An Automation Perspective of Print Production Workflow System

Priyank Singhal, Shakti Kundu, Anil Kumar

Abstract: The technology has always been embraced for making better processes. The increasing use of automation has proven beneficial for business organisations. The businesses that have embraced technological changes have flourished. The print industry has also been touched by such changes. The print industry has faced challenge of survival in couple of years back. It is sure that print lengths have decreased but on having keen insight we can see new opportunities have crept in due to technological changes. Print industry is adopting workflow automation solutions to make desired growth and to serve customers in a better way. This paper discusses about print workflow automation adoption. A reference to print workflow model "PrettyPrint" has been discussed. Also the paper reveals the results of sampling activity performed on print service providers. The results of sampling activity indicate that proposed model solves the problems of print service providers.

Keywords: Print workflow model, PrettyPrint Workflow Model, Print Service Providers, B2B automation

I. INTRODUCTION

By the year 2020, there will be major changes in the print production domain. The industry has to adopt new methods to evolve and to keep their businesses running. Printers are required to rethink on various parameters that include business processes, products and the services delivered by them [1]. All this will require them to embrace new innovative business ideas and reworking to modify their culture being adopted at the print industry [2]. Due to changing demands and trends of customers, the use of internet, and technological advancements major differences have been created for the print industry. It is a fact that there has been decline in demand for print in the market. The print providers those who have adopted new technological methods of business are doing quite well. They have studied the customer expectations as well deeply [3, 4].

The opinion of people towards print media has also changed.

The print media requirements of people are changing. The older approach of reading from printed version prevails but it has reduced to an extent as people also prefer to read e-versions of text. Printing is not only confined to readable texts, books, magazines and newspapers, but it has a wide range and domain. This includes printed packaging material, banners, flex and lot more. But there is an acute need of the hour that print providers must adopt new technological methods of printing and they must integrate it with their print business workflow. Also if required new workflow models must be designed and implemented to achieve print business growth and customer satisfaction.

II. WORKFLOW AUTOMATION SYSTEM FOR PRINT PROVIDERS

The print production is facing a slowdown. The important parameters to focus for the print industry existence are productivity and efficiency. The productivity boosters that industry must use are web-to-print, MIS and efficient workflow [5, 6, 7].

The printing organisations avoid taking important actions that can help for efficient operation in the company because that simply purchases software using old traditional methods. It is evident that many print organisations do not take complete advantage of the new technologies. The reason being heavy cost of licensing and investment for maintaining the system. It is even more surprising that few print organisations went ahead implementing costly systems that were discovered to be not completely fit for the system and this resulted in undue financial burden on the organization. Now-a-days, the printing trends move away from being press-centric to printer-centric [8].

There has been increased stress on traditional printing models, because the challenge is to handle more number of jobs that are of less value. This creates a situation where the print lengths decline and the time of print cycle shortens [9]. Streamlining the operations becomes more complicated.

The implementation of software that is critical can now be done fast and at reasonable rates, because in the digital world the software delivery models have been upgraded. When software is delivered as a service then the set-up fees is very less and the model of pay-as-you-go or pay-per-use is a good feature. This helps the print providers to a great extent as they can efficiently implement automation of workflow and also digital advantages of using web-to-print.

Printing firms can reduce the financial investment burden on adopting software-as-a-service and the cloud computing model.

Retrieval Number: C9112019320/2020©BEIESP
DOI: 10.35940/ijitee.C9112.019320
Journal Website: www.ijitee.org

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The advantages of scalability, integrated software solutions and reducing the requirements for computing resources and manpower on-site are one of the key features of print production system.

For achieving desired productivity, effectiveness and cost efficiencies the printing organisations must understand the need for embracing software-as-a-service and the cloud computing model [9]. These technologies boost business in a short span of time, resulting in growth and better customer services. [10]

The print providers use cloud based print workflow solutions as they are in market from quite some time, but these solutions are used by them to manage their business activities individually [11]. The print job is given to the print provider by clients using cloud based software solution that is via some web portal and the tasks get completed.

Small scale print providers have been kept in focus while proposing new cloud based workflow solution 'PrettyPrint'. This model is based on the idea that small scale print providers face problems to get their printing job fully processed as they lack costly infrastructure at their firm. The small scale print providers mostly complete pre-press task from their end and for further printing job completion they depend upon large scale print providers. On this concept the proposed workflow model has been designed.

The working of proposed cloud based print workflow model involves:

1) The proposed model will be deployed as Software-as-a-Service.
2) Any third party will own the service.
3) The service will be made available for you via a web portal.
4) Small scale print provider will complete pre-press task before using this service.
5) After registration on the web portal, the small scale print provider can submit their pre-press job to be completed by suitable large scale print provider.
6) The pre-press job submitted on the portal will be tagged to one of the large scale print provider. The basis of this tagging will be shortest time to complete the job.

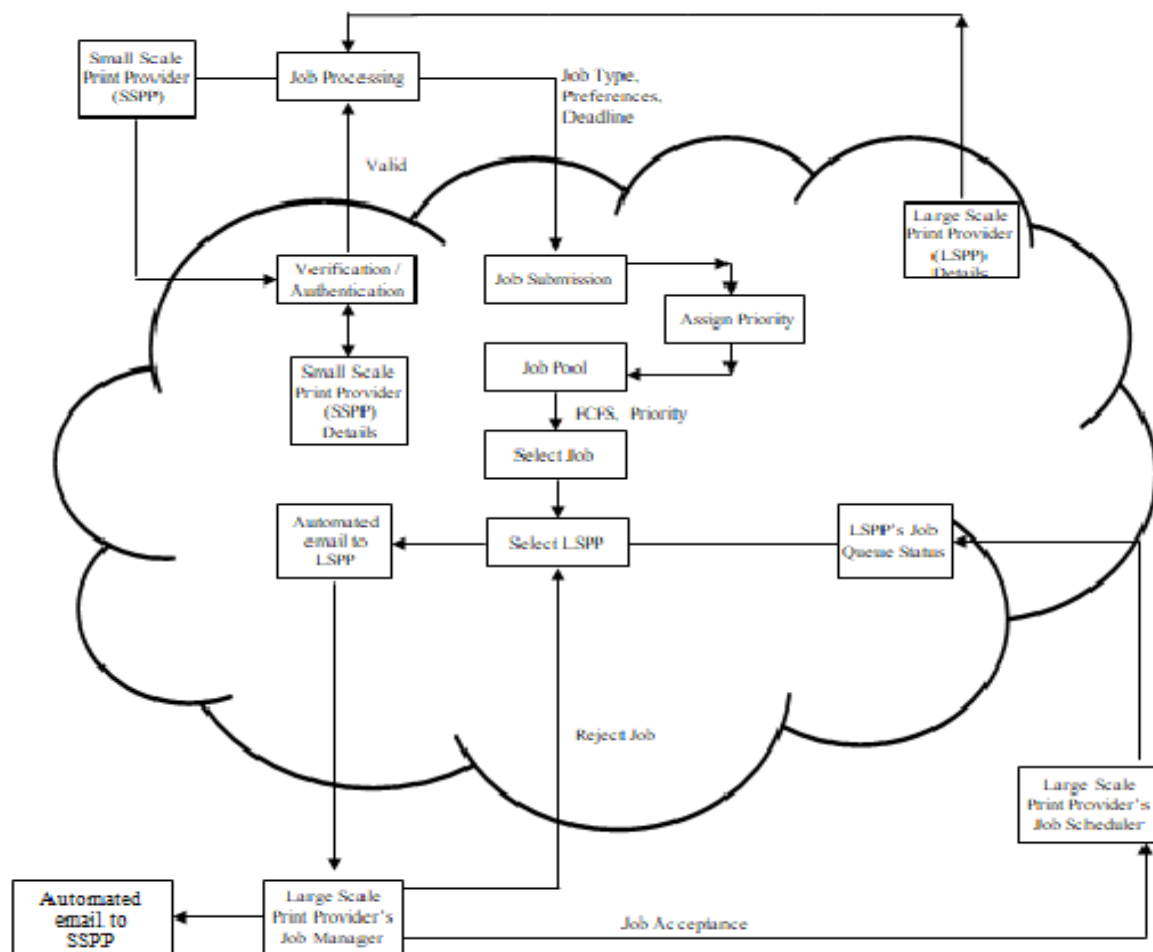The detailed proposed Cloud-based Print Workflow model is shown in figure 1 below:

Fig. 1. 'PrettyPrint' - Proposed Cloud-based Print Workflow Model [12]

The proposed workflow model 'PrettyPrint' will be beneficial for print providers

as this will reduce business operation hurdles for small and large scale print providers. The advantages for small scale print providers will include-

i. It will be simple steps to submit pre-press job on the web portal to use the service.
ii. The pre-press job will be tagged automatically to large scale print provider.
iii. The service will prevent delays.
iv. The service will promote cost effectiveness.
v. The customers will be better satisfied from their small scale print providers.
vi. Business growth is expected.

The benefits of the model for large scale print providers will include:

i. The large scale print providers will grab printing tasks from small scale print providers in an easy way.
ii. It will be the necessity for large scale print providers to grab small jobs as generally print lengths have shortened.
iii. More number of small scale print providers can be connected.
iv. Resource utilization will be optimised.
v. Business will flourish more.

III. DISCUSSION ON PRINT PROVIDERS SAMPLING ACTIVITY

The print providers face many problems in their printing processes. The print industry business processes are dependent on each other. It is generally not possible for any print provider to be able to perform all printing processes under one roof. There is always a need for them to take support from other print providers to cater few of their printing jobs.

The sampling activity has been performed to identify the scenarios of print providers. They have been specifically questioned on various issues. In this activity good number of print providers was contacted. All together 25 of them responded to our questions. These print service providers were mostly those who work at small or medium scale. The sampling activity gave proper insight on the issues faced by print providers.

It is relevant that in current scenario is has become almost mandatory to apply automation to print production processes. But at the same time there has been a need to automate business-to-business processes between print providers. If such automation is adopted by the print providers (proposed PrettyPrint model) then it would help print service providers to gain advantage in their business [12]. Such automation of B2B interactions between print providers can help result in saving time, minimising job delays, and better customer services.

The purpose of the sampling activity is to analyse the applicability of the proposed model for the print providers. It is very much required to understand the automation needs of print providers. The fact that was identified from print providers during data collection was that the print providers mostly are not self sufficient and the print business runs on support between print providers. All types of printing jobs cannot be performed by an individual print provider. The rely on different print providers to get their different types of printing jobs to be completed.

Another aspect identified was that print providers mostly face the problem of delay when they follow traditional approach to get their job completed from third party. The delay factor might become the reason for customer dissatisfaction. The print providers also in general want to use automation but are not in a position to invest heavily for it.

IV. RESULTS

The sampling activity performed on 25 print service providers has generated results. These results have been depicted in the form of graphs as shown further. The questions were multiple choices. These questions have either two, three or four choices to answer from. These questions can be classified as Type 1 (with two choices), Type 2 (with three choices) and Type 3 (with four choices).
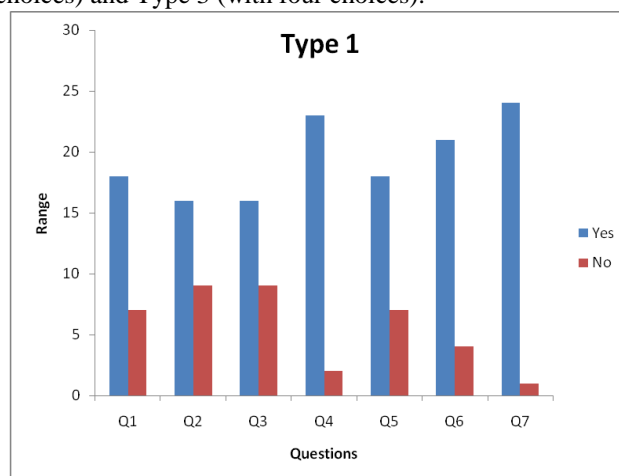

Fig. 2. Graph depicting results for type 1 questions

The questions that comprised Type 1 are:

Q1. Do you use software solutions for printing processes?

Q2. Do you outsource printing jobs to third party?

Q3. Do you experience delay in print job completion from third party?

Q4. If the process of print job assignment is automated then will it be beneficial?

Q5. Will the automation of print job outsourcing reduce the cost of production?

Q6. Will the automation of print job outsourcing reduce the time of job completion?

Q7. Do you feel if print job outsourcing is automated it will minimize delay and you will have more satisfied customer?

The results obtained from Type 1 questions reveal that majority print providers use automation to certain extent. More than 60% print providers outsource print jobs to third parties. They experience delay in job completion when the job is being finished by third party. More than 90% print providers agree that if the print job assigning gets automated than it will benefit them. The cost and time of job completion will get reduced.

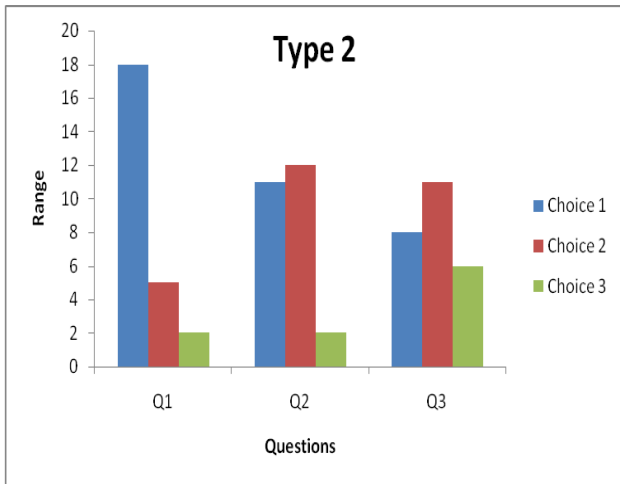Further the most important factor will be that delays will be almost minimised.

Retrieval Number: C9112019320/2020©BEIESP
DOI: 10.35940/ijitee.C9112.019320
Journal Website: www.ijitee.org

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Fig. 3. Graph depicting results for type 2 questions

The questions that comprised Type 2 are:

Q1	Up to what extent automation is used in your printing press?
Choice 1	Pre press job preparation
Choice 2	Post press job preparation
Choice 3	None
Q2	How many regular clients (approximate) do you serve monthly?
Choice 1	< 50
Choice 2	> 50 and < 100
Choice 3	> 100
Q3	
Choice 1	1-2 days
Choice 2	2-3 days
Choice 3	> 3 days

The results obtained from Type 2 questions reveal that majority print providers use automation for pre-press job preparation. Most of the print providers manage customers in the range 50 to 100. The third party job completion takes 2-3 working days for completion in ideal conditions.
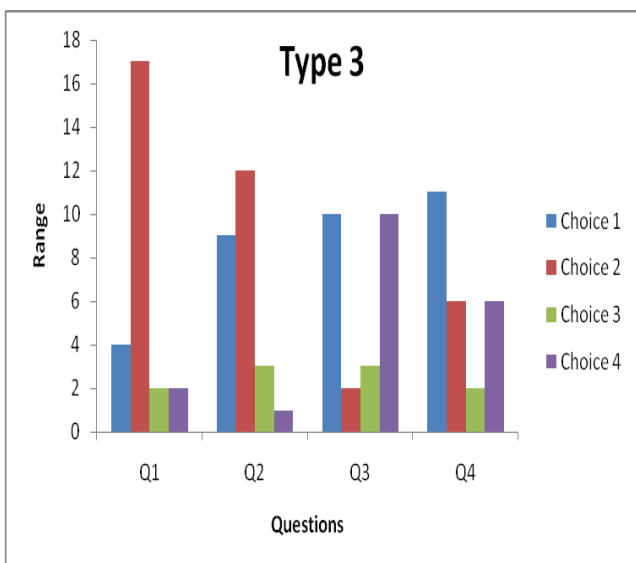

Fig. 4. Graph depicting results for type 3 questions

The questions that comprised Type 3 are:

Q1	What type of printing do you perform in your printing press?
Choice 1	Offset Printing
Choice 2	Digital Printing
Choice 3	Screen Printing
Choice 4	Others
Q2	
Choice 1	< 50
Choice 2	> 50 and < 100
Choice 3	> 100 and < 200
Choice 4	> 200
Q3	How the print job assignments given to third party?
Choice 1	By email
Choice 2	By phone
Choice 3	By personal visit
Choice 4	All of above
Q4	How does the quality of print job affected if it is outsourced?
Choice 1	Quality is maintained
Choice 2	Quality goes up
Choice 3	Quality goes down
Choice 4	Can't say

The results obtained from Type 3 questions reveal that majority of print providers perform digital printing. On monthly basis they perform job assignments in the range of 100 to 200. They hand over print jobs to third party by using methods that include email, phone and personal meetings. The main outcome was that majority print providers agree that this model will maintain the quality of print jobs that are being completed by third parties.

V. CONCLUSIONS

In the era of technological advancements, it becomes important to adopt technological changes and the effective application of the same must be ensured. Then only organizations can think of and achieve incremental growth in their business processes.

In the domain of print production there are challenges faced by the print providers. The print providers working on small scale face more challenges related to their print production business. In this paper the proposed model for print providers has been discussed. The same has been followed by sampling activity where 25 print service providers have been investigated. The investigation was based on personal interactions and use of questionnaire.

The results of the sampling activity have shown that problems are being faced by print providers. The need to adopt the proposed model will solve their problems to an extent. The benefits will be the result of automating the task of tagging of print jobs that has been proposed as a workflow model (PrettyPrint) [12].

REFERENCES

1. Technology and Innovation for the Future of Production: Accelerating Value Creation. Available at: http://www3.weforum.org/docs/. Accessed: (2019) Nov 15.
2. R. Romano, "Transforming today's print business for tomorrow's marketplace - The view from 2020", (2015)
3. Challenges for the Printing Industry Globally in 2015. Available at: https://www.piworld.com/post/. Accessed: (2019) Nov 18.
4. Post Digital Print. Available at: https://monoskop.org/images/a/a6/Ludovico. Accessed: (2019) Oct 22
5. Industry Integration Report. Available at: https://www.tharstern.com/blog/ Accessed: (2019) Dec 02
6. N. Agarwal, "Growth accelerators for the global web-to-print market worth $869 million by 2017", Available at: http://www.designnbuy.com/blog. Accessed (2014), April 28.
7. S. Ofori-Dei, M. Pub project report, "Building an efficient print production workflow through web-toprint: A case study of hemlock printers", Simon Fraser University, British Columbia, Canada, (2016).
8. C. K. Choi, "New trends of digital printing market in Korean printing industry", 9th forum of Asian Pacific Graphic Arts Technology, (2007) June.
9. P. Singhal, A. Kumar, "Print production: Proposing a new cloud based print workflow model for print providers", International Journal of Engineering Research & Technology, Vol. 6(4), (2017), pp. 169-172.
10. EFI PrintStream Fulfillment. Available at: https://www.efi.com/products/productivitysoftware/fulfillment. Accessed: (2019) May 01.
11. Cloud-Based Solutions are Gaining Momentum in the Printing Industry. Available at: https://www.piworld.com/article/off-site-outta-sight/ Accessed: (2019) Dec 07
12. P. Singhal, S. Kundu, A. Kumar, " PRINT PRODUCTION WORKFLOW SYSTEMS: AN ALGORITHMIC IMPLEMENTATION ", International Journal of Advanced Science and Technology, ISSN: 2207-6360, Vol.131 (2019), pp.43-50

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