SKILL AND JOB RECOMMENDER

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ABSTRACT

The Internet-based recruiting platforms become a primary recruitment channel in most companies. While such platforms decrease the recruitment time and advertisement cost, they suffer from an inappropriateness of traditional information retrieval techniques like the Boolean search methods. Consequently, a vast amount of candidates missed the opportunity of recruiting. The recommender system technology aims to help users in finding items that match their personnel interests; it has a successful usage in e-commerce applications to deal with problems related to information overload efficiently. In order to improve the e-recruiting functionality, many recommender system approaches have been proposed. This article will present a survey of e-recruiting process and existing recommendation approaches for building personalized recommender systems for candidates/job matching. In the last years, job recommender systems have become popular since they successfully reduce information overload by generating personalized job suggestions. Although in the literature exists a variety of techniques and strategies used as part of job recommender systems, most of them fail to recommending job vacancies that fit properly to the job seekers profiles. Thus, the contributions of this work are twofold, i) We made publicly available a new dataset formed by a set of job seekers profiles and a set of job vacancies collected from different job search engine sites. ii) We put forward the proposal of a framework for job recommendation based on professional skills of job seekers. iii) We provide a chatbot for user convenience, regarding their doubts to clarify. 4 We thus present a general panorama of job recommendation task aiming to facilitate research and real-world application design regarding this important issue.

INTRODUCTION

PROJECT OVERVIEW

There has been a sudden boom in the technical industry and an increase in the number of good startups. Keeping track of various appropriate job openings in top industry names has become increasingly troublesome. This leads to deadlines and hence important opportunities being missed. Through this research paper, the aim is to automate this process to eliminate this problem. To achieve this, IBM cloud services like db2, Watson assistant, cluster, kubernetes have been used. A hybrid system of Content-Based Filtering and Collaborative Filtering is implemented to recommend these jobs. The intention is to aggregate and recommend appropriate jobs to job seekers, especially in the engineering domain. The entire process of accessing numerous company websites hoping to find a relevant job opening listed on their career portals is simplified. The proposed recommendation system is tested on an array of test cases with a fully functioning user interface in the form of a web application. It has shown satisfactory results, outperforming the existing systems. It thus testifies to the agenda of quality over quantity.

PURPOSE

To develop an end-to-end web application capable of displaying the current job openings based on the skillset of the users.

The users and their information are stored in the Database.

An alert is sent when there is an opening based on the users skill set..

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

Building and managing recommender systems today requires specialized expertise in analytics, applied machine learning, software engineering, this makes it challenging regardless of your background or skillset.

Intelligent_ Chatbot Description A Chatbot is a software application that replaces a live human agent to conduct a conversation via text or text to speech. In this system, we demonstrate a chatbot that uses Artificial Intelligence to produce dynamic responses to online client enquiries. This web-based platform provides a vast intelligent base that can help humans to solve problems. The Chatbot recognizes the user's context, which prompts an intended response. Its objective is to reduce human dependency in every organization and reduce the need for different systems for different processes

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IDEATION&PROPOSED SOLUTION

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Fig 3.1 Empathy Map

IDEATION AND BRAINSTORMING

➤E-recruitment platforms decrease the recruitment time and advertisement cost, they suffer from an inappropriateness of traditional information retrieval techniques like the Boolean search methods. Consequently, a vast amount of candidates missed the opportunity of recruiting. The recommender system technology aims to help users in finding items that match their personnel interests; it has a successful

usage in e-commerce applications to deal with problems related to information overload efficiently

➢Job recommendation application with intelligence of chatbot. In this system, we demonstrate a chatbot that uses Artificial Intelligence to produce dynamic responses to online client enquiries. This web-based platform provides a vast intelligent base that can help humans to solve problems. The chatbot recognizes the user's context, which prompts an intended response. Because this is a dynamic response, the user's desired response will be generated. This also uses a machine-learning algorithm to learn the chatbot by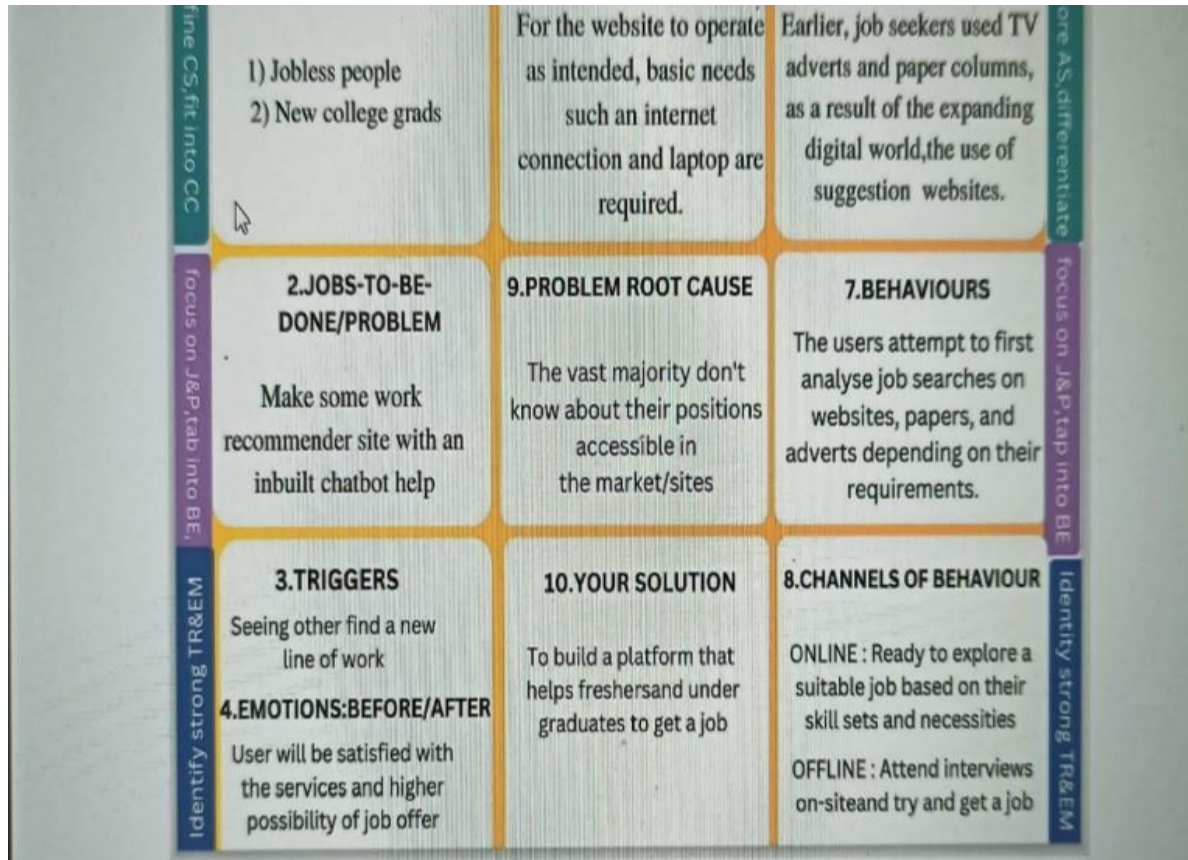 experiencing various requests and responses. Chatbots come to use in numerous fields of our daily life. Because AI enhances the human touch in every communication, chatbots are becoming increasingly robust. It triggers accurate responses after understanding a user's query. Its objective is to reduce human dependency in every organization and reduce the need for different systems for different processes.

PROBLEM SOLUTION FIT

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioural patterns and recognize what would work and why Purpose

❑ Solve complex problems in a way that fits the state of your customers.

❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging. ❑ Increase touch-points with your company by finding the right problembehaviour fit and building trust by solving frequent annoyances, or urgent or costly problems.

❑ Understand the existing situation in order to improve it for your target group.

Table 3.4 Problem Solution Fit:

1) Jobless people 2) New college grads	For the website to operate as intended, basic needs such an internet connection and laptop are required.	Earlier, job seekers used TV adverts and paper columns, as a result of the expanding digital world,the use of suggestion websites.
2.JOBS-TO-BE-DONE/PROBLEM Make some work recommender site with an inbuilt chatbot help	**9.PROBLEM ROOT CAUSE** The vast majority don't know about their positions accessible in the market/sites	**7.BEHAVIOURS** The users attempt to first analyse job searches on websites, papers, and adverts depending on their requirements.
3.TRIGGERS Seeing other find a new line of work **4.EMOTIONS:BEFORE/AFTER** User will be satisfied with the services and higher possibility of job offer	**10.YOUR SOLUTION** To build a platform that helps freshersand under graduates to get a job	**8.CHANNELS OF BEHAVIOUR** ONLINE : Ready to explore a suitable job based on their skill sets and necessities OFFLINE : Attend interviews on-siteand try and get a job

3PROPOSED SOLUTION

Job recommender systems are desired to attain a high level of accuracy while making the predictions which are relevant to the customer, as it becomes a very tedious task to explore thousands of jobs, posted on the web, periodically. The web recommender System suffers from many challenges.

S.NO	PARAMETERS	DESCRIPTION
1	Problem Statement (Problem to be solved)	To develop an end-to-end application capable of displaying the current job openings based on the user skillset

2	Idea / Solution description	In this paper, we proposed a framework for job recommendation task. This framework facilitates the understanding of job recommendation process as well as it allows the use of a variety of text processing and recommendation methods according to the preferences of the job recommender
		system designer. Moreover, we also contribute making publicly available a new dataset containing job seekers profiles and job vacancies. Future directions of our work will focus on performing a more exhaustive evaluation considering a greater amount of methods and data as well as a comprehensive evaluation of the impact of each professional skill of a job seeker on the received job recommendation.

3	Novelty/ Uniqueness	With the development of information technology and application of the Internet, People gradually entered the time of information overload from information scarcity. User satisfaction with recommender systems is related not only to how accurately the system recommends but also to how much it supports the user's decision making. Novelty is one of the important metrics of customer satisfaction. There is an increasing realization in the

		Recommender Systems (RS) field that novelty is fundamental qualities of recommendation effectiveness and addedvalue. This paper combed research results about definition and algorithm of novel recommendation, and starting from the meaning of "novel", defined novelty of item in recommendation system. Experiment proved using the definition of novelty to recommend can effectively recognize the item that the user is familiar with and ensure certain accuracy
4	Social Impact/ Customer Satisfaction	we develop several recommender systems and measure their ability to deliver accurate and diverse recommendations and their ability to generate customer satisfaction with diverse data sets. The results show that accuracy and diversity positively affect customer satisfaction when applying a deep learning-based recommender system. By contrast, only accuracy positively affects customer

		satisfaction when applying traditional recommender systems. These results imply that developers or managers of recommender systems need to identify factors that further improve customer satisfaction with the recommender system and promote the sustainable development of e-commerce.
5	Business Model (Revenue Model)	Recommendation systems allow brands to personalize the consumer experience and make suggestions for the information that make the most sense to them. A recommendation engine also lets businesses analyse the customer's current usage and past browsing history to deliver relevant service and product recommendations
6	Scalability of the Solution	Recommendation system is a which provides techniques with information, which he/she may be interested in or accessed in past. Traditional recommender techniques such as content and collaborative filtering used in various applications such as education, socia.

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT

Following are the functional requirements of the proposed solution

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	This application can be used by the job seekers to login and search for the job based on her Skills set.
NFR-2	Security	This application is secure with separate login for Job Seekers as well as Job Recruiters.
NFR-3	Reliability	This application is open-source and feel free to use, without need to pay anything. The enormous job openings will be provided to all the job seekers without any limitation.
NFR-4	Performance	The performance of this application is quicker response and takes lesser time to do any process.
NFR-5	Availability	This application provides job offers and recommends Skills for a Particular Job openings.
NFR-6	Scalability	The Response time of the application is quite faster compared to any other application.

PROJECT DESIGN
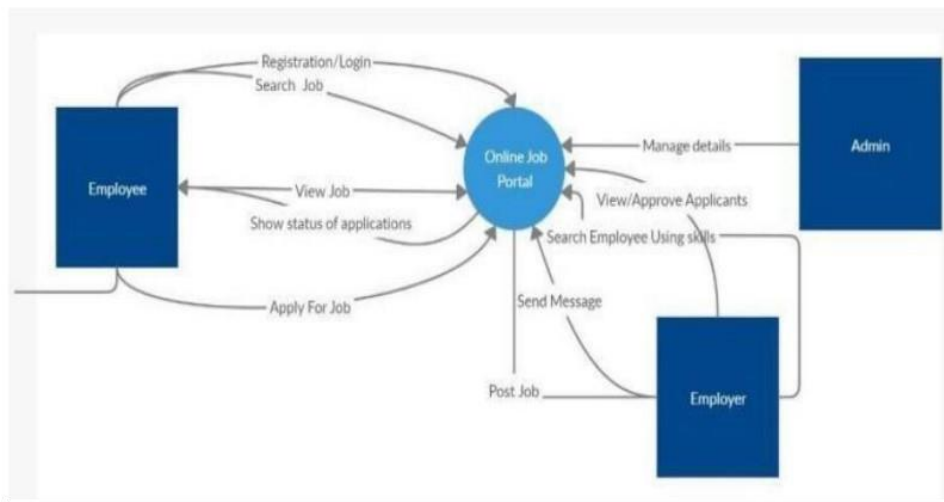
DIAGRAMS

5DATA FLOW

Fig 5.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored

5.2 SOLUTION AND TECHNICAL ARCHITECTURE

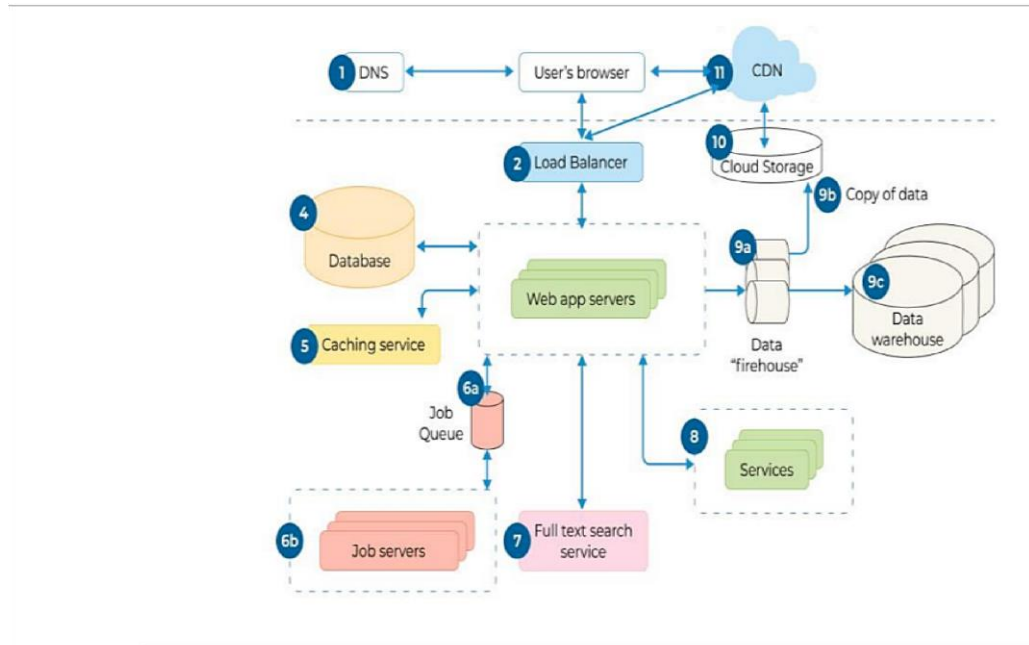JOB RECOMMENDED APPLICATION: (SOLUTION ARCHITECTURE)

Fig 5.2: SOLUTION AND TECHNICAL ARCHITECTURE

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

6 .2 Sprint Delivery Schedule

Table 6.1: Sprint Planning &Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	7	High	1
Sprint1		USN-2	As a user, I will receive confirmation email once I have registered for the application	7	High	1

Sprint2		USN-4	As a user, I can register for the application through Facebook	5	Low	1
Sprint2		USN-5	As a user, I can register for the application through Gmail	5	Medium	1
Sprint2	Login	USN-6	As a user, I can log into the application by entering email & password	10	High	1
Sprint3	Profile and details	USN-7	Update user skills in their account to use it for job search.	7		1

Sprint3		USN-8	Make user able to edit their skill set	7		Low	1

Sprint1	Communication	USN-3	A customer care executive is a professional responsible for communicating the how's and why's regarding service expectations within a company	6		1
Sprint3		USN15	Create a chat assistant for the users.	6	Low	1
Sprint4	Backend processes	USN10	Backend to search job based on user skill set.	20	High	1
Sprint5	Deployment	USN13	Containerize the application.	10	High	1
Sprint5		USN14	Deploy the application for public access.	10	High	1

TESTING

TEST CASES:

Test Cases

				Date	03-Nov-22						
				Team ID	PNT2022TMID25046						
				Project Name	Project - Skill/Job Recommender						
				Maximum Marks	4 marks						
Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	Executed By
LoginPage_TC_OO1	Functional	Login page	Verify that after registration users are navigated to login page	Mail id, Username, Password,Phone number, Pin	1. Open the website and go to register page. 2.Enter details and press register 3.Verify that users are navigated to registration page	Users should be navigated to registration page	Working as expected	Pass	Excellent	`N	JEFRIN J
LoginPage_TC_OO2	UI	Home Page	Verify the UI elements in Login/Signup popup	Username & Password	1. Open the website 2.Enter details and press login 3.Verify that users are notified of login process	Users should be notified of login process	Working as expected	Pass	Good	N	ALBERT RAVIDOSS
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials		1. Open the website 2.Enter details and press login 3.Verify that users are logged into website properly	User should be logged into website properly	Working as expected	Pass	Good	N	ARUN K
HomePage_TC_OO1	Functional	Home Page	Verify that categories of skills and jobs are shown in homepage		1. Open the website 2.Enter details and press login 3.Verify that categories of are showing Jobs shown in	Categories of skills and jobs should be shown in homepage	Working as expected	Pass	Good	N	BALAMURUGAN K
HomePage_TC_OO2	Functional	Home page	Verify that jobs are displayed in homepage		1. Open the website 2.Enter details and press login 3.Verify that jobs are displayed in homepage	jobs should be displayed in homepage	Working as expected	Pass	Good	N	JEFRIN J
HomePage_TC_OO3	Functional	Home page	Verify that when clicked on jobs it is redirected to correct page		1. Open the website 2.Enter details and press login 3.Verify that when clicked on jobs it is redirected to correct	When clicked on job link it should be redirected to correct page	Working as expected	Pass	Excellent	N	JAYAKRISHNAN J

8.2 USER ACCEPTANCE TESTING:

Acceptance Testing UAT Execution & Report Submiss

1. Purpose of Document The purpose of this document is to briefly explain the test coverage and open issues of the Skills and Job Recommendation project at the time of the release to

User Acceptance Testing (UAT).

2. Defect Analysis This report shows the number of resolved or closed bugs at each severity level, and how they were

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	3	3	20
Duplicate	1	1	2	2	6
External	2	3	0	1	6

Fixed	11	2	4	20	17
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Total	24	14	13	26	80

User Acceptance Testing

Test Case Analysis

This report shows the number of test cases

Test Case Analysis

Section	Total case	Not Tested	Fail	Pass
Print Engine	7	0	1	7
Client Application	51	1	0	51
Security	2	0	2	2
Outsource shipping	3	0	1	3
Exception Reporting	9	0	1	9
Final Report Output	4	0	1	4
Version Control	2	0	0	2

RESULTS

PERFORMANCE METRICS

Efficiency should be a priority for employees. This requires them to have a good sense of time management and resource utilization. They should be able to monitor missed deadlines and how well a certain task was executed. But what is efficiency?

In simple terms, it is the output that you get after putting in a certain amount of input that contributes to the overall success of a business.

Here is how you can measure an employee's efficiency. For instance:

- Choose the number of tasks completed
- Measure the number of tasks completed during a period of one month.
- Measure the output against the average figure of the workplace.
  The average of the workplace is the benchmark to measure.
- Evaluate an employee's input which is the number of hours an employee puts in.
- Divide the output by the input to get the efficiency figure Remember, efficiency is a key indicator that reveals whether an employee is meeting expectations or not.

When measuring efficiency, remember to evaluate the following as well:

- The job description
- The nature of work
- Amount of work assigned
- Deadline for completing tasks
Quality of work done

ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

It can speak volumes for a candidate-in-question when they are referred by an
existing employee. Not only will the current employee, the referrer, likely want to add to—and not detract from—company culture, but they'll also vouch for required skillsets and competencies. Here are the top advantages of employee referrals:

1. Your company will save time and money.

Sourcing candidates requires a lot of effort, which means it can cost a company
both time and money. It was found in one study that referred candidates are 55% faster to hire, compared with employees sourced through career sites. An advantage of employee referrals is that your current team member makes the connection and saves the recruiter that initial time of sourcing the candidate. Further, the candidate could be a better match compared to other candidates who apply externally. This will also help expedite the process and cut back on the need to find alternative options.

2. Your company will receive qualified, quality candidates.

Employees will want to work with someone who will improve their own output and
day-to-day workload. So, in most cases, you can have more confidence in the candidate's ability to perform the necessary tasks. Further, according to research done by Zao, nearly three in ten employers have caught a fake reference on an application. So, a personal recommendation that is already within the company can instill confidence that the reference is in fact valid and reputable.

3. Retention rate is typically better.

After two years, retention of referred employees is 45% compared to 20% from job
boards. Employee referrals tend to stay around longer, perhaps because 38 they are personally connected to their peers. That's not to mention that the referrer themselves may feel more respected and valued too after their company takes their recommendation. And when an employee feels respected and valued, they can become more dedicated in turn. You may also want to give an employee referrer a bonus to show your appreciation.

DISADVANTAGES:

To properly answer "What are the advantages and disadvantages of employee
referral?" we must now also look at the disadvantages. The disadvantages of employee referrals do not outweigh the benefits, but there are still some to consider.

Here are three employee referrals disadvantages to keep in mind when making a
hiring decision:

1. You may get a recommendation based on bias.

While in most cases an employee's motives should be "pure," there may
be
circumstances where a person wants to just work with their friend or receive the
referral bonus. This can result in the candidate not being as qualified as either the
referrer or referee said they were. The referrer may think that they can make up for
the candidate's shortcomings or give them a crash course to level-set their skills. This
can impact their own production in a negative way. And now your company may
have two underperforming employees—and you may have to look to fill both of these
positions in the not-so-far-off future.

2.Employee referrals can invite opportunity for negative company politics.

While an advantage of employee referrals is that they can positively
impact peer
morale, they can also cause unnecessary tension. The twosome can be negatively
received by their peers especially if the external hire was chosen over an internal
promotion. Further, the referrer may be afraid to offer critique to the person they
referred. This kind of dynamic can negatively impact their work.

3. Your company could end up losing both the referrer and the referee.

When one goes, the other may follow. Whether one decides to leave because of
company politics, personal reasons, or a better opportunity, there is a risk that their
counterpart will follow suit. This chance may heighten if problems with team dynamics
aren't addressed and resolved. So, it's important to stay involved with a new hire,
beyond any initial onboarding and ensure they are connected to the company and not
just the employee who referred them.