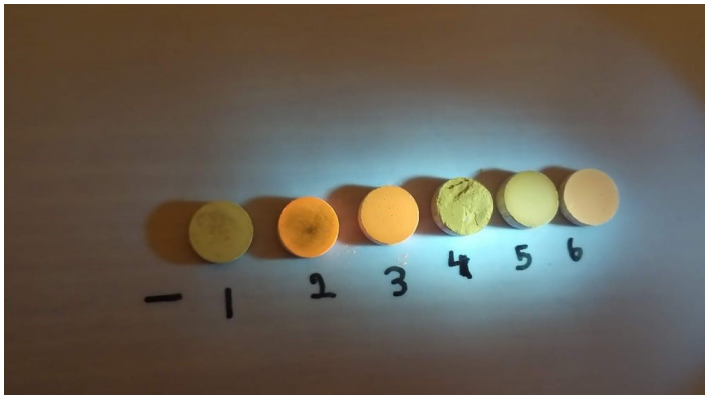
absorbed onto the surface and easily detected. Lanthanide nanoparticles are also used to aid the conversion of IR light into light that can be absorbed by a solar cell.

A recent article showed that lanthanide nanoparticles when functionalized were a good candidate structure for photodynamic therapy. The fluorescent nanoparticle can be activated by near-infrared light when it is inside a tumour cell. The application of nanomaterials made of rare earth elements within biomedical sciences continues to make significant progress. Based upon excellent optical features, such as low background fluorescence and high sensitivity, lanthanide nanomaterials can be applied to various biosensing areas, such as pH detection, essential physiological ions, ROS detection, temperature monitoring or even COVID-19 testing. A current, pandemic related application of lanthanide nanoparticles is the utilization of self-assembled lanthanide-doped polystyrene nanoparticles as a fluorescent sensor to detect anti-SARS-CoV.

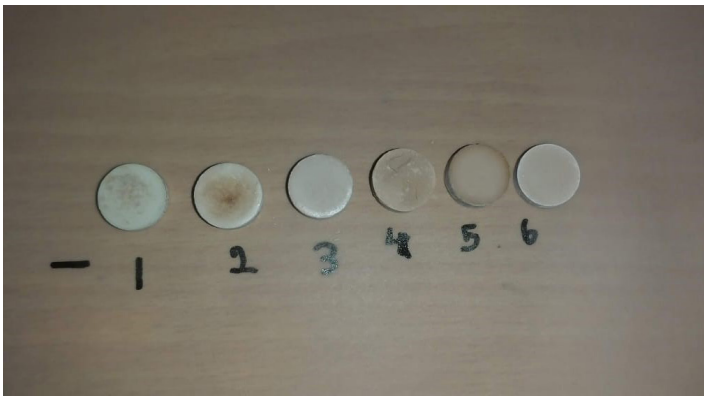
Overall, lanthanide-based composites have shown remarkable application prospects in fluorescence imaging, medical diagnosis, and treatment. But, for inorganic nanocomposites, toxicity is still a major problem, and Nanoparticles made of lanthanides are no different. R&D is often a broad approach to exploratory advancement and R&D advancements do not occur overnight. Years of hard work, patience, a lot of literature study and several detail analysis are required to turn an idea into a viable application. Example – It is reported that a major ink producer has recently developed anti-counterfeit security inks based on quantum dot technology that exhibits high-

efficiency photoluminescence over a wide range of tuneable colours that are inherently very difficult to reproduce. It was being developed since past six years with the collaboration of a Mexico-based nanotechnology company.

The American Ceramics Society reported the use of porous-wall, hollow glass microspheres for the production of counterfeit-proof ink that can have multiple properties including fluorescence at the same time by controlling wall thickness or sphere diameter with external coatings or treatments. A research group at Hokkaido University in Japan found a gold compound with a unique feature. In its original form, the substance produced a visible blue fluorescence. After being ground up into a fine powder, the substance produced infrared emissions. Producing fluorescent materials with excitation properties that can be retained even after bank notes are burnt is another novel and achievable idea. Similarly, many novel ideas can be presented and achieved in the field of fluorescent material research. Overall, lanthanide-based composites have demonstrated impressive potential for use in medical diagnosis, treatment and fluorescence imaging. Nanotechnology researchers dedicated to developing rare earth nano-probes with improved surface modification, morphology and size, have enabled increased function for diagnosis or targeting. In the coming years or decades, there will be a lot of scope and tremendous opportunities for research on it.



Under 365 nm UV Excitation



Under Normal Day Light

FEATURES IN BANKNOTES
FOR VISUALLY IMPAIRED

S. SRIKANTH & MAHESH A

Visual impairment is a medical definition primarily measured based on an individual's better eye visual acuity. Low vision is a functional definition of visual impairment that is chronic and impacts daily living. As such low vision can be used as a disability metric and varies based on an individual's experience, environmental demands, accommodations, and access to services. Globally, at least 2.2 billion people have a near or distance vision impairment. Of those who are blind 90%, live in the developing world.

The world of money has completely changed, but some things remain the same, in recent times, the quickly expanding utilization of cards and all the other different forms of money transfer mechanisms, including electronic payment, has certainly made its mark on today's world. Paper money is still broadly used in today's world for ordinary exchanges because of its convenience. There are plenty of problems faced by people with visual disabilities, one such disability is the inability to recognize paper currency.

There are approximately 180 currencies in the world, and each of them look totally different. In different countries it is observed that the size of the notes determines its value to humans. Humans have paved the way for modern science to make things easier for themselves. Hence, with the help of technology over the last few years it is noticed that people

have shifted to internet banking and other modes of payment. This however, has not stopped people from using cash as a form of payment. It is still very relevant in today's market and will take a great number of years to become obsolete.

The visually impaired are divided in three subgroups: colour-blind, partially sighted and blind people. Their first needs are useful denomination features rather than security features, as they help them in determining a banknote's value. This article provides a historical overview of banknote design features for the visually impaired. Two features are at least needed for every subgroup of the visually impaired to establish the banknote's value. These two features are dedicated firstly to the relevant user group, but will also be used by others, including people with normal vision.

Blind

- Creating a large and increasing length difference between the low denominations, A uniform height is the worldwide trend; banknotes fit better in wallets and are more efficient to produce, distribute and sort.
- Providing all denominations with a coded tactile structure, using dots and lines variants on alternating denominations.
- Using also the short and long edges of the notes.
- Making use of the new digital engraving techniques with a higher relief and sharper slopes.

Indian banknotes contain several features which enable the visually impaired (colour blind, partially sighted and blind people) to identify them, viz., intaglio printing and tactile mark, variable banknote size, large numerals, variable colour, monochromatic hues and patterns. Technological progress has opened up new opportunities for making Indian banknotes more accessible for the visually impaired, thereby facilitating their day-to-day transactions.

"Technological progress has opened up new opportunities for making Indian banknotes more accessible for the visually impaired, thereby facilitating their day-to-day transactions."

Colour-blind

- Creating a colour scheme for all denominations suitable for both the colour-blind and normal sighted people.
- Realizing maximum colour differences between successive denominations.
- The individual banknotes should be monochrome and vivid

Partially sighted

- Increasing the size of denomination figure.
- Using numerals both on the front and on the reverse.
- Keeping numerals on the same location.
- Creating a clear contrast between the numbers and the homogenous background.
- Creating a clear 'silhouettes' on the front, e.g. by different shapes of the main image.

For visually impaired following features have been provided in Indian Bank Notes,

- Intaglio or raised printing of Mahatma Gandhi portrait
- Ashoka pillar emblem
- Bleed lines (7 angular bleed lines on left and right in raised print for ₹2000, 5 angular bleed lines on left and right in raised print for ₹500, 4 angular bleed lines with two circles in between the lines on left and right in raised print for

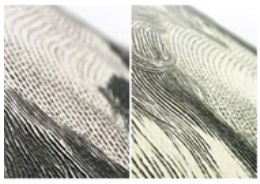
₹200, 4 angular bleed lines on left and right in raised print for ₹100)

· Identification mark for different currency (Horizontal rectangle with ₹2000 in in raised print on the right, Circle with ₹500 in raised print on the right, raised identification mark H with micro text ₹200, raised identification triangular mark with micro text ₹100)

· 'Mobile Aided Note Identifier (MANI)', a mobile application for aiding visually impaired persons to identify the denomination of Indian Banknotes.

World Currency Features for Visually Impaired

USA – Dollar

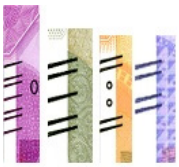


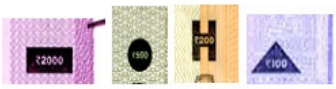
The United States is the only country that prints all denominations of currency in the same size. The currency reader, called the iBill Talking Banknote Identifier, is a compact device that announces a note's value in one of three ways: voice, pattern of tones, or pattern of vibrations. Move your finger along the note's surface to feel the raised printing, which gives genuine Federal Reserve notes their distinctive texture. A large purple/green/gold numeral on the back of the note helps those with visual impairments distinguish the denomination.

Europe – Euro

Different sizes: the higher the value, the bigger the banknote. Tactile marks near the edges of the €200 and €500 banknotes.

India - Rupee





Nail scratch element and Braille like pattern

Australia – Dollar

Tactile feature - Feel for a raised bump on each of the long edges of the banknote.

Intaglio print - Feel the distinctive texture of the raised, dark printing.

Switzerland – Franc

The hand, the number 100 and the bank's name can be felt thanks to the raised print produced by intaglio printing.

Edges of the note are a series of short, raised lines to help the visually impaired. Run your fingers along the edges of the note: the tactile lines can be clearly felt. In the case of the 100-franc note, there are four blocks of these tactile lines.

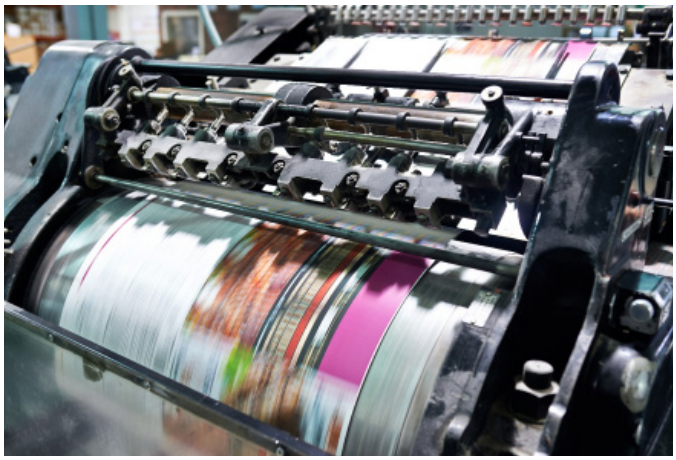
ROLE OF TECHNOLOGY

IN IMPROVING THE QUALITY OF BANK NOTES IN BRBNMPL

S. M. PAWALE

BRBNMPL started printing of banknotes of all denominations at both Mysuru and Salboni Presses from the year 1999 after the inception of Main Press. Initially all the printed sheets were subjected to quality examination manually at two different stages, before numbering and after numbering. All the printed sheets except machine spoil from intaglio and offset machines were subjected to manual quality examination to segregate good printed sheets from the semi good sheets with printing defects at Quality Examination (QE) section before being numbered in the numbering machine.

Again after numbering of the Intaglio and Offset printed good sheets, they were subjected for examination of quality of numbering at Number Sheet Examination (NSE) section. Sufficient quantity of Water Mark Paper (WMP) sheets was required to be maintained in the Vaults before each stage of printing for continuous running of machines as well in quality examination section; due to this more space was required in the vaults. Also the inventory of work is progress was more. To carry out the above examination around 50 to 80 examiners in QE section and around 30 to 50 examiners in NSE section were deployed apart from other staff deployed for transportation.



More than 50% of the total manpower was required to ensure the quality of bank notes. Initially the benchmark for each examiner for detailed quality examination at QE section was 7 reams, after process capability study of the intaglio machines, the flick method of examination was introduced and the bench mark was increased to 11 reams per examiner but this was the bottle neck for increasing the productivity per person. After examination in QE section, the sheets were segregated in to 4 varieties All-Good (AG), Highly Scattered Cancellation (HSC), SC (Serial cancellation) and Spoils. AG and SC sheets were numbered on numbering machine for

"The need of the automated inspection system was felt necessary on offset and numbering machines to reduce the spoil as well as to further improve the quality of bank notes. But the bottle neck was cost of imported automated inspection system and its spares was abnormally high hence it is decided to promote ingenious developed technology."

further processing in finishing machines. HSC sheets were processed in Salvage section to salvage the good notes. In the year 2000 it was decided to install automatic online quality examination system on Intaglio machines. Notasave from KBA was installed on Intaglio machines at Mysuru in the year 2001 and Image Guard from G & D at Salboni press in the year 2002. After the installation of automatic online quality examination system on all the intaglio machines, the need of manual examination All Good printed sheets gradually reduced.

By this, the quality of banknote was ensured by the system and chances of manual error were eliminated. The overall quality of the bank notes improved and complaints from customer started reducing. Only the sheets rejected by the Notasave / Image Guard and sheets marked by the machine operator was subjected for manual examination at QE section and total manpower deployment at QE section reduced by more than 50%. After retrieving good sheets by manual examination of rejected sheets at QE section, the remaining semi-good sheets were further processed in Salvage section manually.

The need of the automated inspection system was felt necessary on offset and numbering machines to reduce the spoil as well as to further improve the quality of bank notes. But the bottle neck was cost of imported automated inspection system and its spares which was abnormally high hence it was decided to promote ingenious developed technology. Lucid technology from Bangalore was awarded the job for developing the automated inspection system on intaglio machine in the year 2007. In the year 2008 they successfully developed the indigenous automated quality inspection system with the help of our technical team. The cost of this indigenously developed system was less the 50% of imported system.

During the year 2009-10 it was felt necessary that there must be integrated cutting and note sorting machine in order to reduce the manual work of salvaging good notes from the rejected semi-good sheets by sorting and numbering at Salvage section. In view of this, on the requirement of BRBNMPL, the G & D designed and integrated cutting and single Note inspection machine and supplied BPS machine (Banknote Processing System) in Salvage section at both Mysuru and Salboni presses to process the numbered semi good sheets which is rejected by the automated inspection system. The BPS is capable of checking and segregating good notes from the numbered semi-good sheets and the spoil notes are shredded online and good notes bundles are available for on line packing. This was a major step taken by the Company to reduce the spoil and improve the quality of Banknotes in economical way by reducing the manpower required in salvage section for processing the semi good sheets.

The indigenously developed automated on line sheet inspection system was retrofitted on all the intaglio and offset machines in the year 2018 to 2022. Also from the year 2022, the work of retrofitting of online number verification system on numbering machines has started to ensure the quality of banknotes. By taking up this major step in technological development for automation of quality inspection system, it has given major advantage to the BRBNMPL in currency printing world by improving the quality of banknotes and increasing the productivity per employee from 4 to 5 million to 8 to 9 million, which is the highest in the world.

ENERGY CONSERVATION

S A RAHIM AND M K NARASHIMA

Energy Conservation

Energy conservation is the effort to reduce wasteful energy consumption. Energy conservation can be achieved through efficient energy use, which has a number of advantages. It not only reduces cost but also helps in reduction of greenhouse gas emissions and achieve reduced carbon foot print. Energy conservation measures have primarily been focused on technological innovations to improve efficiencies. At the same time changes in users' behaviour will also contribute significantly in reducing energy consumption and achieving a low carbon footprint.

Rapid technology changes are main cause for the growth of economy. This in turn has increased the demand for energy substantially. Further, the high level of energy intensity in some of the industrial sectors is a matter of concern for the developing nation. With the advent of Electric Vehicles and increased use of electrical / electronic gadgets, the demand for energy is surging high day by day. In such a scenario, efficient use of energy resources and their conservation assume tremendous significance. This is essential for curtailment of wasteful consumption and sustainable development.

Energy Audit

The objective of Energy Management is to achieve and maintain optimum utilisation, throughout the organization and:

- To minimise energy costs / waste without affecting production and quality
- To minimise environmental effects.

The primary objective of Energy Audit is to measure and analyse energy use. This determines ways to reduce energy consumption per unit of product output or to lower operating costs. Energy audits can determine specific opportunities for energy conservation and efficiency measures as well as determine cost-effective strategies.

Energy Conservation Initiatives In BRBNMPL

BRBNMPL, which is certified for Environmental Management System - ISO 14001:2018, has defined 'Environment and Sustainability' as one of its Core Values. The company has taken a number of pro-active measures to conserve

energy in all the three units. Energy audits at both the presses are conducted regularly through an external certified Energy auditors. The main focus of the audit is to study power consumption and suggest measures to improve energy efficiency and identify opportunities to reduce energy expenses at the presses. The following are some of the measures taken by BRBNMPL in reducing energy consumption / increasing energy efficiency.

- Replacement of Chillers with eco-friendly refrigerant gases and with energy efficient Chillers.
- Use of non-conventional energy by Installation of Solar Power Plant.
- Cyclic de-energisation of idle transformers at Mysuru Press.
- Replacement of conventional light like High Pressure Sodium Lamp /Compact Fluorescent Lamp / Tube light with energy efficient Light Emitting Diode lights.
- Thermal insulation of chilled water pipe line.
- Thermal insulation of roof top at Salboni Press.
- Maintaining Power Factor above of 0.96 to unity.
- Use of energy efficient compressor with Variable Frequency Drive (VFD) system.
- Running of water pumps in 'Off Peak' hour thereby maintaining uniform Max Demand throughout the day.
- Installation of Digital Energy Meters for accurate measurement and monitoring.
- Creation of Internal Energy Cell.
- Appointment of Energy Manager who has a well-defined responsibility to reduce the energy consumption.

Conclusion

The onus of saving energy is with everyone and is the need of the hour. A few acts like Switching off lights when leaving the area, changing over to LED lights, using energy efficient appliances (like 5 star rated) certified by BEE, unplugging devices when not in use, providing for more ventilation and light during construction of houses will help in reducing energy consumption. BRBNMPL being a socially and environmentally responsible company, will always scout to find and adopt new measures /technologies to bring in energy efficiency. Collectively it is our responsibility to leave a greener planet for our future generation.

EVOLUTION OF BRBNMPL

M V Rajanikanth

Bharatiya Reserve Bank Note Mudran Private Limited (BRBNMPL) was incorporated on February 3, 1995. The formation of BRBNMPL was a strategic decision of Government of India to cater the growing needs of currency to the country and achieve self-sufficiency in currency printing. BRBNMPL, since its inception has achieved many milestones in the field of Currency/Bank note Printing and supply. Let's quickly look back to history of BRBNMPL and its contribution in the currency eco system till date.Concerns about virus transmission

"By mid-80s currency requirement in India had increased. The capacity of both Currency Note Press, Nasik and Bank Note Press, Dewas was not becoming sufficient. Government of India decided in principle to establish a bank note press with a capacity of 7500 million note pieces/ annum."

History of BRBNMPL

By mid-80s currency requirement in India had increased. The capacity of both Currency Note Press, Nasik and Bank Note Press, Dewas was not becoming sufficient. Government of India decided in principle to establish a bank note press with a capacity of 7500 million note pieces/ annum and asked Shri M.V.Char, General Manager BNP, Dewas to submit a preliminary Project report in 1984. The Preliminary report confirmed the need for a new bank note press. Accordingly, a committee consisting of Shri P.S. Shivaram, General Manager, India Security Press and Shri H.N. Gupta, General

Manager, Calcutta Mint was constituted by the Government of India to study the suitability of Panaghar near Durgapur, West Bengal and its surrounding areas for the establishing New Note Press Project which was indicated by the then Finance Minister Shri Pranab Mukherjee. However, the same was not came up for final decision.

In Aug 1985, G.R. Kahate, General Manager of Bombay Mint was appointed as Officer on Special Duty (OSD) for the New Note Press Project (NNPP) and Mecon, Ranchi was asked to prepare a Detailed Project Report. The report was prepared and submitted to the Ministry in February 1986. Following the report, a committee comprising OSD- NNPP, Chief Officer-RBI, GM-MECON visited various countries to study the technology used for bank note printing. In the meantime, Reserve Bank of India indicated the rise in demand and projected annual demand by 1995-96 to approximately 16000 million note pieces and told single unit cannot cater to the needs.

Transportation of banknotes to various RBI centers and supply chain constraints were also informed as a major concern. Public Investment Board (PIB) in June 1986 recommended to establish two Presses, one in the eastern region and the other in the southern region and accordingly Ministry directed to prepare a Detailed Project Report (DPR). Officers deputed from GOI and officers deputed from MECON were appointed to study and prepare the DPR. The team consisting Shri G.R. Kahate, Shri V.V. Lakshminarayan, Shri S.B. Deshmukh, Shri A.C. Jolly and from MECON Shri P.K. Adak, Shri S.K. Moorthy and Shri A.V. Ramaiah made rich contributions in preparing DPR. The estimated output in the DPR was

M/s Currency Note Press, Nashik	4400
M/s Bank Note Press, Dewas	1650
M/s NNP, Southern Region	4975
M/s NNP, Eastern Region	4975
Total	16000

Assumptions

- Labour productivity: 2.66 Million Notes / Man Year.
- Smaller sheet sizes in reels to suit web technology.
- Expected all good sheets – 85% for higher denominations and 87.5% for lower denominations.
- Semi good sheets - 15% for higher denominations and 12.5% for lower denominations.
- Over all spoilage - 5% for higher denominations of Rs. 100 and 500 with sheet technology and 9.5% for denominations of Rs. 5 and 10 with web technology and 11% for denominations of 20 and 50.
- Effective working hours 5 hrs / shift out of 9 hours with one hour overtime.

Site Selection and Transfer of NNP Project to RBI

The committee initially studied the Panaghar in West Bengal and felt that the place may create law and order problems due to many Bangladeshi migrants residing over there. Committee visited Salboni near Kharagpur where an abandoned airstrip used during the Second World War was available and found that it is suitable to establish bank note press. Since the area belonged to the Ministry of Defence and could be transferred without any difficulty. As regards to the Project in the southern region, the Committee visited

several places and recommended sites near Bellary, Kolar and Mysore in Karnataka. Doubts were expressed on the effect of the frequent blasts at Kolar mines. Considering the availability of infrastructure and land, Mysore was favoured. The NNP Project which was initially started by GOI was later in Dec. 1989 shifted to Reserve Bank of India for faster considerations.

Award of Contract

An advertisement was published in leading world newspapers in February 1990 inviting the pre-qualification bids to identify the eligible and competent tenderers for supply of the plant and machinery for the New Note Press Projects. During elaborate discussions, it was finalized for sheet printing instead of web printing. Out of identified six suppliers viz., De La Rue Giori, Miller, Komori, Hamilton, Goebel and Thrissel only two qualified bids were received from De La Rue Giori and Komori. After many rounds of technical and price negotiations M/s. De La Rue Giori was awarded Mysore unit and M/s. Komori was awarded Salboni unit to establish complete bank note printing machinery and equipment. M/s. De La Rue Giori was an established machine supplier in bank note printing around the world had turnkey project experience since decades. M/s. Komori was a new entrant in the area of bank note machine manufacturing. A pragmatic / challenging decision was taken by awarding turnkey project contract to M/s. Komori Corporation, Japan.

Formation of BRBNMPL and Commencement of Operations

The transfer of New Note Press Project to Reserve Bank of India was a big leap of Historical importance. RBI formed a wholly owned entity Bharatiya Reserve Bank Note Mudran Private Limited on 3rd February 1995 with two production units at Mysore and Salboni having Corporate Office initially at RBI, Garment House at Worli, Mumbai. Later on Corporate Office was shifted to Banglore at RBI premises. Eventually own building was constructed at the present location of Bannerghatta Road and shifted all central operations. By virtue of the provisions of 43A of the Companies act 1956 the company became a deemed public limited company from 5th March 1997. Consequent amendment in the provision in 43A in companies (Amendment) Act 2000, the company again became private limited company w.e.f 24th Feb. 2002.

Considering the magnitude of the project, it was decided that the press should be established in two phases, first phase being with one line of operation basically as testing ground for new work methods and train personnel for efficient run of phase-II operations. The operations of Mysore with one line of Rs.100/- denomination and Salboni with one line of Rs.10/-denomination for phase-I (which was called as Mini Press) was inaugurated by Dr. Rangarajan, Governor of RBI in June and December 1996. Similarly, Phase-II (called as Main Press) with all combination of denominations was inaugurated by Dr. Bimal Jalan, Governor of RBI on 12th May 1999 at Mysore with 7 lines and Salboni on 12th February 2000 with 8
.lines.

Process Re-Engineering: Innovative Methods of Operations

Since inception, BRBNMPL has been practicing many process re-engineering activities simultaneously during project stage and later on as a continual process. Prevailed processes at CNP and BNP were reviewed and methodically modified to optimize productivity, quality, security and manpower utilization. Following are the major outcomes

- The initial estimates of around 2300 employees / press to produce 4950 Millions / annum has drastically reduced to 650-700 employees/ press.
- The per employee productivity has gradually increased to 9-10 million from the DPR estimates of 2.66 Millions.
- Spoil percentages has reduced significantly from the DPR estimates to 2-4%.
- Staggering work practice has started to increase the productivity.

- Concept of overtime work was not started since beginning. Instead productivity linked incentives started at later stage.

Over two and half decades of existence, BRBNMPL has emerged as world's top most producer of bank notes with state-of-art technology, production of bank notes, designing of bank notes, distribution to various RBI and currency chest destinations caters 60-65% of country's bank note requirement. As a part of backward integration, Bank Note Paper Mill was established as a joint venture between BRBNMPL and SPMCIL. In house security ink manufacturing unit was established and CSI ink manufacturing was also started from 2018-19.

Key Milestones, Developments and Achievements of BRBNMPL

» 1996 - Technologies and machineries from De La Rue Giori, Switzerland and Komori Corporation, Japan, thereby introducing competition in a monopoly market
» Revisiting activities established at Nasik and Dewas and non-significant activities are optimized thereby increased productivity, reduced huge man power, process easiness increased
» 1998 - Remittance of fresh banknotes by road to RBI Issue Offices
» 2000 - Multiple sources for CWBN paper through global bidding
» 2004-06 - Design and Production of Improved Mahatma Gandhi Series – (MG Series-2005)
» 2007 - Introduction of indigenised online inspection system in Intaglio
» 2008 - Introduction of CTiP, CToP and integrated automatic cutting and Single Note Examination System (SNES)
» 2009 - Approval for issue of non-sequential numbering
» 2013-2016 - Setting up of 12000 MT banknote paper mill
» 2014 - Establishing state of the art laboratories for testing raw materials and banknotes
» 2016-18 - Design and Production of New Mahatma Gandhi Series
» 2016 - Stellar role in remonetisation efforts of RBI
» 2016 - Direct remittances to Currency Chests
» 2018 - Establishing Varnika – Ink Manufacturing Unit with 1500 MT/ annum capacity
» 2019 - Starting of production of CSI Ink
» 2020 - Setting up of Varnish Plant – a key raw material for ink production
» 2020 - Integrated quality inspection systems (Indigenous), for assuring security features and print quality
» 2022 - Ink Manufacturing Unit- Varnika- dedicated to nation by Governor, RBI
» 2022 - Learning and Development Centre – Training modules commenced and for new physical infrastructure foundation stone laid down by Governor, RBI
» Introduced novel security features developed in-house
» Procurement of colour shift security thread, Colour Shift ink through competitive bidding
» Multiskilling and multi-tasking of human resources
» Highest Per Person Productivity in the world through significant process engineering
» Meeting 60-65% of RBI's banknote requirements

(*Based on Various documents and diaries)

LOGISTICS:
PAST, PRESENT AND FUTURE

A K SRIVASTAVA

Printing of Currency is a highly sophisticated operation which needs dedication and understanding about the substrate and inks. After printing the currency the most important thing is its distribution across the country. Security of the product is paramount right from the various stages of printing, till it reaches to the vaults of the banks safely.

When BRBNMPL started its despatches in 1996, we were following the norms of Nasik and Dewas, as the newly recruit employees had no idea of how these operations were carried out. We were under the influence of the old presses for about a year or so. In the old presses, two Press Representatives (PR) were going, by road/rail/air. Gradually when we gained confidence, we reduced the number of press representatives by road/air to one. For some years we sent only one PR by rail also, but now with more complications in rail transport, we have gone back to two PR's. In Nasik and Dewas, the movement of treasure is only through rail only. That also they move through passenger (slow) trains which take sometimes 8 to 10 days to reach their destinations.

From the inception, BRBNMPL connected our treasure with express trains, so that they can reach their destination within a week. Initially for the first few years, Salboni was despatching through Eastern Railway. But we being situated under South Eastern Railway, we were finding it difficult to send our remittances through Eastern Railway, as they had their own priorities. Sometimes our treasure was held up at Howrah for few days, which was not safe also.

Things changed in 2011, South Eastern Railway Headquarters, Kolkata was approached and requested to divert the route through Tatanagar to North India. By achieving this, we were no longer dependent on Eastern Railway, and SER Headquarters became our nodal point for controlling the rail consignments. This was one giant step towards the easing of our despatches.

In future, more emphasis will be given to Direct Remittances. So accordingly, we may have to change our mindset also. As Chests have a capacity of 90-100 boxes and many have a much lesser capacity also. So, we may have to device a fool proof plan to load boxes for two or more chests in one railway wagon or truck.

As our organisation has reached in such a situation that we may have to swim against the tide, the need of the hour is 'out of the box thinking' and this approach will help us to see golden days ahead.

Banknotes in The Time of COVID 19

Pandemic - Myths and Findings

DHRUV MATHUR

Introduction

In light of uncertainties that the SARS-CoV-2 infection could be transmitted through banknotes, fears fuelled by media and government created confusion for the public. The epidemic has increased the demand for banknotes as a store of value while decreasing the usage of banknotes in commerce. Even the WHO issued no warnings or statements about COVID-19 transmission via coins and banknotes. Despite the fact that citizens reported using banknotes, less in transactions due to fear of infection, study reveals that the danger of the virus being transferred by banknotes and coins is minimal.

"The scientific community's concludes that SARS-CoV-2 spreads mostly by respiratory fluids and airborne transmission and surfaces play an insignificant role in the spread of virus. According to scientific data, banknotes have a lower probability of transmitting a virus than plastic cards..."

Concerns about virus transmission

There have always been worries that money might contain bacteria or viruses. Numerous surfaces that individuals come into contact with, on a daily basis harbour bacteria and viruses. But just because there are germs or viruses on a surface doesn't indicate that anybody who touches it runs the risk of getting sick. One of those numerous surfaces is banknote. Numerous tests and studies have been conducted to understand the behavior of the corona virus on our banknotes, which has improved our understanding of virus transmission.

Inhaling droplets or aerosols released by an infected person or possibly touching a surface where droplets from an infected person have landed, is the most prevalent route for people to catch the Covid infection. Due to their intermittent direct exposure to the environment, banknotes are often not directly implicated in these transmission channels.

The danger of direct contamination for banknote is often much lower than for open surfaces in retail or home settings where inhaled droplets from an infected person can

fall since banknote is typically housed securely in wallets or safes. Wherever it might happen, contamination of banknotes is most likely to happen indirectly by transfer from an infected person's hands or when a person touches a contaminated surface before touching a banknote. Any contamination through these channels would probably result in far lower viral levels than contamination through direct contact

Scientific Evidence- Research Findings

According to the study published in the journal PLOS ONE, it is not recommended to use credit/ debit cards or any plastic currency as a substitute to paper banknotes as a COVID-19 preventive technique. The virus exhibits increased stability on plastic money cards, according to the researchers, with active virus still being found 48 hours after first deposition. The scientists collected several $1 banknotes, metal coins and credit (plastic) cards and infected the currency with SARS-CoV-2. Following that, samples of the banknotes and cards were examined for signs of viruses. Even 30 minutes after infestation, the SARS-CoV-2 was difficult to be detected on the paper currency, according to the researchers. According to this study, at 30 minutes, the virus got reduced by 99.99%. After 48 hours, the researchers performed another test and discovered no living virus on the banknotes. On plastic cards, however, the infection only decreased to 90% after 30 minutes, and 48 hours later, the live virus was still visible on the cards. The metal coins responded similarly to the plastic cards, with an initial reduction in virus presence that was significant, but after 48 hours, the coins continued to test positive for the live virus. The amount of virus that can survive on banknotes in the event of a transfer similar to a cough or sneeze has also been studied by the Bank of England.

Less than 2% of the virus survives more than six hours after being transferred to a banknote, according to their study. Another study conducted by the European Central Bank (ECB) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) found that the virus can survive on a variety of surfaces. According to it, the viral concentration drops to such a low level after only six hours that the risk of infection is small and the virus is fully gone after two to three days. It also indicates that the virus persists for a shorter period of time on the porous surface of a banknote. The virus is also more difficult to spread when it comes into contact with porous and absorbent surfaces.

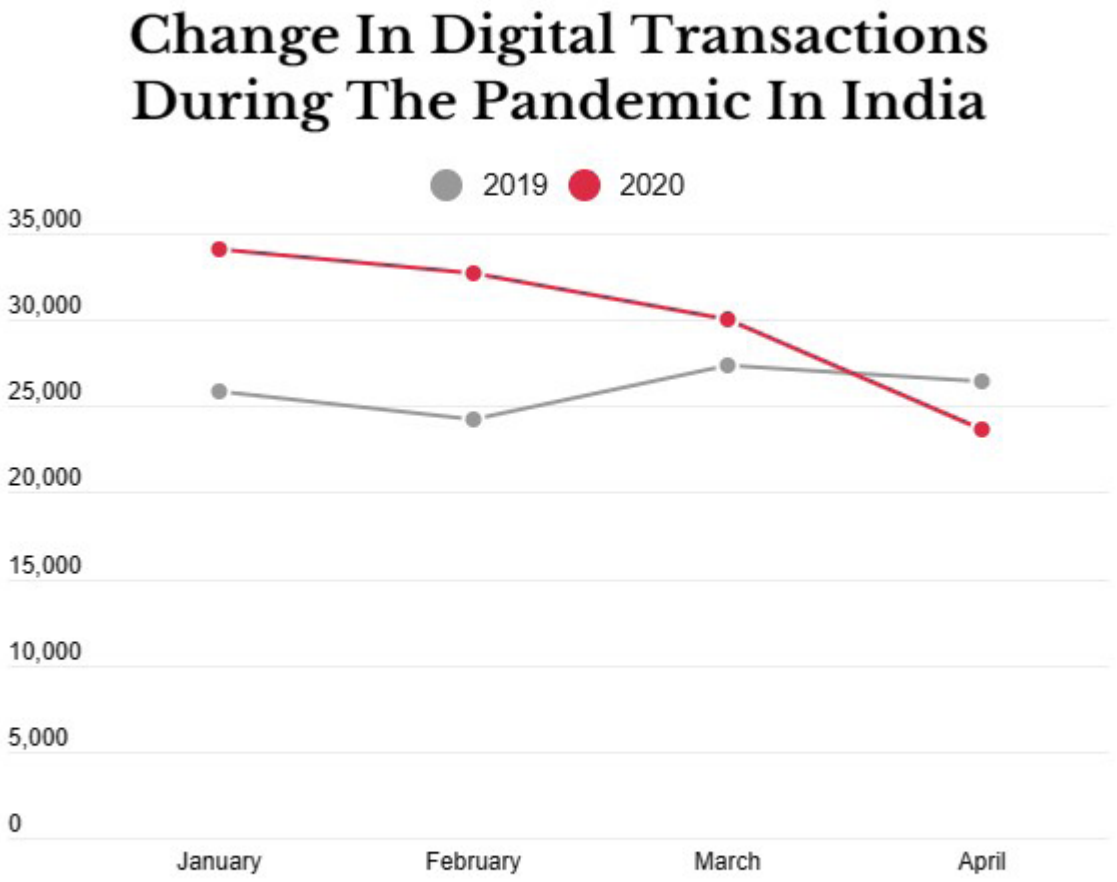
It has been determined by the ECB and the Koch Institute in Germany that there is very little chance of contracting an infection through banknote. They have shown that when the virus is transferred from a banknote to the fingers, the virus concentration drops to less than 10%. When the respiratory system is reached through the nose, mouth or eyes instead of the fingers, the concentration is further reduced to negligible volume.

Conclusion

The scientific community concludes that SARS-CoV-2 spreads mostly by respiratory fluids and airborne transmission and surfaces play an insignificant role in the spread of virus. According to scientific data, banknotes have a lower probability of transmitting a virus than plastic cards and other commonly handled items like card terminals. The likelihood of catching SARS-CoV-2 through a banknote is extremely low under practical circumstances. Hence, banknotes can be regarded as a safe payment medium and a shield from contracting Covid-19 virus.

References

1. Assessing the risk of SARS-CoV-2 transmission via euro cash, Occasional Paper Series, No 259 / July 2021, European Central Bank (ECB)
2. Bank of England: 'Banknote Frequently Asked Questions (FAQs)', March 2021
3. Center for Disease Control (2020): "How to Protect Yourself", March 2021
4. Harbourt et al (2020), 'Modelling the stability of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on skin, currency
5. Ellen Caswell, Miranda Hewkin Smith, David Learmonth, Cash in the time of Covid, Quarterly Bulletin 2020 Q4, Bank of England
6. Colleen R. Newey, Abigail T. Olausson, Presence and stability of SARS-CoV-2 on environmental currency and money cards in Utah reveals a lack of live virus, PLoS One, January 2022
7. Auer R , Cornelli G , Frost J., Covid-19, cash, and the future of payments 2020.



Source: Reserve Bank of India Weekly Statistical Bulletin, 2020

Avian Biodiversity

In BRBNMPL Township

ARJUN KUMAR P

"The natural environment has received the close attention of the ancient Hindu scriptures. Forests and groves were considered sacred, and flowering trees received special reverence. Just as various animals were associated with gods and goddesses, different trees and plants were also associated in the Hindu pantheon. The Mahabharata says that, 'even if there is only one tree full of flowers and fruits in a village, that place becomes worthy of worship and respect"

BRBNMPL has carried out a pioneering initiative of making its spaces green by concerted efforts in afforestation, gardening and landscaping. BRBNMPL's basic environmental responsibility is to wisely manage the land, water and atmosphere entrusted to it and it is imperative that it maintains and lives up to its stated vision and mission of caring for its environment and its stakeholders. The core values of BRBNMPL, which takes pride in a deep sense of caring for the society and a proactive concern for environment in which it operates and discharge its duties as a responsible corporate entity to the satisfaction of all stake holders. BRBNMPL has been contributing in a large scale to its neighborhood institutions and larger public for more than two decades at Bangalore, Mysore and Salboni. This has resulted in the accrual of immeasurable goodwill as a benefactor in its operating geographies.

The operational units at Mysore and Salboni are spread about 337 acres and 560 acres respectively and with a built-up area of about 60% and 40% areas. The Mysore Unit has about 60,000 trees of different species and the Salboni Unit has about 300000 trees of 90 species. Obviously, these trees along with ponds attract large number of birds, as they provide natural habitats for them. They are the fertile grounds for living, eating, breeding and migration for the birds.

It is pertinent to mention that the Mysore unit has a number of landmarks including biologically and zoologically sensitive areas within a radius of 15 kilometre. These include, Ranganathittu Bird Sanctuary, Zoological Garden, river Cauvery, Mysore Palace and Krishnarajasagara Reservoir. All these facilitate the campus of Mysore Unit to attract a large variety of birds. The avifauna seen in the campus include, sparrows, cranes, bulbuls, storks, peacocks, parrots, kingfishers, pigeons, crows, mynahs, partridges, warblers, flycatchers, babblers, barbets, leafbirds, bee-eaters, bulbuls, oriole,

ioras, malkohas, starlings, sun birds, flower-peckers, drongos, coucals, robins, cinerous tits, herons, tailor birds, wagtails, munias, fantails, harriers and fauna like squirrels, wild cats etc. Mysore is also known for reserve forests and wildlife sanctuaries nearby, as it is located on the confluence of Western Ghats and Eastern Ghats.

Salboni Unit is located at the end of Chota Nagpur Plateau, amidst Bhadutola Reserve Forest, Arabari Forest Range and Salboni Forest Range in the Jangal Mahal area, which are known for Sal, Piasal, Mahogani, silk cotton and Chatim trees. The name Salboni in Bengali is a derivative of "Sal Tree Forest". Invariably Salboni is known, for a number of birds like parrots, cuckoos, mynahs, kingfishers, woodpeckers, pigeons, crows, sparrows, partridges, warblers, flycatchers, babblers, barbets, leafbirds, bee-eaters, bulbuls, oriole, ioras, malkohas, starlings, sun birds, flower-peckers, robins, cinerous tits, herons, tailor birds, wagtails, munias, fantails, harriers and fauna like squirrels, fox, jackal, monitor lizard, etc., in addition to a number of wild animals. Salboni is also a reserve for varieties of insects like, bees, wasps, beetles, scorpions, centipedes, snails, leeches and other associated animals. Note Mudran Nagar, Salboni attracts a good number of birds due to the availability of fruit bearing trees like banyan, peepal, mango, guava, Indian blackberry, jackfruit, etc.

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats of an ecosystem. Even in our thrust to develop the infrastructure, the new buildings and getting endowed with trees in all their variety and sylvan beauty.

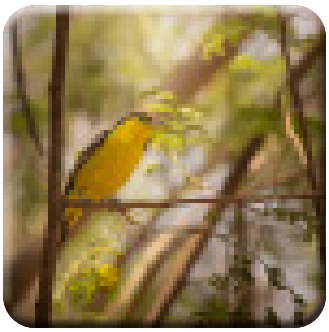
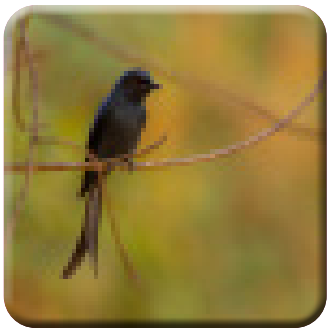
Birds form a significant part of natural ecosystem and they contribute to their environment. They thrive on fruits, seeds, pests, insects, rodents, reptiles and dead animals. Their droppings add nourishment to the soil. They add audio and visual features to their habitats. They play a vital role in controlling pests in agriculture and forestry, rodent control, pollination of plants, seed dispersal and forest regeneration, scavenging services. They are also indicators of environmental health and have socio-cultural and religious values. Also, birds are a source of joy to humanity, especially for children. It is said that "Children have an innate affinity to nature". Unfortunately, this connection is often lost while growing up. If nurtured, however, a child's association with nature can last a lifetime and lead to several physical and emotional benefits.

The overall lush greenery enveloping the development at Integrated Township in Mysuru and Salboni indicates the health of the ecosystem in these areas for all its inhabitants - human and avian population alike by including biodiversity as a key consideration during their planning. BRBNMPL has found a way to help flora and fauna thrive alongside their residents. Manufacturing operations of BRBNMPL do not cause any negative impact on biological diversity. In addition, BRBNMPL undertakes activities in and around the unit to conserve, preserve and enhance the biological diversity.

While the lush, sprawling greenery is nature's bounty, it is also human effort which makes it a reality. The horticultural team is dedicated to maintain and nurture flora and fauna of the township which adds calmness quotient to the hustling- bustling township. while the sight is soothing to the eyes, the ecological benefits adds an important value addition which enhances the experience of living/working in BRBNMPL.

List of Birds at Mysuru Township
(Left to Right)
a. Black Naper Oriole
b. Black Drongo
c. Brahminy Starling
d. Oriental Magpie Robin
e. Cinereous Tit
f. Yellow Billed Babbler
g. Red Whiskered Bulbul
h. Indian White-eye
i. Spot Brested Fantail
j. Common Tailorbird
k. Scaly-Brested Munia
l. White-Throated Kingfisher
m. Indian Paradise Flycatcher
n. Jerdon's Leafbird
o. White Cheeked barbet
p. White Naped Woodpecker
q. Greater Coucal
r. Purple Rumped Sunbird
s. White Browed Bulbul
t. Indian Peafowl
u. Pale Billed Flowerpecker
v. White Browed Wagtail
w. Copper Smith Barbet
x. Blue Faced Malkoha
y. Indian Golden Oriole
z. Grey Francolin

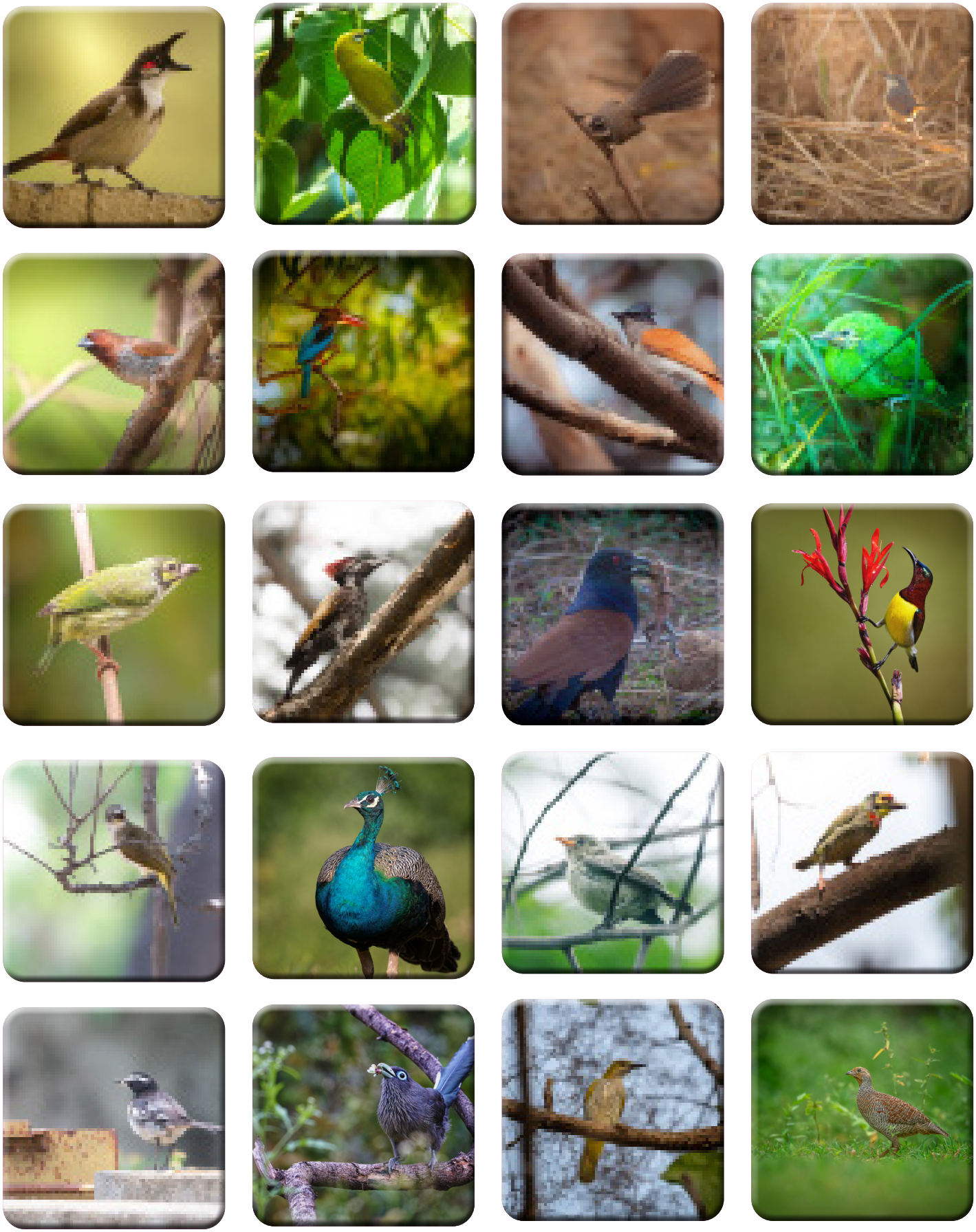
Note :
a. The list is only indicative not exhaustive.
b. All Photographys by Author at respective location



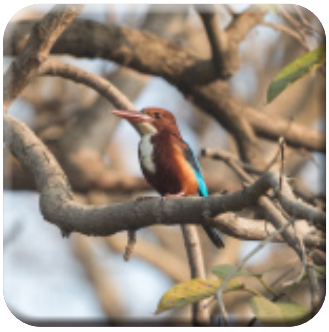
MYSURU

Top Left to Right - (a) -> (f)



Top Left to Right – (g) –> (z)

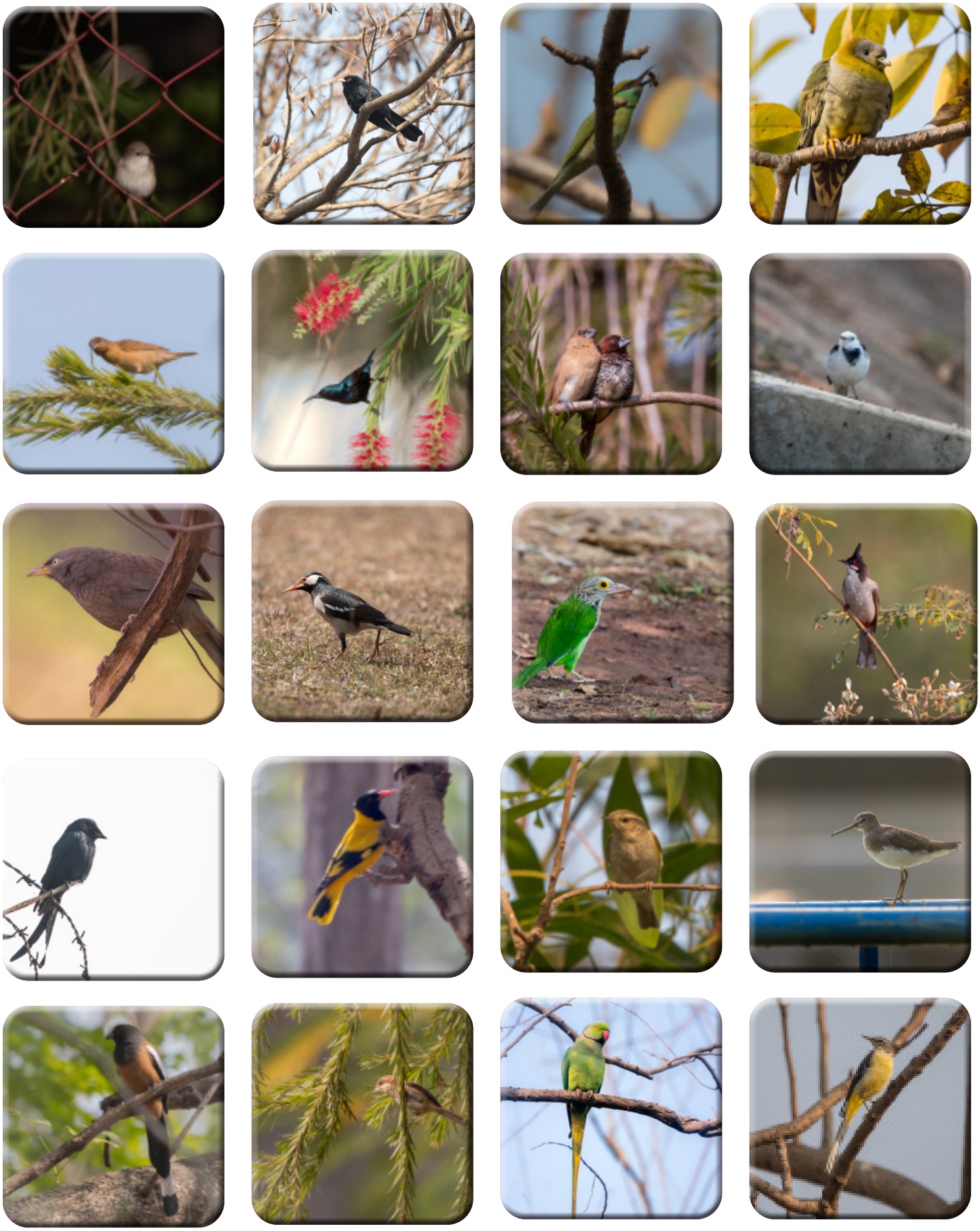
SALBONI



Top Left to Right - (a) -> (f)

List of Birds at Salboi Township
(Left to Right)
a. Common Myna
b. White-Throated Kingfisher
c. Wryneck
d. Oriental Magpie Robin
e. Red Vented Bulbul
f. Greater Coucal
g. Asian Brown Flycatcher
h. Indian Koel
i. Green Bee-eater
j. Yellow footed Green Pigeons
k. Indian Silver Bill
l. Purple Sun Bird
m. Scaly-Brested Munia
n. White Wag Tail
o. Yellow Billed Babbler
p. Pied Starling
q. White Cheeked barbet
r. Red Whiskered Bulbul
s. Black Drongo
t. Black Hooded Oriole
u. Blyth's Reed Warbler
v. Green Sandpiper
w. Rufous Treepie
x. Brown Shrike
y. Rose RInged Parakeet
z. Gray Wagtail

Note :
a. The list is only indicative not exhaustive.
b. All Photographys by Author at respective location



Top Left to Right - (g) -> (z)

VISIONARY STALWARTS

CHAIRPERSONS

Shri D. R. Mehta	1995	1995
Shri R. V. Gupta	1995	1999
Shri Jagdish Capoor	1999	2003
Shri Vepa Kamesam	2003	2005
Smt. K. J. Udeshi	2005	2005
Smt. Usha Thorat	2005	2010
Shri Kamalesh Chandra Chakrabarty	2010	2014
Shri Rama Subramaniam Gandhi	2014	2014
Shri Subhash Sheoratan Mundra	2014	2014
Shri Rama Subramaniam Gandhi	2014	2017
Shri Bibhu Prasad Kanungo	2017	2021
Shri T Rabi Sankar	2021	Present

MANAGING DIRECTORS

Shri A. P. Aiyer	1995	1996
Shri K. J. Hegde	1996	1999
Shri K. D. Savkur	1999	2001
Shri C. Krishnan	2001	2004
Dr. T. C. Nair	2004	2006
Shri Subhash Chandra Agrawal	2006	2010
Shri Annappa Narayana Rao	2010	2014
Shri Kaza Sudhakar	2014	2017
Shri Subodh Kumar Maheshwari	2017	2020
Shri Manas Ranjan Mohanty	2020	Present

BOARD OF DIRECTORS

Shri S. P. Talwar	1995	2001
Shri S. A. Hussain	1995	1998
Shri Inderjit Khanna	1997	1999
Shri Taqi Husaini	1998	1999
Shri Pradip P. Shah	1998	2004
Dr. Subir Chowdhury	1998	2006
Shri I.D.Agarwal	1999	2000
Shri K. R. Prasad	2000	2005
Shri S. L. Parmar	2001	2003
Shri Vipin Malik	2001	2004
Shri P.K.Biswas	2003	2005
Dr. Narasimha Rao Tekumalla	2003	2007
Shri Parthasarathi Bhattacharya	2008	2017
Dr. M. S. Vijayaraghavan	2004	2012
Shri Vinod Kumar Sharma	2008	2013

Shri Udupi Ramachandra Rao	2007	2014
Shri Uma Shankar Paliwal	2014	2014
Dr. (Smt.) Deepali Pant Rajeev Joshi	2014	2018
Smt. Uma Shankar	2018	2018
Smt. Parvathy Vairavasundaram	2018	2018
Dr. Krishnarajanagar Ganesh Nagappa	2014	2018
Smt. Parvathy Vairavasundaram	2018	2019
Smt. Nanda Sameer Dave	2020	2020
Shri Vijaya Kumar Pammi	2020	2021
Shri Subrata Das	2021	2021
Shri Yezdi Hirji Malegam	2004	Present
Shri Aravind Gopalrao Kulkarni	2012	Present
Maj. Gen. Devendra Kapur (Retd.)	2019	Present
Shri Sanat Hazra	2018	Present
Shri Suman Ray	2021	Present

MEMORY LANE

A VISUAL JOURNEY OF BRBNMPL

MAKING OF BRBNMPL -A PHOTO ESSAY

Bharatiya Reserve Bank Note Mudran Pvt. Ltd. has its Corporate Office in Bengaluru and its operational units in Mysuru, Karnataka and Salboni, West Bengal in India. Both the sites started with a single line prototype units called Mini Press and the full set of lines were installed in the Main Press, the main production unit.

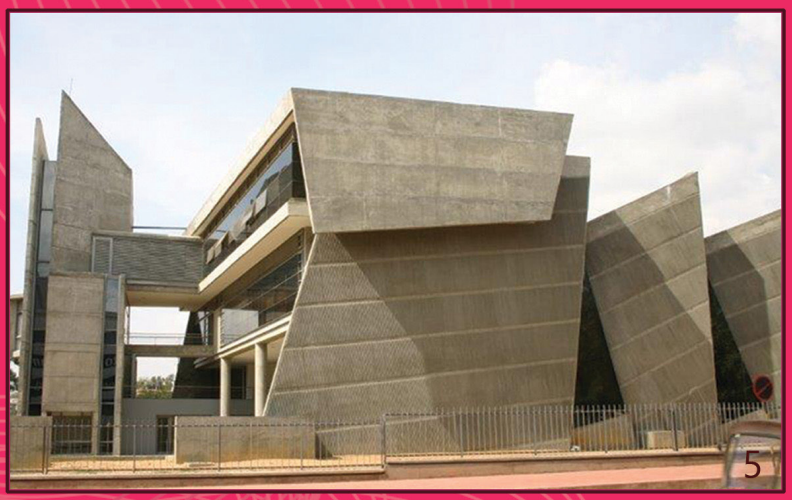
Corporate Office had its origin in Bombay- now Mumbai, then moved to RBI Bangalore-now Bengaluru, before moving to its current site at Bannerghatta Road in Bengaluru.

MAKING OF BRBNMPL

CONSTRUCTION OF CORPORATE OFFICE AT BENGALURU


1


2


5

1. Breaking the ground ceremony for construction of Corporate Office on Bannerghatta Road in Bengaluru. 2. This unique architectuaral design is visualized as a depiction of clam shell platten printing machine. 3. A profile of the building. 4. A profile of the building from the north. 5. Two views of the facade.

4


3

INAUGURATION OF THE MINI PRESS, MYSURU BY Dr. C. RANGARAJAN,GOVERNOR


1


2


3

1. Dr. C. Rangarajan, Governor, planting a sappling on the inauguration of Mini Press at Mysuru.
2. He is witnessing the training imparted to the new recruits in the presence of Col. V. Raju and Shri Krishna Rao.
3. Dr. Rangarajan attending a briefing session on NNPP Project.
4. Construction of Main Press.


4

INAUGURATION OF THE MAIN PRESS, MYSURU
by Dr. BIMAL JALAN,
the then Governor Of RBI
1998


1


2

1.Inaugural function attended by Dr. Bimal Jalan, Shri R.V Gupta, Dr. Y.V Reddy and other dignitaries.
2. Dr. Bimal Jalan releasing the first set of banknotes printed by BRBNMPL Mysuru.
3. Dr. Bimal Jalan inaugrating the Main Press.
4.Model of the Mysuru press being shown to the dignitaries.


3


4

MINI PRESS INAUGURATION OF SALBONI BY Dr. C. RANGARAJAN, GOVERNOR

1. Dr. C. Rangarajan, Governor at the inaugural function of Mini Press at Salboni on December 11, 1996. 2. Dignitaries present at the function. 3. Unveiling the inaugural plaque by the Governor. 4. A model of the plant being shown to the dignitaries. 5. Governor along with the dignitaries at BRBNMPL, Salboni.

MAIN PRESS INAUGURATION OF SALBONI BY Dr. BIMAL JALAN, GOVERNOR

1


2

3

1. Dr. Bimal Jalan at the inaugural function of Main Press at Salboni. Shri Jagadish Capoor, the then Deputy Governor, RBI and Chairman of BRBNMPL; Shri K.D Savukur, MD, BRBNMPL and Shri A.K Chattopadyaya, GM, BRBNMPL were also present. 2. Dr. Bimal Jalan addressing the gathering. 3. Unveiling of the plaque by the Governor. 4. The dignitaries present during the function. 5. & 6. The Governor and the other dignitaries visiting the plant.


4


5


6

MAKING OF BRBNMPL

CONSTRUCTION OF BRBNMPL SALBONI

Salboni Main Press - Different stages of construction and finished view.

IMPROVING INFRASTRUCTURE

* BRBNMPL set up a pair of state of the art Paper and Ink testing laboratories in Mysuru and Salboni units.

*It had set up a Ink Manufacturing Unit named Varnika at Mysuru to manufacture the full set of banknote security inks for india.

*It has initiated the setting up a Bank Note Paper Mill.

*It is currently in the process of establishing a Learning and Development Centre and Currency Research and Development Centre for Reserve Bank of India.

SHRI SHAKTIKANTA DAS, GOVERNOR VISIT TO BRBNMPL, MYSURU (MARCH 28, 2022)

1. Shri Shaktikanta Das, addressing the gathering after dedicating Varnika to the nation. 2. Governor lighting the lamp in Varnika. 3. Governor with employees of Varnika. 4. Governor with officers of BRBNMPL. 5. Governor dedicated Varnika to the nation. 6. Governor and Madam Governor met a young girl Kanyaka Chandra who lost both parents due to Covid.

DEPUTY GOVERNOR'S VISIT

Shri T. Rabi Sankar, Deputy Governor, RBI and Chairman, BRBNMPL laid the foundation stone for Central Vista in BRBNMPL Salboni. Deputy Governor with officers and family members of BRBNMPL

EVENTS AND VISITS

1. Shri Shaktikanta Das with other dignitaries at Mysuru.
2. The Governor planting a sappling at BRBNMPL Mysuru.
3. Dr. Raghuram Rajan, the then Governor visiting BRBNMPL.
4. A meeting of the then Deputy Governor, Dr. Urjit R. Patel with Shri R. Gandhi, ED; Shri Kaza Sudhakar, the then MD, BRBNMPL and Shri Thakur Desai, CGM.

INAUGURATION OF
CURRENCY RESEARCH DEVELOPMENT CENTRE (JULY 22, 2022)

1.Arrival of Shri T. Rabi Shankar, Deputy Governor and Chairman of BRBNMPL; Shri Manas Ranjan Mohanty, MD BRBNMPL; Shri Suman Ray, CGM, RBI and Director BRBNMPL; Shri Sanath Hazra, Director and other dignitaries.
2. Planting a sappling by the Deputy Governor.
3. Inaugration of CRDC. 4. Dignitaries visiting the Press. 5. Dedication of Nakshatravana by the Deputy Governor in the presence of Shri J. J. Katoor, ED. RBI; Shri Manas Ranjan Mohanty, MD BRBNMPL; Shri Suman Ray, CGM, RBI and Director, BRBNMPL; Dr. A.G. Kulkarni, Director; ShriSanat Hazra, Director and Maj. Gen. Devendra Kapoor, (Retd.),Director.

1

2

3

1. Foundation stone laying ceremony of BNPMIPL. 2. Paper and Ink Testing Laboratory inaugration. 3. Foundation stone laying ceremony of VARNIKA (Ink Manufacturing Unit).

LEARNING AND DEVELOPMENT CENTRE

1. Temporary Learning and Development Centre inauguration by Shri S. Das, CGM, RBI and Shri Manas Ranjan Mohanty, MD, BRBNMPL. 2. A lecture session by the MD. 3. A lecture session by Shri. Suman Ray, CGM, RBI. 4. Participants of the training programme.
5. Participants of the Board of ACU with Shri Vepa Kamesam, the then Deputy Governor of RBI

32ND BOARD OF ASIAN CLEARING UNION

VISIT BY DIGNITARIES

BRBNMPL being a premier banknote production unit of India and the world. It is visited by dignitaries, senior delegations and officers from Central banks. These visits have been recorded for posterity, through the photographs presented in the following pages.

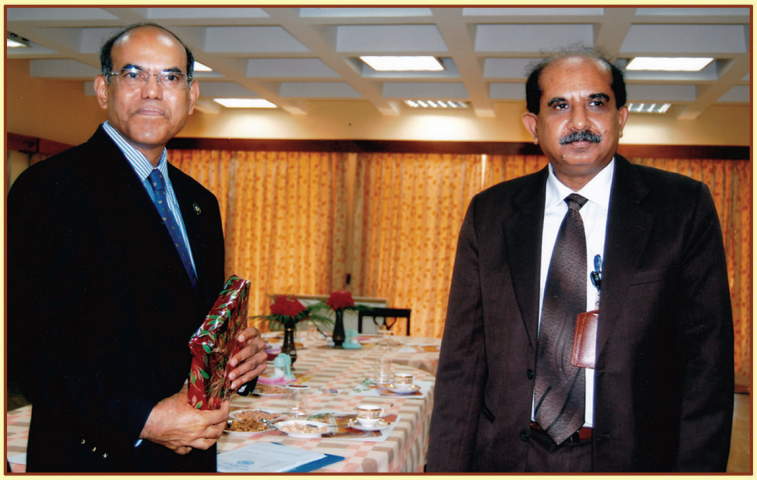
MEDLEY OF EVENTS AND VISITS

1. Shri Manas Ranjan Mohanty, MD addressing a group of officer trainees from RBI. 2. A group of Grade B officer trainees from RBI. 3. Visit of officers from RBI. 4. The soldiers and officers from Indian Armed Forces who worked with BRBNMPL at the time of remonetisation.

EVENTS AND VISITS

1. Shri R. Gandhi the then DG, RBI and Chairman, BRBNMPL addressing the meeting of board of Directors.
2. Shri Y.H. Malegam chairing the meeting of Audit Commitee of the Board.
3. Shri K.D. Savukur the then Managing Director recieving an album of specimen notes from the then GM.
4. Shri R. Gandhi the then DG, RBI and Chairman, BRBNMPL receiving guard of honour.

EVENTS AND VISITS



EVENTS AND VISITS

CSR INITIATIVES OF BRBNMPL

1

2

1. Shri Manas Ranjan Mohanty, MD and Dr. A.G Kulkarni Director handing over an ambulance to a beneficiary.
2. MD interacts with the students of Kendriya Vidyalaya.
3.&4. CSR initiative for enpowerment of women.

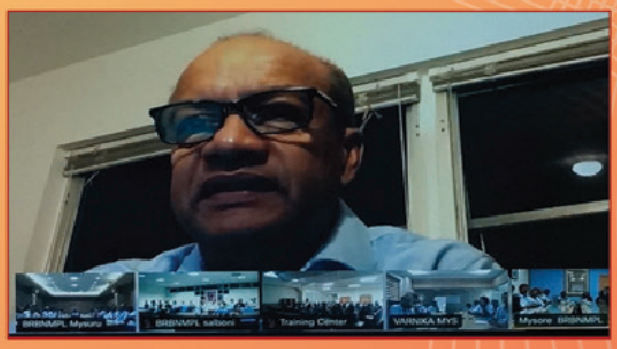
3

4

CSR INITIATIVES

Active participation in facilitating and enabling CSR activities by the Chairperson, Managing Director and Board of Directors.

CURRENCY PRINTERS' DAY CELEBRATION BENGALURU

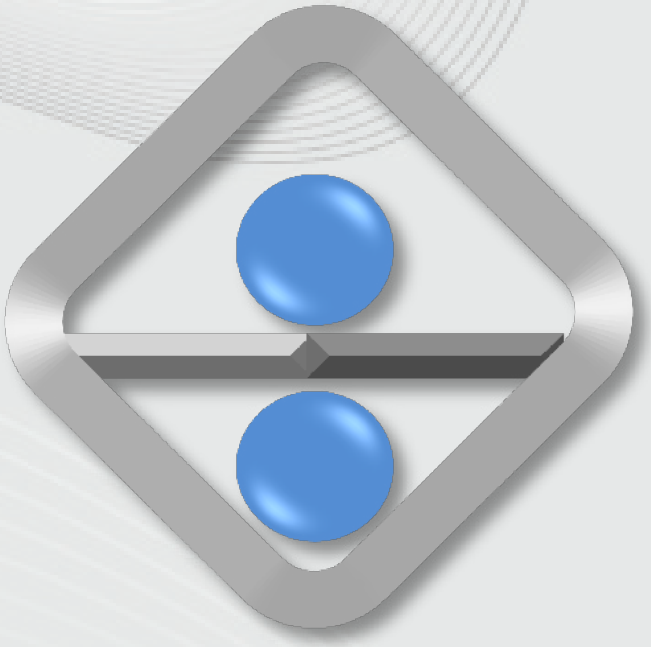


CURRENCY PRINTERS' DAY CELEBRATION BENGALURU

CURRENCY PRINTERS' DAY CELEBRATION SALBONI

CURRENCY PRINTERS' DAY CELEBRATION MYSURU

CURRENCY PRINTERS' DAY CELEBRATION MYSURU



G20 भारत 2023 INDIA

वसुधैव कुटुम्बकम्
ONE EARTH • ONE FAMILY • ONE FUTURE

आज़ादी का अमृत महोत्सव