

FMEA

Process/Product Name: Course Recommendation System
 Responsible: Data Science and Machine Learning

Prepared By: Wahyu
 FMEA Date (Orig.): _____ (Rev.): _____

Process Step/Input	Potential Failure Mode	Potential Failure Effects	SEVERITY (1 - 10)	Potential Causes	OCCURRENCE (1 - 10)	Current Controls	DETECTION (1 - 10)	RPN	Action Recommended	Resp.	Actions Taken	SEVERITY (1 - 10)	OCCURRENCE (1 - 10)	DETECTION (1 - 10)	RPN
What is the process step, change or feature under investigation?	In what ways could the step, change or feature go wrong?	What is the impact on the customer if this failure is not prevented or corrected?		What causes the step, change or feature to go wrong? (how could it occur?)		What controls exist that either prevent or detect the failure?			What are the recommended actions for reducing the occurrence of the cause or improving detection?	Who is responsible for making sure the actions are completed?	What actions were completed (and when) with respect to the RPN?				
Data Collection & Processing	Missing or inaccurate data collected from users	Poor quality recommendations, leading to low engagement	8	Incomplete user profiles, faulty data sources	6	Data validation scripts that check for missing or malformed values; daily data integrity checks	4	192	Implement real-time data validation processes that flag and fix anomalies before they propagate into the system	Data Science and Machine Learning	Implemented a real-time data validation pipeline, where missing or incorrect data is flagged and rectified within minutes, improving data accuracy and preventing downstream issues in recommendations.	8	4	2	64
Recommendation Algorithm	Algorithm fails to provide relevant course recommendations	Users may not find the courses they want, leading to churn	9	Poor algorithm tuning, lack of diversity in recommendations	6	Periodic retraining of the model using new data; recommendation model is tested with sample users before production	5	270	Regularly evaluate the algorithm with A/B testing on live users to ensure relevance, and introduce diversity in recommendation logic (e.g., collaborative filtering + content-based)	Data Science and Machine Learning	A/B testing was performed with 10% of users. Diversified the recommendations based on content preferences and collaborative filtering. Algorithm adjustments reduced churn by 15% for new users.	9	4	3	108
User Interface & Experience	Poor or confusing UI/UX makes it difficult for users to find recommendations	Frustration, drop-off in user engagement, and poor user retention	7	Unintuitive design, poorly placed recommendation widgets	4	Basic UI/UX testing during development; user focus groups conducted to get feedback	6	168	Perform extensive A/B testing on various UI designs; refine UI layout based on heatmaps to ensure ease of navigation for recommendation widgets	UI/UX	Implemented A/B tests for multiple UI designs and improved navigation based on click-tracking heatmaps, reducing bounce rates by 12% and increasing engagement with recommendations by 35%.	7	4	3	84
System Performance	System lags or crashes during high-traffic periods	Users will abandon the system, leading to dissatisfaction	10	Recommendations don't improve over time, leading to static system	4	Load testing is done periodically to simulate traffic spikes; basic server monitoring (CPU, RAM, disk space) is in place	6	240	Scale infrastructure automatically based on user traffic; Implement load balancing across multiple servers to handle traffic surges	DevOps	Implemented auto-scaling on the cloud server infrastructure, which dynamically adjusts resources based on real-time demand. Load balancing reduced crash incidents by 90% during high-traffic periods.	10	4	3	120
Feedback Loop	User feedback on recommendations is not incorporated	Late response to underperformance	6	Lack of a proper feedback mechanism, or ignoring feedback	6	User feedback is collected through star ratings, but this is not tied directly to algorithm improvement	4	144	Develop mechanisms for users to provide more granular feedback (e.g., thumbs up/down on specific courses); Use feedback to fine-tune the algorithm	Software Engineers	Integrated a thumbs-up/down feature for individual courses, tied to immediate algorithm adjustments. Feedback utilization increased relevance scores, and user satisfaction improved by 18%.	6	4	3	72
Data Security & Privacy	User data is compromised or used inappropriately	Loss of user trust, legal issues, penalties	10	Inadequate data encryption, lack of compliance with regulations	3	Basic data encryption (SSL for transmission); periodic security audits	5	150	Ensure end-to-end encryption, perform more frequent security audits, and ensure compliance with GDPR, CCPA, and other data protection laws	Data Govern	Enhanced security by implementing AES-256 encryption for data storage, and scheduled quarterly security audits. Compliance with GDPR and CCPA was improved, reducing potential legal risks by 85%.	10	3	4	120

FMEA															
Process/Product Name: Marketing Campaign Responsible: Marketing Promotion Manager						Prepared By: Wahyu FMEA Date (Orig.): (Rev.):									
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Ad Design & Creation	Ad message is unclear or not compelling	Low engagement with the ads, low CTR (low customer interest, reduced clicks)	8	Poor copywriting, unclear message, Lack of understanding of user needs or inaccurate audience segmentation	5	Initial audience research done using basic analytics tools; Marketing personas created based on existing users' data	4	160	Conduct in-depth surveys and interviews to refine personas; Use A/B testing on multiple ad copies to see which messaging resonates best. Ensure clear, value-driven messaging that speaks to user pain points.	Marketing Promotion Manager	Conducted user surveys and interviews to understand needs. A/B tests on multiple ad copies led to optimized messaging that increased click-through rate (CTR) by 15% compared to the initial ads.	8	4	2	64
Audience Identification	Wrong target audience is selected	High bounce rate, low conversions	9	Inaccurate customer segmentation	6	Monthly review	5	270	Conduct thorough customer analysis; run small-scale A/B tests on different audience segments before full campaign.	Marketing Promotion Manager	Collaborate with data science and machine learning dept running AB Testing	8	4	3	96
Social Media Strategy	Social media posts are inconsistent or irrelevant	Reduced engagement, poor brand visibility	7	Poor content planning, mismatch with audience	4	Monthly review	5	140	Develop a social media content calendar aligned with target audience interests and campaign objectives.	Marketing Promotion Manager	Social media calendar - target audiences interest - campaign objectives	7	4	3	84
Budget Allocation	Over-budget in one channel (e.g., TV)	Financial overspend, reduced ROI	8	Inaccurate budget forecasting or resource waste	5	Tracking by monthly financial report	3	120	Use a marketing budget planner; allocate resources based on channel performance metrics.	Marketing Promotion Manager	Project budget and project controller work with finance and accounting and monitor ROAS	8	4	3	96
Performance Monitoring	Campaign metrics are not tracked in real-time	Late response to underperformance	6	Inadequate use of tracking tools	6	Monthly review	4	144	Implement real-time campaign tracking tools; set up dashboards for key metrics (CTR, conversion rate).	Marketing Promotion Manager	Campaign tracking tools	6	4	3	72
Customer Engagement	Leads are not followed up promptly	Low conversion from leads to customers	9	Poor lead nurturing, slow response time	6	Manual follow up leads	6	324	Schedule lead nurturing emails immediately after capturing leads using automates.	Course Manager	Implement automated lead follow-up through CRM	9	4	3	108
Ad Placement Strategy	Inefficient ad placement, missing key platforms	Reduced reach and visibility, lower conversion rates	7	Failure to choose the right platforms where the target audience is active	6	Ads placed on general platforms (Google, Facebook); Basic analytics used to track impressions and clicks	5	210	Conduct audience behavior analysis to identify underutilized platforms (e.g., LinkedIn for professionals, YouTube for tutorials); Allocate ad spend based on platform performance	Ads Manager	Analyzed user behavior and found underutilized platforms like LinkedIn and YouTube. Reallocated budget towards those platforms, improving overall reach by 20% and boosting conversions from professionals in particular.	7	4	3	84
Press Release & Media	Delayed or poorly distributed press releases	Reduced media coverage and brand awareness	6	Inefficient coordination with media outlets, delays in approval	4	Press releases sent to a few key outlets manually	7	168	Build relationships with a larger network of journalists, influencers, and bloggers; Use automated tools to schedule timely releases	PR Manager	Automated press release distribution and built a media relationship pipeline. Press coverage increased by 25%, and timely publication ensured visibility aligned with campaign peaks.	8	4	3	96
Social Media Ads	Low engagement rates on social media campaigns	Lower-than-expected ROI, wasted budget	8	Unattractive visuals, weak call-to-action (CTA)	6	Basic social media engagement tracking (likes, shares, and comments)	6	288	Enhance visuals and CTA with A/B testing; Use interactive elements like polls and quizzes; Tailor ads for each platform (e.g., Instagram vs LinkedIn)	Ads Manager	Revamped visuals and CTAs with a focus on A/B testing. Engagement on social media improved by 18%, with polls and interactive quizzes increasing direct interaction and ad performance on platforms like Instagram and Facebook.	8	4	3	96
Budget Management	Budget overrun due to poor cost tracking	Depletion of marketing funds, leading to campaign cutback	9	Inefficient allocation, unexpected expenses	3	Weekly budget reviews by the finance team, using basic expense tracking software	6	162	Implement real-time budget tracking and automated alerts for over-budget items; Forecast using dynamic spend analysis based on real-time ad performance	Marketing Promotion Manager	Introduced automated budget tracking software that sent real-time alerts when costs approached set limits. This led to a 10% reduction in unexpected expenses and better control of the overall marketing spend.	9	3	3	81
User Conversion Rate	Low conversion rate from ad click to signing up for the course	Low ROI, fewer course sign-ups	8	Poor ad targeting, ineffective landing pages	7	Basic conversion tracking using Google Analytics; Weekly reviews of conversion data	4	224	Conduct A/B tests on landing pages to improve conversion rates; Optimize the user journey from ad click to course sign-up with personalized landing pages	Marketing Promotion Manager	A/B testing of landing pages resulted in a 12% improvement in conversion rates. Personalized landing pages for different user personas were created, aligning better with the audience's needs and journey.	8	4	3	96
Timing of Campaign	Campaign launched at a suboptimal time	Low user interest, low traffic	7	Lack of coordination with key seasonal trends or competing events	5	Ads are timed based on previous marketing schedules and intuition	6	210	Analyze user behavior and seasonality data to schedule campaigns during peak times (e.g., exam prep seasons for courses); Optimize ad frequency	Marketing Promotion Manager	Adjusted campaign schedules to target key user interest periods (e.g., before exams). Increased sign-up rates by 20% during high-demand periods, compared to campaigns launched at random times in the past.	7	4	3	84
Competitor Activity	Competitor runs simultaneous campaigns	Marketing noise and reduced effectiveness of the course campaign	6	Lack of awareness of competitors' marketing schedules	4	Basic competitor monitoring using general tools like Google Alerts; React to competitor campaigns after they've been noticed	6	144	Set up proactive monitoring for competitor activities and market trends; Plan campaigns around or in anticipation of competitor launches	Competitive Intelligence Analyst	Implemented competitor activity monitoring using specialized tools. Planned the launch of our ads one week before a major competitor's campaign, leading to 10% higher engagement during that competitive period.	6	4	3	72