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Information Integrity, Rationalist Media and Public Interest Discourse

Mapping and Analyzing Science Communication and Science Journalism Practices in Pakistan

Dr Shafiq Ahmed Kamboh and **Adnan Rehmat**

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DISCLAIMER

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Executive Summary: Topology of science communications practices in Pakistan

Why the need for this focused research? Co-authored by Dr Shafiq Ahmed Kamboh and Adnan Rehmat – both active science communications advocates – on behalf of the International Media Support (IMS) by the Institute for Research, Advocacy and Development (IRADA), this investigative report maps the topology of science communication practices in Pakistan and their general effect on journalism in the country and its accumulative impact on society. This evaluation is done in the context of the critical need for information integrity, rational media, and public interest discourse.

Context: The report analyses how science organizations (SOs) and science academia (SA) use the normative means of communications such as press releases, websites and social media to communicate scientific knowledge, revealing a systemic underrepresentation of science-focused content. The study finds that both SOs and SA prioritize administrative publicity and ceremonial content over substantive science communication, resulting in a dual weakness of quantity and quality.

Rationale: The rationale for this study stems from the recognition that science communication and journalism are essential for translating scientific knowledge into public understanding and informed decision-making. In Pakistan, these practices are underdeveloped, with little institutional support for journalists to access locally grounded scientific stories. The absence of systematic research on these domains has left policymakers and practitioners without evidence-based insights to promote science culture and support national development priorities. The report aims to fill this gap by providing a foundational evidence base for policy, curriculum reform, and practical interventions.

Significance: The significance of the report lies in its call to strengthen information integrity and rational media by bridging the gap between scientific research and public discourse. Poor science communication leaves society vulnerable to superstition, rumour, and misinformation, undermining rationalist discourses and public interest journalism.

Summary findings: The major findings of this report are summarized, in terms of the general practices of the normative communications means as well as the impact that this has on media and society, as follows:

Key findings: Science communication practices of science organizations (SOs) in Pakistan

Press releases: Quantitatively limited and qualitatively inadequate in terms of focus on science.

Websites: Greater focus on administrative publicity and public relationing than on disseminating science.

Social media: Disproportionately skewed toward institutional updates, administrative activities, and ceremonial content, rather than scientific knowledge-sharing.
Summary finding across all mediums: *Less science, more PR*

Overall outcome:

For media: Despite the presence of these SOs, journalists in Pakistan often struggle to access reliable, locally grounded scientific content, because of a lack of institutional support in connecting with researchers during science-critical events (e.g., floods, pandemics, vaccination drives, etc.). This leaves journalists without a reliable pool of locally developed stories.

For society: Inadequate science communication by both science organizations and media leaves room for superstition, rumor and conjecture rather than strengthen rationalist discourses through public interest journalism. This leaves citizens disconnected from homegrown research and innovation and vulnerable to disinformation and misinformation.

Overall impact of current communications practices by science organizations:

- *Dual weakness in quantity and quality results in science organizations in Pakistan failing to leverage their communication platforms as bridges between research communities and society at large.*

- *Lack of prioritization and capacity translates into a missed opportunity of contributing meaningfully to public understanding of science and inspiring young audiences to pursue scientific inquiry. This majorly limits opportunities for promoting a culture of science and rationalist and development public discourses.*

- *Without a deliberate strategy to enhance science communication qualitatively and quantitatively, science organizations continue to fail their primary responsibility to foster scientific literacy, inform evidence-based p*olicymaking, and inspire a new generation of scientists and critical thinkers in Pakistan.

Key findings: science communication practices of science academia (SA) in Pakistan

Press releases: General indifference to highlighting scientific discoveries, achievements of researchers, and science-related events.

Websites: As much focus on administrative visibility and publicity as on science communication

Social media: Sparse content on science and generally sluggish posting frequency.

Summary finding across all mediums: *Science takes a back seat to official publicity*

Overall outcome:

For media: The general lack of tangible, meaningful science communication by universities leaves journalists without reliable and locally developed science stories, forcing them to rely on anecdotal evidence or translate stories from abroad.

For society: The lack of meaningful media coverage of issues in scientific context by journalists, science organizations and universities leaves citizens disconnected from evidence-based public discourse and vulnerable to unenlightened opinions rather than facts.

Overall impact of current communications practices by science academia:

- *The generally poor quality and low quantity of science content published means research is not translated into accessible knowledge for the public or journalists, which disconnects society from relevant scientific debates and encourages dependency on misinformation and disinformation.*

- *The absence of a critical mass of science communication undermines information integrity, weakens rational media, and prevents the development of a robust public interest discourse in Pakistan.*

Call to action:

Among key suggestions this report recommends establishing Science Communication Centers, establishing a coalition to strengthen information integrity, training content creators and public relations officers, and fostering academia-media partnerships to enhance the quality and impact of science communication. It emphasizes that by institutionalizing these reforms, Pakistan can build resilience against disinformation, improve risk communication, and promote evidence-based policymaking, ultimately promoting a culture of scientific literacy and robust public interest discourse.

CHAPTER 1:
Introduction: Mapping Science Communication and Science Journalism Practices in Pakistan

Science has become one of the most critical forces shaping modern societies, influencing policy, development, and public life in profound ways. Yet, the translation of scientific knowledge into public understanding and informed decision-making depends heavily on two interlinked but distinct practices of human communications: *science communication and science journalism*.

Science communication broadly refers to the practice of disseminating and engaging scientific knowledge with non-specialist audiences. It involves scientists, educators, policymakers, and communicators who aim to make scientific concepts accessible, relatable, and relevant to diverse communities. Its purpose is often educational, participatory, and advocacy-driven—bridging the gap between expert knowledge and public awareness.

Science journalism, by contrast, is rooted in the norms and practices of the news media. It focuses on reporting, investigating, and critically analyzing scientific developments, ensuring accountability, accuracy, and relevance within the public sphere. Unlike science communication, which often operates in or in partnership with scientific institutions, science journalism maintains an independent, critical distance to ask difficult questions, uncover controversies, and highlight both the promises and pitfalls of science and technology.

These two practices do not operate in isolation. Their interface — the day-to-day relationship, exchange, and mutual support between science communicators (often embedded in universities, government labs, or research-focused science organizations) and journalists — is central to how science becomes an integral part of public knowledge.

Science communicators play a pivotal brokerage role: they translate the findings of recent papers, projects, and patents into lay language, package evidence and provide timely expert access, and act as rapid points of contact during episodic events such as disease outbreaks, climate-related disasters, or major scientific missions on earth and in space with the general public. By curating reliable sources, summarizing technical evidence, and making local researchers available to the *press,* help journalists produce evidence-based reporting rather than anecdotal accounts.

Moreover, *science communicators* disseminate this content through institutionally controlled media, such as websites, campus radio/TV channels, newsletters/magazines, and social media platforms, to enhance the public's understanding of science. In resource-constrained settings, such as Global Southern societies, this interface is particularly valuable because it enables local journalists to move beyond mere translation of stories originating in technologically advanced countries; instead, journalists can surface locally relevant research, investigate causes and

consequences, and frame stories through a science-based lens that reflects national contexts and policy needs.

Besides this interface, aspirant audiences for science-based content can benefit from knowledge disseminated by local, credible academic and organizational *science communication* sources, rather than relying on foreign outlets that often address issues with limited relevance to their socio-political and environmental realities.

The quality of this interface directly affects public understanding: when it works well, citizens receive timely, accurate explanations of complex phenomena and policymakers face sustained, evidence-informed pressure to act. When it is weak or absent, news coverage tends toward episodic reporting — short bursts of attention around crises — and may rely on superficial or sensational narratives that deepen misunderstanding and mistrust.

In low- and middle-income countries such as Pakistan, where scientific infrastructure and journalistic resources are uneven, strengthening the communicator-journalist interface is therefore an essential route to building resilience against disinformation, improving risk communication in crises, and promoting research uptake for development goals.

In summary, both practices play indispensable roles in a democratic society. Effective science communication helps build a culture of scientific literacy and public trust in evidence-based knowledge, while rigorous *science journalism* enhances democratic oversight, ensuring that science and technology serve the public good rather than narrow interests. Together, they shape how societies understand and respond to pressing challenges, such as climate change, health crises, food security, and technological transformations and interventions on land and in space.

Rationale of the project

In Pakistan, however, these practices remain underdeveloped and underexplored. While sporadic initiatives in popular *science communication and limited reporting on science-related issues* exist, there has been no systematic or scientific study that analyzes how science is *communicated* or *reported* in the country. The absence of such research means that we lack an evidence-based understanding of the strengths, gaps, and challenges in these crucial domains. As a result, both policymakers and practitioners have limited insight into how *communication and journalism* can be harnessed to promote science culture, enhance public engagement, and support national development priorities.

This report, as part of efforts to promote **public interest journalism and strengthen information integrity** undertaken on behalf of International Media Support (IMS) by the Institute for Research, Advocacy and Development (IRADA), seeks to fill this gap. By analyzing *science communication and science journalism* practices in Pakistan, it provides a foundational evidence base to understand their current state, their practices, the reforms needed to strengthen each, and eventually help bridge gaps between them. This report further aims to understand how the interface between *communicators* and *journalists* functions in practice (if it exists at all), and what institutional and capacity-building measures could strengthen evidence-based public discourse around science. By

combining qualitative and quantitative methods, the study seeks to establish an evidence base for policy, curriculum reform, and practical interventions that can enhance the accuracy, local relevance, and impact of *science reporting* and *communication*.

CHAPTER 2:
Analyzing Science Communication Practices

To explore the state of *science communication* practices in Pakistan, this study began by examining two of the most prominent and widely used controlled media channels employed by *science academia (SA)* and *science organizations* (*SOs*): i.e., *institutional websites* and *social media platforms*. These communication channels were selected because they represent the primary self-managed spaces where scientific actors directly communicate with their audiences, free from the editorial oversight and gatekeeping associated with mainstream journalism.

Institutional *websites* remain the central and most authoritative medium through which universities, research centers, and scientific organizations disseminate information. They serve as repositories of official content—ranging from research findings, policy briefs, and annual reports to event announcements and outreach materials through news and press release sections. Because these websites are totally controlled by the institutions themselves, they allow for unfiltered presentation of content. Institutions can publish whatever they deem relevant without concern that their messages will be altered, reduced, or deprioritized by journalists or editors. This makes institutional websites an essential tool for understanding how scientific actors in Pakistan seek to represent themselves and their work to the public.

Similarly, *social media handles*, especially those maintained on platforms such as *Facebook, X* (formerly *Twitter*), *Instagram*, and *LinkedIn*, provide dynamic, interactive spaces for *science communication.* Here too, *SA* and *SOs* retain significant control. They can decide whether to use these platforms for genuine public outreach—sharing accessible, lay-friendly science content that enhances public understanding—or whether to prioritize internal institutional promotion, highlighting the activities of senior officials, ceremonial events, or administrative visibility. *Social media* thus reveals not only intent but also the communication priorities of science actors. Moreover, these organizations exercise authority over user-generated content (UGC) too, by moderating comments, filtering audience engagement, and, in some cases, restricting which followers can contribute to discussions. This allows them to create curated spaces for dialogue, though it also raises questions about inclusivity and openness in their communication practices.

2.1 Primary-level Data of Science Communication Study

In order to systematically assess *science communication* practices, a list of 43 **science actors** was drawn up. This sample comprised 20 science-based academic institutions/universities offering science subjects in various degree level programs to students, called hereinafter ***SAs*** (see Annex 1), and 23 specialized research centers/national-level **science organizations** focusing on extensive research work/activities, called hereinafter ***SOs*** (See Annex 2), both of which represent the institutional backbone of scientific work in Pakistan.

The *official websites and social media handles* of each of these actors were collected, verified, and analyzed using a structured Google Response Sheet provided by IRADA. This method ensured that only authentic and official accounts were considered, thereby avoiding reliance on duplicate, inactive, or fake institutional pages—a common problem in digital research environments in Pakistan.

It is noteworthy that the websites and social media details were not arbitrarily compiled but were directly supplied to *IRADA* by the institutions themselves in response to formal queries administered through a Google Form. This approach both enhanced the credibility of the dataset and established an accurate baseline for analyzing the communication practices of legitimate science actors in the country.

By focusing on these controlled media (i.e., *websites and social media*), the study was able to identify how ***SAs*** and ***SOs*** project their identities, share knowledge, and engage (or fail to engage) with the wider public. The analysis provides insights not only into the content of communication but also into the underlying institutional culture that shapes whether *science communication* is approached as a public good, an administrative formality, or a tool for self-promotion.

In summary, primary-level data, provided by IRADA, served as the foundation for analyzing *science communication* practice in Pakistan. This includes information from 20 selected SAs and 23 SOs, collected through a Google Response Sheet. The data covers website links, social media handles, and details about the content formats used. Building on this, secondary-level data (*press releases, social media posts*) was retrieved from the official *websites* and social media *platforms* of these institutions. To analyze the quantity and quality of *science communication* practices, this secondary-level data was further explored by applying the following methodology.

2.2 Methodology

This study primarily, employed a *quantitative content analysis* approach to examine both the quantity and quality of science communication content disseminated by *SAs* and *SOs* in Pakistan. The goal was to capture not only the volume of communication but also the nature, purpose, and orientation of content being shared with the public.

Content analysis was selected because it provides a systematic and replicable method for describing communication practices in measurable terms. Unlike anecdotal observation or case-based exploration, *quantitative content analysis* allows researchers to identify patterns, compare across institutions, and quantify institutional priorities with a degree of objectivity (Wimmer & Dominick, 2011[5]). This was particularly important given the absence of prior empirical work on *science communication* in Pakistan, where anecdotal impressions often dominate discussion.

The *unit of analysis* consisted of institutional "*press releases*" published on official websites and "posts" disseminated through the verified social media accounts of the selected SAs and SOs. To establish a manageable and representative sample, a time frame of one month—from 15 August

5 Wimmer, R. D., & Dominick, J. R. (2011). Mass media research: An introduction (9th ed.). Wadsworth, Cengage Learning.

2025 to 14 September 2025—was selected. Alternatively, if an institution produced more than 50 press releases or posts within this period, the first 50 items were included in the final analysis. This dual condition allowed for comparability across institutions of **varying levels of media activity**, while controlling for potential bias from highly prolific actors. In simple words, this criterion allowed for a balanced sample that captured both highly active and less active communicators.

The primary level data collected by *IRADA* included 20 universities in total (See Flowchart 1). Of these, *six* were identified as *general universities*, offering a broad mix of disciplines such as *natural sciences, social sciences, fine arts, languages,* and *religious/area studies*. The remaining 14 were classified as *science universities*, with a dedicated focus on scientific and technological disciplines, including *IT/engineering, medical sciences, social, behavioral,* and *natural sciences*. These two groups of *science academia* were coded separately in the analysis, enabling a comparative assessment of how *general* versus *science-focused universities* prioritize and communicate scientific content. On the other hand, no such distinction was made while analyzing *SOs'* data. For the purpose of measuring the quantity of overall content for both *SAs* and *SOs*, *two* broad *categories* were constructed and operationalized as:

Category A: Science-Related Content included such units of analysis (i.e., press *releases* and *posts*) that communicated scientific discoveries, outlined their implications, highlighted the achievements of scientists or researchers, presented expert commentary, featured peer reflections, or announced science-related events.

Category B: Non-Science Content encompassed *press releases* and *posts*, such as administrative matters, policy or regulatory announcements, coverage of non-scientific events, statements from officeholders, and broader community or cultural engagement activities.

This distinction made it possible to calculate the proportion of institutional **communication explicitly focused on science** versus other domains.

Beyond quantity, the study also sought to evaluate the *quality of science communication* falling in *Category A*. To do this, science-related content (*Category A*) was further divided into *three subcategories*, which were operationalized as:

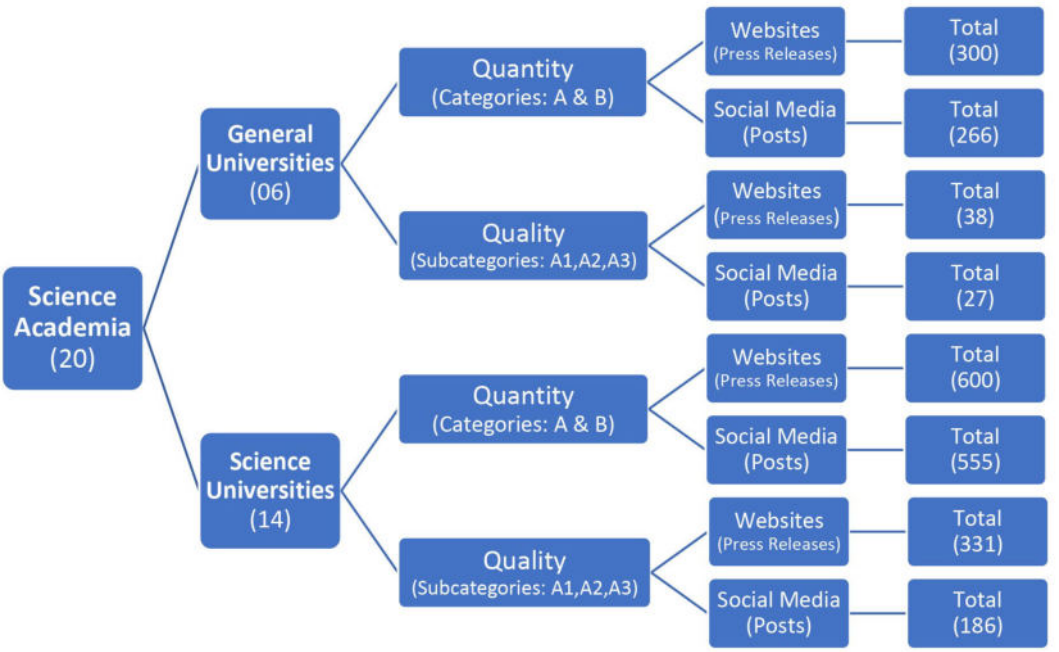
A1: Content Enhancing Public Understanding of Science included outputs that presented novel research findings published in high-quality research journals/books, cutting-edge methodologies, or advances across fields such as natural/social sciences, space, technology, and health. This subcategory also encompasses expert commentary, author reflections, and explanatory articles aimed at making science accessible and engaging to the general public.

A2: Achievements of Scientists and Researchers covered recognition of scientific excellence, such as awards, prizes, high-impact publications, or breakthrough experiments by faculty, students, or affiliated researchers. These items played a motivational role by showcasing individual and institutional contributions to science.

A3: Announcements of Scientific Events included content about seminars, conferences, public lectures, workshops, symposia, official visits, or inaugurations. While informative, this type of

content often served dual purposes, both as an informational tool for public awareness and as an institutional public relations strategy.

Flowchart 1: Explaining the methodology of science communication practice in Science Academia.



By quantifying outputs in numerical and percentage terms, this methodology made it possible to determine the relative weight given to *science-related versus non-science-related content*. Within the domain of *science-related communication* (*Category A*), the analysis further illuminated which objectives were prioritized: whether the focus was on deepening public understanding of science (*Subcategory: A1*), inspiring younger generations to pursue scientific careers (*Subcategory: A2*), or primarily enhancing institutional/individual visibility/image (*Subcategory: A3*).

By combining **volume measures (quantity) with thematic distribution (quality)**, this dual-level analysis sheds light on the extent to which *science academia and organizations* in Pakistan use their controlled media platforms to advance meaningful public engagement with science. It further highlights whether these institutions see communication as a responsibility to enhance understanding and inspire future scientists, or as a tool for administrative visibility and image-building. Ultimately, the findings generated through this methodology provide evidence-based insights into the strengths and shortcomings of institutional science communication practices in Pakistan, offering a foundation for targeted reforms and capacity-building initiatives.

The results attained through *content analysis* raised many questions, based on which *qualitative interviews* with 15 key participants, representing *science academia, science organizations*, and *science media*, were conducted to understand the reasons behind gaps among them and how they can be bridged to improve science communication/journalism practice in the country (Annex 3).

CHAPTER 3:
Data Analysis of Science Communication Practices of Science Academia (SA)

Science Academia (SA) was divided into two categories, i.e., *general universities* and *science universities*. The findings, presented in this section, offer insights into the strengths and limitations of current practices and point to opportunities for strengthening *science communication* as a driver of public understanding and societal engagement with science in both types of universities. Initially, the quantity of science-based content (*Categories A & B*) was measured and analyzed in both *general* and *science universities*.

3.1 Analyzing the Quantity of Website Content through Press Releases in General Universities

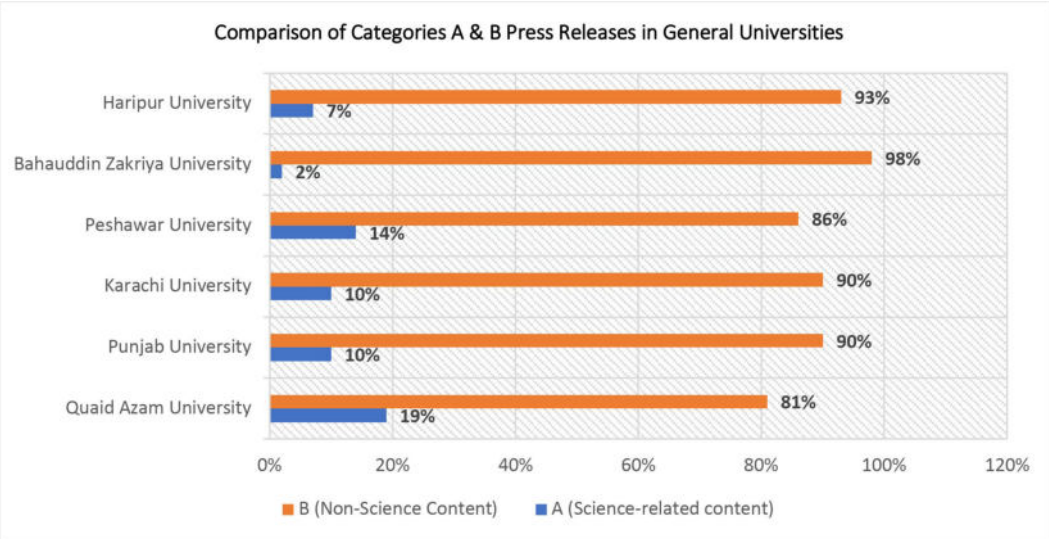
To measure the quantity of science-based content, the content analysis of 300 press releases published on the websites of six *general universities* paints a sobering picture of how ***little priority is given to science-related communication*** (See Table, Fig. 1). Out of the total, only 38 *press releases* (12.7%) fell into *Category A* (*Science-Related Content*), while an overwhelming 262 *releases* (87.3%) were classified as *Category B* (*Non-Science Content*). This imbalance underscores the tendency of general universities to use their press release platforms primarily for administrative announcements, ceremonial activities, or institutional **public relations rather than for communicating science** to the public.

Table 1: Showing the Percentage of General Universities' Press Releases in A & B Categories (N-300)

Sr. No.	University Name	Press Releases	A	B
1	Quaid Azam University	50	15 (30%)	35 (70%)
2	Punjab University	50	20 (40%)	30 (60%)
3	Karachi University	50	1(2%)	49(98%)
4	Peshawar University	50	0 (0%)	50(100%)
5	Bahauddin Zakriya University	50	0(0%)	50(100%)
6	Haripur University	50	02(04%)	48(96%)
Total		**300**	**38(12.7%)**	**262(87.3%)**

A closer look at individual universities reveals stark contrasts. The University of Karachi, for instance, produced 50 press releases in the sampled period, yet only one (2%) contained science-related content, while Haripur University published only two science-related press releases (4%) in

the same period. Similarly, the University of Peshawar and Bahauddin Zakariya University recorded no science-related releases at all during the one-month timeframe, with their entire output focused on non-science categories such as officeholder statements, administrative notices, or community engagement activities. These findings suggest either a **lack of prioritization of science communication** or an **absence of structured mechanisms within their communication (Public Relations) offices** to translate research outputs into accessible content.



In contrast, the *University of the Punjab* and *Quaid-i-Azam University* demonstrated comparatively stronger performance, with 40% and 30% of their *press releases*, respectively, falling into the science-related category. Although still a minority of their overall output, these figures indicate that some institutional attention is being directed toward **highlighting scientific discoveries, achievements of researchers, and science-related events**. The stronger presence of *Category A* content at these universities could be attributed to their larger research base, more active media cells, or stronger linkages between faculty and communication units. However, the quality of this content was later determined and discussed in section 2.5 of this report.

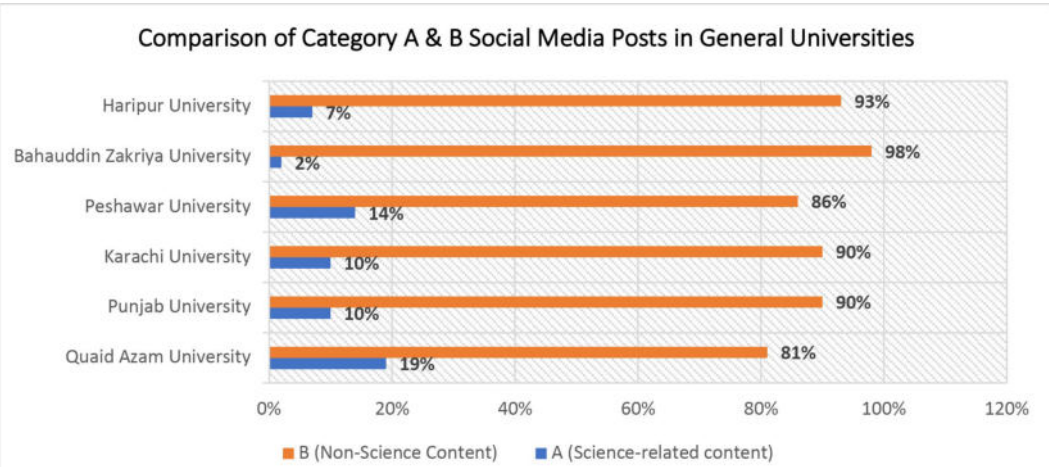
When compared with international best practices, the gap becomes even more evident. Universities in Europe and North America, such as *Oxford University*, *MIT*, or the *Max Planck Institutes* in *Germany*, routinely dedicate the majority of their press releases to science-related stories, often exceeding 60–70% of their digital content. These institutions have established professional science communication offices staffed with trained communicators who proactively translate peer-reviewed research into accessible stories for the public and the press. Even in countries of the Global South, such as the UAE and South Africa, leading universities now recognize science communication as a central part of their mission, using press releases not only to highlight discoveries but also to contextualize them for societal impact. In comparison, a meagre 14.4% **science-related output from Pakistani general universities reflects both institutional neglect and a systemic undervaluing of science communication as a public good**.

3.2 Analyzing the Quantity of Content through Social Media Posts in General Universities

To measure the quantity of science-based content, the analysis of 266 *social media posts* published by six *general universities* in Pakistan reveals an even lower commitment to science-related communication compared to their *website press releases*. Of the total content analyzed, only 27 posts (10.2%) fell into *Category A* (*Science-Related Content*), while an overwhelming 239 posts (89.8%) were classified under *Category B* (*Non-Science Content*). This imbalance suggests that **social media, despite its wide reach and interactivity, remains underutilized as a platform for meaningful *science communication* by *general universities* in Pakistan** (See Table/Fig. 2).

Table 2: Showing the Percentage of General SA Social Media Posts in A & B Categories (N-266)

Sr. No	University Name	Social Media Posts	A	B
1	Quaid Azam University	36	07 (19%)	29 (81%)
2	Punjab University, Lahore	50	05 (10%)	45 (90%)
3	Karachi University	50	05(10%)	45(90%)
4	Peshawar University	50	07(14%)	43(86%)
5	Bahauddin Zakriya University	50	01(02%)	49(98%)
6	Haripur University	30	02(07%)	28(93%)
Total		**266**	**27(10.2%)**	**239 (89.8%)**



Institutional variations, however, present an interesting picture. *Quaid-i-Azam University* (19%) emerges as the strongest performer within this group, with nearly one-fifth of its social media posts dedicated to science-related communication. Despite this comparatively higher proportion, the university's overall output—just 36 posts during the review period—is very limited, reflecting

a slow pace of posting. Similarly, *Haripur University*, with only 30 posts in total, also demonstrated **sluggish posting activity**. Its science-related share stood at 7%, which is not only low in terms of proportion but also undermined by its minimal overall activity.

The *University of Peshawar* followed with 14% of science-related posts, while *Punjab University* and *Karachi University* each contributed only 10% of their posts to *Category A*. At the lowest end, *Haripur University* had only two (7%), while *Bahauddin Zakariya University* had only one science-related post (2%) during the observed period, indicating an almost total neglect of their scientific output on social media.

These facts are especially concerning given the global role of social media as one of the most effective tools for science communication, particularly among younger audiences. Platforms such as *Facebook*, *Instagram*, *TikTok* (*STEM feature*), and *X* (formerly *Twitter*) are increasingly used worldwide to engage students and youth with interactive science content—from short explainer videos and infographics to live Q&A sessions with researchers.

In contexts like the United States, Europe, and even emerging economies such as India and Brazil, universities have recognized that social media can extend their reach beyond traditional academic audiences and position them as key actors in the democratization of knowledge. By contrast, the **near absence of science-focused content on the social media platforms of Pakistani general universities indicates a missed opportunity to inspire, educate, and engage a digitally active youth population**.

In summary, the analysis of content published by six general universities in Pakistan, on both *websites* and *social media platforms*, reveals a **systematic underrepresentation of science-related communication**. Together, these two controlled media outlets—over which universities have full authority—provide a unique opportunity to highlight scientific achievements, communicate discoveries, and engage the public. Yet, the findings indicate that this opportunity remains largely untapped.

3.3 Analyzing the Quantity of Website Content through Press Releases in Science Universities

To measure the quantity of science-based content, the content analysis of *press releases* from 14 science-focused universities across Pakistan provides a stark contrast to the earlier findings from the six general universities (See Table 3). Out of 600 *press releases* published by *science universities*, 331 (55.2%) were *science-related* (*Category A*), while 269 (44.8%) were *non-scientific* (*Category B*). This represents a **pointedly higher prioritization of *science communication compared to general universities***, where only 38 out of 300 *press releases* (12.7%) contained *science-related* content and an overwhelming 87.3% were devoted to non-scientific coverage. This contrast underlines the expected yet crucial observation: ***science-focused institutions are more engaged in science communication*** (however, the quality of this content was later determined and discussed in sections 2.7 and 2.8 of this report), while ***general universities*** **remain overwhelmingly preoccupied with bureaucratic and ceremonial activities on their official *websites***.

Table 3: Showing the %age of Science Universities' Press Releases in A & B Categories (N-600)

Sr. No.	University Name	Press Releases	A	B
1	Agha Khan University	50	36 (72%)	14 (28%)
2	COMSATS, Islamabad	50	43 (86%)	7 (14%)
3	NUST, Islamabad	50	22 (44%)	28 (56%)
4	BUITEMS, Quetta	50	12 (24%)	38 (76%)
5	Institute of Space Technology	36	9 (25%)	27 (75%)
6	NED	50	39 (78%)	11 (22%)
7	KEMU	41	29 (70.7%)	12 (29.2%)
8	DOW	50	43 (86%)	7 (14%)
9	Agricultural Uni, Faisalabad	50	38 (76%)	12 (24%)
10	IT University, Lahore	50	14 (28%)	36 (72%)
11	IBA, Karachi	50	40 (80%)	10 (20%)
12	LUMS, Lahore	50	6 (12%)	44 (88%)
13	Lasbela Uni of Agri, Water& Marine Sci.	15	0 (0%)	15 (100%)
14	UET, Taxila	8	0 (0%)	8 (100%)
Total		**600**	**331 (55.2%)**	**269 (44.8%)**

Within this group, several institutions emerged as leaders in science communication. *COMSATS University* (86%), *Dow University of Health Sciences* (86%), *NED University* (78%), *IBA Karachi* (80%), and the *Agricultural University, Faisalabad* (76%) all published a majority of their press releases on science-related matters, highlighting scientific research, discoveries, and academic achievements. Similarly, *Agha Khan University* (72%) and *King Edward Medical University* (70.7%) demonstrated a clear prioritization of *science communication* in their institutional output.

By contrast, some institutions revealed major shortcomings. *LUMS Lahore* (12%), *BUITEMS Quetta* (24%), the *Institute of Space Technology* (25%), and the *IT University Lahore* (28%) demonstrated weak science coverage, devoting the majority of their press releases to non-scientific events and administrative affairs. Most concerning is the *Lasbela University of Agriculture, Water & Marine Sciences*, and *UET Taxila*, which produced no science-related content in the sampled period, rendering their digital presence ineffective as a vehicle for promoting science.

Nevertheless, **even within *science universities*, the fact that nearly 45% of *press releases* were still devoted to non-science content points to persistent institutional and cultural challenges**. Rather than focusing exclusively on scientific research and innovation, many universities continue to allocate significant space to events such as officeholder visits, policy announcements, or administrative decisions. Such practices dilute the impact of science communication, particularly given the public's growing reliance on university websites as sources of credible information.

Taken together, the comparative evidence suggests that **while *science universities* in Pakistan are significantly outperforming *general universities* in communicating science, both sectors fall short of international best practices**. Globally, leading *science universities* prioritize highlighting research outputs, public engagement activities, and knowledge transfer, often making over 80–90% of their outward communication science-focused. In Pakistan, even the best performers remain well below this threshold.

3.4 Analyzing the Quantity of Content through Social Media in Science Universities

To measure the quantity of science-based content, the analysis of 555 *social media posts* from 14 *science universities* reveals that science-focused institutions, despite their mandate, continue to struggle with using digital platforms effectively for *science communication*. The data in Table 4 reveal that only 186 (33.5%) *posts were science-related* (*Category A*), while 369 (66.5%) were devoted to *non-science content* (*Category B*). This shows that even in specialized institutions, which are expected to serve as national hubs of research visibility, nearly two-thirds of social media activity is directed toward ceremonial, administrative, or other non-scientific purposes.

Table 4: Showing the %age of Science Universities' Social Media Posts in A & B Categories (N-555)

Sr. No.	University Name	Social Media Posts	A	B
1	Agha Khan University	50	17 (34%)	33 (66%)
2	COMSATS, Islamabad	50	13 (26%)	37 (74%)
3	NUST, Islamabad	50	08 (16%)	42 (84%)
4	BUITEMS, Quetta	50	01 (02%)	49 (98%)
5	Institute of Space Technology	35	8 (23%)	27 (77%)
6	NED	8	00 (00%)	08 (100%)
7	KEMU	19	13 (68%)	06 (32%)
8	DOW	50	38 (76%)	12 (24%)
9	Agricultural Uni, Faisalabad	50	16 (32%)	34 (68%)
10	IT University, Lahore	32	17 (53%)	15 (47%)
11	IBA, Karachi	50	11 (22%)	39 (78%)
12	LUMS, Lahore	50	31 (62%)	19 (38%)
13	Lasbela Uni of Agri, Water, Marine	50	13 (26%)	37 (74%)
14	UET, Taxila	11	0 (0%)	11 (100%)
Total		**555**	**186 (33.5%)**	**369 (66.5%)**

Data further show that performance across institutions varied significantly. *DOW University* (76%), *KEMU* (68%), and *LUMS* (62%) performed relatively well, with more than half of their content devoted to *science-related communication*. However, the quality of this content was later determined (and discussed in section 2.8 of this report). In contrast, *BUITEMS* (2%), *NED* (0%), and *UET Taxila* (0%) performed abysmally, with almost no visible prioritization of science content. *NUST* (16%) and *IBA Karachi* (22%) also remained weak performers, despite being highly reputable institutions with significant research output.

Institutions such as *IT University Lahore* (53%) and *Agha Khan University* (34%) reflect a mixed performance, showing moderate emphasis on science communication but still overshadowed by *non-science-related* content. *COMSATS* (26%), despite being one of the country's largest science universities, exhibited low science-related visibility, which suggests a misalignment between its scientific contributions and its public-facing communication strategy.

Overall, the findings of measuring the quantity of *science communication* content between two categories of science academia highlight a paradox. **While *science universities* are expected to lead Pakistan in producing and promoting science-based knowledge, their digital presence does not reflect this mandate.** Instead, ***social media* is underutilized as a platform for promoting science culture in the country**. When compared with the six *general universities*, the contrast becomes clearer. *General universities* devoted only 10.2% of their *social media posts* to science content, whereas *science universities* performed better, with 33.5% of their content *science-related*. This difference indicates that **specialized institutions are relatively more engaged in *science communication***. However, the fact that two-thirds of posts from *science universities* still fall into *non-science content* demonstrates a systemic issue across higher education institutions in Pakistan.

A cross-platform comparison reveals an interesting paradox. On websites, *science universities* perform reasonably well, with over half of their *press releases* related to science, while *general universities* remain almost absent from this responsibility. On *social media*, however, the performance of science universities drops significantly, with only one-third of *posts* being *science-related*. This indicates that while **science universities in Pakistan are more willing to highlight research achievements in structured formats like *press releases*, they have yet to embrace the dynamic and youth-driven space of social media for science promotion**. General universities, meanwhile, remain weak performers across both platforms, providing little to no science-related visibility.

These findings of measuring the quantity of *science communication* content underscore a systemic issue in Pakistan's higher education sector: ***science communication* is not being mainstreamed into institutional communication strategies**, regardless of whether the institution is *general* or *science*-focused. *Websites* and *social media platforms*—visited daily by thousands of students, journalists, and the broader public—are dominated by ceremonial and administrative content rather than the scientific knowledge that these universities are mandated to generate. This **lack of emphasis on scientific knowledge hampers public understanding of science, fails to inspire young people toward scientific careers, and leaves space for misinformation and anecdotal narratives to dominate public discourse**.

3.5 Analyzing the Quality of Website Content through Press Releases in General Universities

The analysis of *press releases* from six *general universities* highlights not only the scarcity of science-related content but also the poor *quality* of the little content that is produced. Out of 300 total *press releases* sampled, only 38 (12.7%) fell under the *science-related category A* (See Table 1). Within this small pool, a deeper qualitative subcategorization into *A1* (enhancing public understanding of science), *A2* (celebrating scientific achievements), and *A3* (announcements of scientific events) reveals a troubling trend: most of the science content is concentrated in *A3*, the least impactful science subcategory (See Table 5).

Table 5: Showing the %age of General Universities' Press Releases in A1, A2 & A3 Subcategories (N-38)

Sr. No.	University Name	Press Releases (A)	A1	A2	A3
1	Quaid Azam Uni	15	2(13%)	1(7%)	12(80%)
2	Punjab University	20	2(10%)	2(10%)	16(80%)
3	Karachi University	1	0(0%)	0(0%)	1(100%)
4	Peshawar Uni	0	0(0%)	0(0%)	0(0%)
5	BZU, Multan	0	0(0%)	0(0%)	0(0%)
6	Haripur University	2	0(0%)	2(100%)	0(0%)
Total		**38**	**4(10.5%)**	**5(13%)**	**29(76.5%)**

The data show that 29 out of 38 *science-related press releases* (76.5%) were classified under *A3*. This means that *general universities* largely restrict their science-related communication to announcements of events, seminars, or administrative notices. Such content, while useful for institutional visibility, does little to uplift public understanding of science or inspire future generations toward scientific careers.

By contrast, only 4 *press releases* (10.5%) fell under *A1*—the most meaningful subcategory that involves translating research findings, publishing expert commentary, or providing interpretations of local scientific work. Similarly, only 5 press releases (13%) were placed under A2, highlighting scientists' achievements, awards, or recognitions. Notably, some universities—such as *Peshawar University and Bahauddin Zakariya University*—produced no science-related content at all, while *Karachi University* produced only one *release*, and that too in the lowest-quality subcategory (*A3*). *Quaid-i-Azam University* and *Punjab University* published slightly more in *category A*, but even here, 80% of the science content was event-related (*A3*). *Haripur University* provided an anomaly by publishing exclusively in *A2*, yet with only two entries, its overall contribution was negligible.

These findings underscore **a dual weakness: *general universities* in Pakistan not only fail to produce an adequate quantity of *science-related press releases*, but the content they do generate is of limited quality, dominated by institutional self-promotion rather than knowledge dissemination**. When benchmarked against international standards in technologically advanced countries, the gap becomes even more pronounced. Leading universities in North America, Europe, and East Asia

frequently use their *press releases* and *websites* to translate complex research into accessible language for the general public. For example, institutions such as *MIT*, *Stanford*, or *Oxford* maintain dedicated *science communication* teams whose *press releases* are often picked up by global media outlets because of their clarity, relevance, and emphasis on public engagement. In these contexts, the majority of online content falls into what would be categorized here as *A1*: enhancing public understanding of science through summaries of peer-reviewed research, interviews with local scholars, and contextual analyses of emerging scientific challenges. A smaller but still significant portion highlights achievements (*A2*), while event-related announcements (*A3*) are generally relegated to separate administrative sections.

3.6 Analyzing the Quality of Content through Social Media Posts in General Universities

The analysis of science-related social media posts from six *general universities* further reinforces the weaknesses identified in their *website press releases*. Out of a total of 27 *science-related posts*, the majority—16 posts (59.3%)—fell into *subcategory A3*, which is the least meaningful form of *science communication* (Table 6). These posts largely consisted of announcements of events, seminars, or ceremonial activities that, while useful for institutional branding, provide little in terms of enhancing public understanding of science or motivating youth toward scientific inquiry.

Table 6: Showing the %age of General Universities' Posts in A1, A2 & A3 Subcategories (N-27)

Sr. No.	University Name	Social Media Posts	A1	A2	A3
1	Quaid Azam Uni	7	1(14%)	2(29%)	4(57%)
2	Punjab University	5	0(0%)	4(80%)	1(20%)
3	Karachi University	5	1(20%)	0(0%)	4(80%)
4	Peshawar Uni	7	0(0%)	2(29%)	5(71%)
5	BZU, Multan	1	0(0%)	0(0%)	1(100%)
6	Haripur University	2	0(0%)	1(50%)	1(50%)
Total		**27**	**2(7.4%)**	**9(33.3%)**	**16(59.3%)**

Only 2 posts (7.4%) fell into the most valuable *subcategory*, *A1*, which aims to improve public understanding of science by presenting research findings, local scientific issues, or expert commentary in accessible formats. This extremely low proportion indicates that ***general universities* in Pakistan have almost completely neglected their responsibility to translate complex research into meaningful public knowledge through social media**. *Subcategory A2*—content celebrating achievements of local academics, researchers, or students—accounted for 9 posts (33.3%), a slightly better performance but still insufficient in scale or depth.

A closer look at the institutional distribution shows that *Quaid-i-Azam University* and *Punjab University* are marginally better in highlighting achievements (*A2*), though both remain heavily reliant on *A3* event-based posts (57% and 20% respectively). *Karachi University* made one valuable contribution in A1 but overwhelmingly favored A3 content (80%). Peshawar University also leaned heavily toward A3 (71%), with no contributions to *A1. Bahauddin Zakariya University* contributed

only a single science post during the entire period, and that too in the least impactful *subcategory (A3)*. *Haripur University*, though producing only two posts, displayed some balance by allocating one to *A2* and one to *A3*, but contributed nothing to *A1*.

These findings highlight **a dual weakness: not only are general universities** producing very few science-related posts overall (quantity), **but the little content they do generate is** of poor quality, **dominated by event announcements rather than substantive knowledge-sharing**. This severely **limits the role of social media—arguably the most effective medium for youth engagement in Pakistan—as a tool for cultivating a science-oriented culture and countering misinformation.**

When compared with international best practices, the performance of Pakistani general universities is alarmingly weak. In technologically advanced countries, universities use social media as a primary science communication platform to reach broader audiences beyond academia. Institutions such as *Harvard*, *Oxford*, or the *University of Tokyo* frequently publish *A1*-type content—explainer videos of recent research, Q&A sessions with scientists, podcasts, and infographics—that are designed specifically to enhance public understanding of science. *A2*-type content, highlighting achievements, is also common and used to inspire pride and aspiration among younger generations. *A3*-type content is present but usually placed in separate administrative feeds rather than dominating the main *science communication* stream.

3.7 Analyzing the Quality of Website Content through Press Releases in Science Universities

The analysis of 331 science-related press releases across 14 *science universities* reveals that while these institutions fare better than *general universities* in terms of producing science content, the quality of this content remains a major concern. The overwhelming majority of the *releases*—246 items, or 74.3%—fell into A3, the least significant *subcategory*, which consists mainly of event announcements, administrative notices, or ceremonial activities. While such content may enhance institutional visibility, it does little to strengthen public understanding of science (*A1*) or to motivate students (*A2*) and the wider public toward scientific engagement (See Table 7).

Table 7: Showing the %age of Science Universities' Press Releases in A1, A2 & A3 Subcategories (N-331)

Sr. No.	University Name	Press Releases (A)	A1	A2	A3
1	Agha Khan University	36	6(16.7%)	12(33.3%)	18(50%)
2	COMSATS, Islamabad	43	7(16.3%)	2(4.7%)	34(79%)
3	NUST, Islamabad	22	2(9.1%)	5(22.7%)	15(68.2%)
4	BUITEMS, Quetta	12	1(8.3%)	2(16.7%)	9(75%)
5	Institute of Space Technology	9	1(11.1%)	2(22.2%)	6(66.7%)
6	NED	39	0(0%)	1(2.6%)	38(97.4%)

7	**KEMU**	29	0(0%)	2(6.9%)	27(93.1%)
8	**DOW**	43	0(0%)	3(7%)	40(93%)
9	**Agricultural Uni, Faisalabad**	38	9(23.7%)	5(13.2%)	24(63.1%)
10	**IT University, Lahore**	14	6(42.8%)	4(28.6%)	4(28.6%)
11	**IBA, Karachi**	40	8(20%)	5(12.5%)	27(67.5%)
12	**LUMS, Lahore**	6	1(16.7%)	1(16.7%)	4(66.6%)
13	**Lasbela Uni of Agri, Water, Marine**	0	0(0%)	0(0%)	0(0%)
14	**UET, Taxila**	0	0(0%)	0(0%)	0(0%)
Total		**331**	**41 (12.4%)**	**44 (13.3%)**	**246 (74.3%)**

In contrast, only 41 press releases (12.4%) were categorized under A1, the most meaningful form of *science communication* aimed at enhancing public understanding of science through research findings, expert commentary, or interpretation of local scientific issues. A slightly higher share—44 *press releases* (13.3%)—fell into *A2*, highlighting the achievements of scientists, researchers, or students. While this *subcategory* contributes to building motivation and recognition, it remains limited in its overall presence.

Performance varied significantly across universities. *IT University, Lahore*, stood out positively, with 42.8% of its science content falling into *A1* and 28.6% in *A2*, making it the best performer in terms of quality. Similarly, the *Agricultural University Faisalabad* (23.7% *A1*) and *IBA Karachi* (20% *A1*) showed a stronger emphasis on substantive communication, producing a mix of content that sought to inform and inspire. On the weaker end, several large and otherwise prominent universities published almost exclusively in *A3*. For instance, *NED University* (97.4% *A3*), *KEMU* (93.1% *A3*), and *DOW University* (93% *A3*) produced little to no meaningful *A1* content. Some universities, such as *Lasbela University* of *Agriculture*, Water and *Marine Sciences*, and *UET Taxila*, failed to publish any science-related *press releases* during the studied period, reflecting a complete neglect of this responsibility.

Overall, these results reveal **a troubling reality: *science universities* in Pakistan, though producing more *science-related content* than *general universities* in terms of quantity (A), fail to prioritize quality content that enhances public understanding or motivates the scientific spirit**. Instead, institutional announcements dominate, suggesting that **communication offices are being used for administrative visibility rather than fulfilling the broader responsibility of *science communication.***

When benchmarked against practices in technologically advanced countries, the performance of Pakistani science universities falls significantly short. Internationally, science universities such as *MIT*, *Imperial College London*, or the *National University of Singapore* routinely translate their cutting-edge research into accessible language for the public, journalists, and policymakers. Their press releases and digital outputs often focus on *A1*-type content, explaining the societal relevance of scientific discoveries, and *A2*-type content, celebrating the achievements of faculty and students

to inspire future generations. Event announcements (*A3*) are secondary, typically hosted on separate administrative channels.

3.8 Analyzing the Quality of Content through Social Media Posts in Science Universities

The analysis of 186 *science-related social media posts* from 14 *science universities* highlights persistent weaknesses in both the quantity and quality of *science communication*. Although *science universities* are expected to lead in the dissemination of scientific knowledge, the data show that the majority of their social media activity falls into the least impactful category. Specifically, 127 posts (68.3%) were classified as *A3*, consisting mainly of event announcements, inaugurations, or ceremonial updates. Such posts contribute little to public understanding of science (*A1*) or to inspiring young audiences (*A2*), serving primarily institutional or image-building purposes.

Table 8: Showing the %age of Science Universities' Social Media Posts in A & B Categories (N-186)

Sr. No.	University Name	Social Media Posts	A1	A2	A3
1	Agha Khan University	17	1(5.9%)	2(11.8%)	14(82.3%)
2	COMSATS, Islamabad	13	2(15.4%)	5(38.5%)	6(46.1%)
3	NUST, Islamabad	8	1(12.5%)	3(37.5%)	4(50%)
4	BUITEMS, Quetta	1	0(0%)	0(0%)	1(100%)
5	Institute of Space Technology	8	0(0%)	2(25%)	6(75%)
6	NED	0	0(0%)	0(0%)	0(0%)
7	KEMU	13	0(0%)	2(15.4%)	11(84.6%)
8	DOW	38	0(0%)	11(29%)	27(71%)
9	Agricultural Uni, Faisalabad	16	1(6.2%)	2(12.5%)	13(81.3%)
10	IT University, Lahore	17	4(23.5%)	6(35.3%)	7(41.2%)
11	IBA, Karachi	11	0(0%)	4(36.4%)	7(63.6%)
12	LUMS, Lahore	31	6(19.4%)	6(19.4%)	19(61.2%)
13	Lasbela Uni of Agri, Water, Marine	13	0(0%)	1(7.7%)	12(92.3%)
14	UET, Taxila	0	0(0%)	0(0%)	0(0%)
Total		**186**	**15 (8.1%)**	**44 (23.6%)**	**127 (68.3%)**

By contrast, only 15 posts (8.1%) fell into A1, the *subcategory* most strongly associated with high-quality *science communication*, where research findings, local issues, and expert perspectives are made accessible to the public. This is a remarkably low proportion, underscoring that ***science***

***universities* are failing to use *social media* as a platform to translate scientific knowledge into forms that resonate with wider audiences**. A relatively better but still insufficient portion, 44 posts (23.6%), were allocated to *A2*, which highlights scientific achievements and recognitions. While *A2* does play a motivational role, inspiring students and early-career researchers, its share remains far below what would be expected in institutions mandated to promote scientific excellence.

Data in Table 8 shows that performance varied across universities. *IT University Lahore* (23.5% *A1*; 35.3% *A2*) and *LUMS* (19.4% *A1*; 19.4% *A2*) stand out for making more conscious efforts to prioritize quality *science communication* through their *social media* platforms, though even here, *A3* content dominates. *COMSATS* (15.4% *A1*; 38.5% *A2*) and *NUST* (12.5% *A1*; 37.5% *A2*) also demonstrate better-than-average performance, showing some balance between achievement-oriented and knowledge-enhancing content. In contrast, institutions such as *Agha Khan University*, *KEMU*, *Agricultural University Faisalabad*, and *Lasbela University* overwhelmingly prioritized *A3*-type content, with more than 80% of their posts falling into this *subcategory*. Particularly concerning are *BUITEMS* (100% *A3*) and *DOW* (71% *A3*), which, despite their visibility, failed to produce *A1*-level content altogether. Some institutions, such as *NED* and *UET Taxila*, produced no *science-related social media content* during the period under review.

When compared with global practices in technologically advanced countries, the weaknesses of Pakistani science universities become starkly evident. Internationally, universities such as *Stanford*, *Cambridge*, or the *University of Melbourne* use social media as a frontline tool for *A1*-type content—producing engaging infographics, explainer videos, podcasts, and interactive Q&A sessions to make cutting-edge research accessible to the general public. *A2*-type content is also widely utilized to celebrate achievements, but it is balanced with substantive *A1* communication. Event-related posts (*A3*), while present, are typically supplementary rather than dominant.

In contrast, Pakistani *science universities* have inverted this model, with nearly seven out of ten posts falling into *A3*, and less than one in ten dedicated to *A1*. This **reliance on ceremonial announcements not only diminishes the educational value of university platforms but also represents a missed opportunity to build trust in science, inspire the next generation, and strengthen resilience against disinformation in a highly digital and youth-centric society**.

3.9 Summary: Assessing Science Communication Practices by General and Science Universities in Pakistan

The findings drawn from the analysis of *website press releases and social media posts* across both *general* and *science universities* in Pakistan present a dismal picture of the state of institutional *science communication*. Across eight tables of data, the results consistently reveal that **universities—whether *general* or *science-focused*—are failing to prioritize *science communication* in both *quantity* and *quality*, thereby undermining their potential role as key actors in shaping public understanding of science and supporting science journalism** in Pakistan.

The first clear finding is that ***general universities* contribute almost nothing to the promotion of science through their digital platforms**. In the case of *website press releases*, *general universities* produced only 12.7% *science-related content*, with the vast majority (87.3%) dedicated to *non-science* topics such as administrative updates, ceremonial activities, or cultural programs. Their

social media presence was even weaker, with only 10.2% of posts dedicated to science. In practical terms, this means that ***general universities*—the majority of higher education institutions in Pakistan—are almost absent from the *science communication* landscape, hence providing no support to local science journalism in terms of providing any meaningful content and connections**.

Science universities, by contrast, performed somewhat better in terms of quantity but still fell short of expectations. On websites, 55.2% of *press releases* were *science-related*, suggesting that these institutions at least attempt to align with their scientific mandates. However, on *social media*, the proportion dropped sharply to 33.5% *science-related posts*, reflecting an **underutilization of the platform most relevant to Pakistan's youth.** Thus, **while *science universities* outperform *general universities*, neither group uses its digital presence to consistently highlight scientific achievements or discoveries.**

Equally troubling is the **poor quality of the science content that is published**. For both *general* and *science universities,* the overwhelming majority of outputs fall into *subcategory A3*—event announcements, ceremonial activities, or administrative notices. In *general universities*, 76.5% of science-related *website press releases* and 59.3% of science-related *social media posts* were classified as *A3*. *Science universities* mirrored this trend: 74.3% of science-related *press releases* and 68.3% of *social media posts* were also categorized as *A3*.

By contrast, *A1* content, which is the gold standard of *science communication*—presenting research findings, interviews, and expert insights to enhance public understanding of science—was almost absent. *General universities* produced *only* 10.5% of their *science-related press releases* and 7.4% of *science-related social media posts* in this category. *Science universities* fared slightly better but still alarmingly low, with only 12.4% of press releases and 8.1% of *social media posts* classified as *A1*. This represents **a missed opportunity for universities to translate research into an accessible language for the public and for journalists**.

Similarly, *A2* content (highlighting achievements, awards, and recognitions of scientists and researchers) accounted for just 13% of *general university press releases* and 33.3% of their *social media posts*. Among *science universities*, *A2* content reached 13.3% of *press releases* and 23.6% of *social media posts*, reflecting some effort to celebrate accomplishments but far below international best practices.

The findings across all eight tables point to **systemic weaknesses related to science communication in Pakistan's higher education communication culture. Universities overwhelmingly prioritize institutional or ceremonial visibility over the dissemination of substantive science knowledge.** This imbalance not only diminishes their role as credible *science communicators* but also undermines the broader ecosystem of *science communication* and *journalism*.

The consequences are far-reaching. *Science journalism* in Pakistan has struggled to take root, largely because journalists are unable to find locally developed science stories from universities.

Institutional websites and social media platforms, which should serve as gateways to research findings, are instead filled with event announcements and administrative news. This leaves **journalists without reliable entry points to scientific knowledge, forcing them either to rely on anecdotal evidence or to translate stories** from technologically advanced countries.

Moreover, the absence of A1-type communication means that **journalists often cannot connect with local scientists, as there are no intermediating outputs** (such as research summaries or press briefings) to bridge the gap[5] (Kamboh et al., 2024).

This **weak *science communication* culture creates a vicious cycle: universities fail to highlight their research, journalists fail to cover local science stories, and the public remains disconnected from locally relevant scientific debates. In turn, this fuels public reliance on imported narratives or misinformation, rather than grounded, homegrown science communication**.

3.10 Action Recommendations for Strengthening Science Communication in Pakistani Universities

The findings of this study make it clear that both *general* and *science universities* in Pakistan lack strong mechanisms for effective *science communication*. This has resulted in **a communication environment dominated by administrative and ceremonial content** (*A3*), **rather than meaningful dissemination of research and scientific knowledge** (*A1* and *A2*). To address these systemic gaps and align university communication practices with international standards, a multi-pronged set of recommendations is proposed as follows:

1. Establishing Science Communication Centers (SCCs) in Pakistani Universities

Data reveal that *general universities* are, particularly, the weakest actors in terms of having both *quantity* and *quality* of *science communication*. *Science universities* are also weak in converting *science-based* content into the *A1* or *A2* required standards. One long-term, major structural solution is the establishment of *Science Communication Centers (SCCs)* in the existing *Office of Research, Innovation, and Commercialization (ORIC)* in every *HEC-affiliated/accredited* university.

This recommendation is grounded in the *HEC 2021 Policy*, which makes it mandatory for every higher education institution to establish an *ORIC*. Section 5 of the policy explicitly states that *ORICs*[6] are responsible for ***"strengthening institutional collaboration between university researchers and potential users of research in government, industry, and communities."***

Building on this mandate, *SCCs* can operate as dedicated units within *ORIC* to focus specifically on the dissemination of scientific outputs (produced by local professors/researchers suggesting local remedies) for public and media audiences. The *SCCs* would have three primary functions:

- **Content Development** – Collecting research findings, project outcomes, patents, and innovations from faculty, and repackaging them into layperson-easy, user-friendly, accessible formats such as press releases, briefs, podcasts, explainer videos, and social media posts.
- **Media Linkages** – Acting as bridges between researchers and journalists by feeding timely science stories and facilitating access to scientists during critical episodic moments (e.g., pandemics, climate events, space missions).

5 Kamboh, S. A., Ittefaq, M., & Rehmat, A. (2024). A coalition for science journalism as a multi-stakeholder community of practice: A proposal from South Asia. Journalism Studies, 25(5), 566-574. https://doi.org/10.1080/146167 0X.2023.2293823

6 https://www.hec.gov.pk/english/services/universities/ORICs/Documents/ORICs%20Policy%202021.pdf

- **Capacity Building** – Training faculty and students in science communication skills, including storytelling, visual communication, and the use of digital platforms.

Such centers would not only enhance the public visibility of university research but also provide a sustainable pipeline of locally relevant science stories to feed the media ecosystem.

2. Training Digital/Social Media Content Creators in SCCs

Proposed *Science Communication Centers (SCCs)* can possibly operate on a sustainable business model by offering 3–6 months-long paid certificate programs for digital content creators. Currently, thousands of informal creators produce content on health, technology, and other science-related fields—often promoting weak or pseudo-science on social media. Through structured programs, they can be trained not only in the basic science of their chosen area but also in professional storytelling, videography, infographic design, and editing skills.

By enhancing both scientific literacy and creative capacity, *SCCs* would enable content creators to produce engaging, reliable, and impactful digital outputs—ultimately helping to counter mis/disinformation in the science domain.

3. Training University Public Relations Officers (PROs) in Science Communication

General universities seem unable to produce an adequate *quantity* and *quality* of science-based content. *Science universities*, while producing more research, face limitations in how their findings are communicated. Most of their outputs remain confined to ceremonial announcements or institutional visibility (A3).

To improve this, extensive capacity-building programs for university PROs must be organized as a stopgap arrangement until dedicated *SCCs* are established in every university's *ORIC*. These trainings should equip Public Relations Officers with skills to:

- Collecting and curating research papers, project findings, and faculty achievements for public dissemination.
- Developing institutional communication strategies that prioritize A1 and A2 content.
- Using controlled media (websites and social media platforms) to translate complex research into layperson-friendly formats.
- Collaborating with journalists and science influencers to ensure wider visibility and credibility of scientific outputs.
- Build effective press kits and maintain media databases for science communication.

Such professional development will ensure that PROs are no longer limited to administrative publicity but become active contributors to a university's role in shaping public understanding of science.

4. Training Faculty Members in Digital Science Communication

Faculty members and early-career researchers are often the most direct source of scientific outputs, but they lack the skills to communicate their work beyond academic circles. International development organizations such as *International Media Support (IMS), United Nations Development*

Program (UNDP), United Nations Educational, Scientific and Cultural Organization (UNESCO), and Deutche Welle Akademie (DW-A) can play a catalytic role by organizing training for science faculty on:

- Developing and managing institutional and personal *science communication channels (Facebook, Twitter/X, LinkedIn, YouTube, podcasts, Reels)*. This way they can help generate for themselves and for their university additional monetary sources in an age of shrinking higher education funds from the government.
- Skills in content creation and dissemination, including uploading summaries of research findings, *podcasts, YouTube shorts, Facebook reels, and LinkedIn explainer posts*.
- Presenting research in narrative forms that are relatable and engaging to wider audiences.
- Equipping faculty with strategies to detect and counter fake science news, pseudoscience, myth-busting, and mis/disinformation campaigns.
- Designing educational outreach content for schools, communities, and media outlets that bridge academic research with societal needs.

Such training will not only amplify the visibility of research but also provide faculty with tools to directly engage with public audiences without relying solely on institutional PROs/SCCs.

5. Building Academia–Media Partnerships

Both *general* and *science universities* must actively cultivate relationships with journalists, editors, and digital influencers. Proposed *Science Communication Centers (SCCs)* and PRO offices should host periodic media briefings, press tours, and science cafes where journalists can meet researchers, ask questions, and gain direct access to scientific insights.

SCCs and PRO offices should maintain lists of good communicator scientists and keep sharing them with journalists/science media content creators. This will help dismantle the barrier where journalists currently struggle to find locally developed science stories and are forced to depend on translated international narratives or weak or pseudo-science-based content.

6. Establishing an 'Information Integrity Coalition' to strengthen science journalism and communication

An 'Information Integrity Coalition' (IIC) should be established to strengthen science journalism and communication. This can be established by bringing together (i) **Media** organizations (TV channels, radio stations, newspapers and other print publications and digital media platforms), (ii) **Freelance science communicators** (specialist podcasters/vloggers), (iii) **Academia** (universities and colleges) and (iv) Representative **science organizations** (specialist public and private sector institutions). The coalition can share and implement a collaborative mandate to promote rational public discourses and scientific explanations and engender a journalism ecosystem sustained on the basis of information integrity that debunks disinformation and dispels misinformation in favor of evidence-based knowledge.

Organizations like IMS, UNESCO, UNDP, European Union and DW Akademie (DW-A) can play a catalytic role by facilitating and resourcing such a collaborative coalition.

7. International Support and Long-Term Sustainability

Finally, the long-term sustainability of *science communication* reforms requires international collaboration. Organizations such as *IMS, UNDP, UNESCO, DW Akademie*, and regional science journalism networks (SjCOOP[7]) can provide:

- Seed funding for establishing Science Communication Centers (SCCs).
- Training modules and toolkits customized for Pakistani universities.
- Exchange programs connecting Pakistani science communicators and journalists with global counterparts and science journalism mentors.
- Monitoring and evaluation frameworks to assess improvements in the quality and impact of university-led science communication.

Conclusion

By embedding SCCs within *ORIC* structures in general universities and by training PROs and faculty in science universities, Pakistan can begin to shift from ceremonial communication to substantive, public-oriented science communication. With sustained support from international media development organizations, universities can create an enabling environment where locally developed research is communicated effectively, journalists gain access to credible sources and content, and the public becomes more scientifically literate. Such reforms are essential not only for strengthening science communication but also for fostering the roots of science journalism in Pakistan, thereby ensuring that local science is not overshadowed by imported narratives.

7 https://wfsj.org/resources/sjcoop/

CHAPTER 4:
Data Analysis of Science Communication Practices of Science Organizations (SOs)

In contrast to science academia, where institutions were categorized into *general universities* and *science universities*, the analysis of ***Science Organizations (SOs)*** was undertaken without any subdivisions. This is because, unlike universities, SOs in Pakistan generally operate with specialized mandates—such as *health, engineering, agriculture, climate, space,* or *technology*—and therefore already represent distinct domains of scientific practice.

The analysis, therefore, treated 23 *SOs* as a single group, examining their institutional *websites* and official *social media platforms* to assess both the *quantity* and *quality* of *science communication* practice. The focus remained on how effectively these organizations use *controlled media channels* to communicate scientific knowledge, highlight research outputs, and engage broader audiences. By analyzing them collectively, the study aimed to identify overall trends and patterns in the science communication practices of Pakistani SOs, while also facilitating a comparison with the communication strategies employed by science academia.

4.1 Analyzing the Quantity/Quality of Website Content through Press Releases in Science Organizations

To initiate the analysis of *science communication* practices in *science organizations*, the *quantity* and *quality* of content published on their official websites were assessed, with *press releases* serving as the primary *unit of analysis*. The *SOs* list developed by *IRADA* was taken as the baseline data source, and eventually, the selected 23 SOs' website links were taken from there and explored for retrieving and analyzing *press releases*.

During this retrieval exercise, it was revealed that one organization—*National Engineering and Scientific Commission (NESCOM)*—does not operate a dedicated institutional website, thereby limiting its visibility and outreach potential. Moreover, seven more organizations were found to maintain functional websites, yet they were not actively utilizing them for *science communication* purposes. Specifically, these websites lacked a dedicated *press release* or *media section*, suggesting that they primarily serve administrative or informational purposes rather than acting as platforms for disseminating scientific knowledge to the wider public.

The list of such *science organizations* is provided below in Table 9.

Table 9: Science Organizations Without Dedicated Press Release/Media Sections on Their Websites

Sr. No.	Organization Name	Status of Science Communication via Website
1	Pakistan Council for Science and Technology (PCST)	No dedicated press release/media section
2	Centre for Applied Molecular Biology (CAMB), Lahore	No dedicated press release/media section
3	National ICT R&D Fund (Ignite)	No dedicated press release/media section
4	National Center for Artificial Intelligence	No dedicated press release/media section
5	Shifa International Hospital Research Department	No dedicated press release/media section
6	NSF (National Science Foundation)	No dedicated press release/media section
7	PCSIR (Pakistan Council of Scientific and Industrial Research)	No dedicated press release/media section

This finding highlights **a significant limitation in the *science communication practices* of several key *SOs* in Pakistan**. Despite their mandates to advance and promote scientific research, their lack of accessible *press releases* or *media sections* restricts public engagement and hinders the dissemination of timely, credible, and research-based scientific information.

This lag becomes even more evident when compared with practices in technologically advanced countries. For instance, leading institutions such as *NASA (USA), CERN (Switzerland- France)*, or the *National Institutes of Health (NIH, USA)* consistently use their websites' *press release* and *media sections* to disseminate real-time updates on scientific breakthroughs, public health advisories, and space missions. These platforms not only provide accurate and accessible information but also serve as vital tools for public engagement, policy influence, and international visibility of their research work.

By contrast, the absence of such communication practices in a few prominent/significant Pakistani *SOs* reinforces the gap between scientific research and its translation into public knowledge. This **underutilization of controlled media contributes to the overall weak *science communication* culture in Pakistan** and underscores the urgent need for institutional reforms and capacity-building in this domain.

Based on the data in Table 10, the *quantity* of *press releases* disseminated by 15 *science organizations (SOs)* through their institutional *websites* reveals a striking imbalance between *science-related* content (*Category A*) and *non-science-related* content (*Category B*). Out of a total of 237 *press releases* analyzed, only 41 (17.3%) fell into the *science category (A)*, while the overwhelming majority, 196 (82.7%), represented non-scientific content. This reveals a significant gap in the core mandate of these organizations, which should ideally prioritize disseminating research findings, scientific achievements, and knowledge-based insights rather than administrative updates or institutional promotions.

Table 10: Showing the Quantity & Quality of Website Content through Press Releases in SOs (N=237)

No.	Science Organization Name	Total	A	B	A1	A2	A3
1	National Commission for Human Development (NCHD)	7	0	7	0	0	0
2	National Institute of Health (NIH), Islamabad	1	0	1	0	0	0
3	Space & Upper Atmosphere Research Commission (SUPARCO)	25	16	9	0	0	16
5	Pakistan Meteorological Department (PMD)	20	4	16	0	0	4
6	Pakistan Institute of Development Economics (PIDE)	7	0	7	0	0	0
7	Centre for Economic Research in Pakistan (CERP)	3	1	2	1	0	0
8	Centre for Advanced Studies in Engineering (CASE)	4	0	4	0	0	0
9	National Incubation Center (NIC)	50	0	50	0	0	0
10	Sustainable Development Policy Institute (SDPI)	50	13	37	4	3	6
11	Petroleum Institute of Pakistan	12	0	12	0	0	0
12	Pakistan Industrial Technical Assistance Centre (PITAC)	10	0	10	0	0	0
13	Pakistan Council of Research in Water Resources (PCRWR)	5	5	0	0	0	5
14	National Disaster Management Authority (NDMA)	25	2	23	0	0	2
15	Pakistan Council of Renewable Energy Technologies (PCRET)	18	0	18	0	0	0
Total		**237**	**41 (17.3%)**	**196 (82.7%)**	**5 (12.2%)**	**3 (7.3%)**	**33 (80.5%)**

When turning to the *quality* of the 41 science-related *press releases*, the results are equally underwhelming. Only 5 releases (12.2%) fell under *subcategory A1*, which represents the gold standard of *science communication*—content that enhances public understanding of science through research-based outputs, expert commentaries, or scientifically grounded public education. An additional 3 releases (7.3%) were found in *subcategory A2*, highlighting the achievements of scientists and researchers, which, while important, are more celebratory than educational in nature. The bulk of science-related communication, however, was concentrated in *subcategory A3*, with 33 releases (80.5%). This category is the least impactful in terms of *science communication* as it primarily consists of event announcements, inaugurations, or ceremonial updates that serve more to boost institutional visibility than to enhance public scientific literacy.

In contrast, technologically advanced countries have institutionalized the role of science communication within their research organizations. Entities such as the *European Space Agency (ESA), NASA (USA), or the Chinese Academy of Sciences (CAS)* actively curate and publish high-quality *science communication* content on their *websites* and *social media* platforms. There is no need to look far for examples of effective *science communication* practices. A neighboring science organization, i.e., *The Indian Space Research Organisation (ISRO)*[5], for instance, has established a dedicated "*Engagement*" tab on its official website. This section is carefully designed to cater to the needs of fourteen distinct audiences, including media professionals, students, researchers, visitors, internees, experts, and the general public.

These SOs keep on posting accessible summaries of peer-reviewed research, multimedia explainers of ongoing projects, and interactive data portals, and offer regular engagement with journalists and the public. Such practices not only enhance public understanding of complex scientific issues but also help build trust in science and strengthen the linkage between research institutions, media, policymakers, and society.

4.2 Analyzing the Quantity/Quality of Content through Social Media Posts in Science Organizations

Beyond institutional *websites*, the study also examined the *social media* platforms of *science organizations*, given their growing role as primary channels of public engagement, especially among younger audiences. Unlike static *press releases*, *social media posts* offer immediacy and interactivity, enabling organizations to share knowledge, highlight achievements, and directly engage with followers/subscribers.

For this analysis, the official social media handles of selected *SOs* were reviewed to assess both the *quantity* and *quality* of *posts*. Using the same operational categories applied to *website* content, the study explored whether these platforms are being used to promote science (*A*) or non-science-based content (*B*). The science-based content was further examined to reveal whether social media posts are being uploaded with an intent to enhance public understanding of science, highlight the work/achievements of scientists, or mainly serve institutional promotion and event announcements. This dual assessment of quantity and quality helps to clarify how effectively science organizations in Pakistan are using social media for *science communication*.

5 https://www.isro.gov.in/

Interestingly, from the evaluated sample list, seven SOs don't maintain dedicated *press release/ media* sections on their *websites*. However, each of them—except *Shifa International Hospital*, which has a *Facebook* page but is not being updated by the admin—actively uses their official social media accounts, and therefore, their *social media posts* were incorporated into the further analysis.

The analysis of *social media posts* generated by *science organizations (SOs)* reveals a similar pattern of imbalance and weakness as observed in their *website press releases*. Data in Table 10 reveal that out of 511 total *posts* examined, only 191 (37.4%) were *science-related (Category A)*, while a majority of 320 posts (62.6%) fell into *non-science content (Category B)*. This indicates that **even on social media**—a platform with immense potential to reach young audiences and enhance public engagement with science—**the communication priorities of Pakistani SOs are disproportionately skewed toward institutional updates, administrative activities, and ceremonial content, rather than toward substantive scientific knowledge-sharing.**

A closer look at the quality of the 191 science-related posts shows a dominance of the least impactful type of content. Specifically, 160 posts (84%) were classified as A3, which primarily consist of event announcements, inaugurations, and official visits. Such content serves more as **institutional promotion rather than contributing meaningfully to public understanding of science or inspiring young audiences to pursue scientific inquiry**. By contrast, only 21 posts (11%) fell into A1, the category considered most valuable for enhancing scientific literacy, as it involves

Table 10: Showing the Quantity & Quality of Content through Social Media Posts in SOs (N=511)

No.	Science Organization Name	Posts	A	B	A1	A2	A3
1	National Commission for Human Development (NCHD)	22	0	22	0	0	0
2	National Institute of Health (NIH), Islamabad	31	27	4	4	0	23
3	Space and Upper Atmosphere Research Commission	4	2	2	0	2	0
5	Pakistan Meteorological Department	42	42	0	0	0	42
6	Pakistan Institute of Development Economics (PIDE)	50	16	34	9	1	6
7	Centre for Economic Research in Pakistan (CERP)	27	12	15	1	0	11
8	Centre for Advanced Studies in Engineering (CASE)	24	0	24	0	0	0
9	National Incubation Center	47	2	45	0	2	0

10	Sustainable Development Policy Institute (SDPI)	20	17	3	0	0	17
11	Petroleum Institute of Pakistan	19	4	15	0	0	4
12	Pakistan Industrial Technical Assistance Centre (PITAC)	21	0	21	0	0	0
13	Pakistan Council of Research in Water Resources (PCRWR)	20	18	2	3	0	15
14	National Disaster Management Authority (NDMA)	46	32	14	2	1	29
15	Pakistan Council of Renewable Energy Technologies (PCRET)	19	1	18	0	0	1
16	**Pakistan Council for Science and Technology (PCST)**	12	3	9	0	0	3
17	**Centre for Applied Molecular Biology (CAMB), Lahore**	11	1	10	1	0	0
18	**National ICT R&D Fund (Ignite)**	38	0	38	0	0	0
19	**National Center for Artificial Intelligence**	14	4	10	0	2	2
20	**Shifa International Hospital Research Department**	0	0	0	0	0	0
21	**NSF (National Science Foundation)**	27	4	23	0	0	4
22	**PCSIR (Pakistan Council of Scientific and Industrial Research)**	17	6	11	1	2	3
Total		**511**	**191 (37.4%)**	**320 (62.6%)**	**21 (11%)**	**10 (5%)**	**160 (84%)**

presenting original research findings, expert interviews, or commentaries by local scholars. Similarly, only 10 posts (5%) were categorized as A2, which highlight scientific achievements of individuals or institutions and could have served to motivate students and early-career researchers.

This heavy reliance on *A3* content indicates that **Pakistani SOs are not effectively using their social media platforms for meaningful science communication**. A few institutions—such as the *National Institute of Health (NIH), the Pakistan Meteorological Department (PMD)*, and the

Sustainable Development Policy Institute (SDPI)—stand out as exceptions, producing relatively higher proportions of science-related content, yet even their outputs largely remain confined to event-based or institutional narratives. By contrast, many organizations, including *Ignite*, *CASE*, and *PITAC*, showed little to no use of their social media for science-related communication.

In contrast, international science organizations use social media far more effectively as a tool for public engagement. For instance, *NASA, CERN, the European Space Agency (ESA)*, or the *Max Planck Institutes (Germany)* actively post explanatory threads, live Q&A sessions, infographics, podcasts, and short videos that translate complex research into digestible formats for general audiences. These platforms are not merely used for institutional visibility but serve as dynamic interfaces between scientists, journalists, and the broader public. By comparison, the **weak social media engagement of Pakistani SOs severely limits opportunities for promoting a culture of science, leaves journalists without a reliable pool of locally developed stories, and keeps citizens disconnected from homegrown research and innovation**.

4.3 Summary: Assessing Science Communication Practices by Science Organizations in Pakistan

The assessment of *science organizations (SOs)* in Pakistan, based on both their *websites (press releases)* and *social media platforms*, paints a sobering picture of underdeveloped *science communication* practices. Across institutional *websites*, only 17.3% of *press releases* were *science-related*, with the overwhelming majority (82.7%) devoted to *non-science content* such as administrative notices, institutional ceremonies, and policy statements. Similarly, *social media platforms*—arguably the most powerful tool for engaging young and digitally active audiences—were dominated by non-science content. Of the 511 posts reviewed, only 37.4% were *science-based*, while 62.6% were focused on *non-scientific matters*.

Even more striking is the *quality* dimension of the *science-related* content that *SOs* did publish. On both websites and social media, the vast majority of posts were concentrated in *subcategory A3*, consisting of announcements of scientific events, commemorations, or institutional promotions. While these posts provide visibility for the institutions, they do little to enhance public understanding of science or inspire youth engagement with scientific inquiry. Content of the highest value—*A1*, which explains scientific research, contextualizes local discoveries, and features expert commentary—remained exceedingly rare. Similarly, content in *A2*, which highlights hallmark achievements of researchers/scientists/technologists/astronauts and could serve as motivation for young aspirants, was also minimal.

This **dual weakness in quantity and quality underscores that science organizations in Pakistan are failing to leverage their communication platforms as bridges between research communities and society at large**. Instead of positioning themselves as trusted sources of knowledge for journalists, educators, and the public, **many *SOs* continue to treat their websites and social media primarily as institutional publicity tools**. By comparison, international science organizations such as *NASA, CERN, or the UK's Royal Society* have institutionalized communication as a professional function, investing in specialized teams that translate complex science into accessible, multimedia-rich formats. These practices foster public trust in science, inspire young minds, and provide journalists with reliable content for storytelling.

In Pakistan, the absence of such practices contributes directly to the stagnation of *science journalism*. **Despite the presence of these SOs, journalists in Pakistan often struggle to access reliable, locally grounded scientific content, and lack institutional support in connecting with researchers during science-critical events** such as pandemics, climate disasters, or technological breakthroughs. This gap forces much of science journalism in Pakistan to rely on repackaged content from technologically advanced countries, leaving local science underreported and underappreciated.

The overall findings make it clear that **without a deliberate strategy to enhance both the volume and quality of science communication, science organizations will continue to fall short of their responsibility to foster scientific literacy, inform evidence-based policymaking, and inspire a new generation of scientists and critical thinkers in Pakistan**.

4.4 Action Recommendations for Strengthening Science Communication in Science Organizations

To strengthen *science communication* in Pakistan and align it with international standards, science organizations must reorient their communication strategies from institutional publicity to public engagement and knowledge dissemination. The following actions are recommended:

1. Institutionalize Dedicated Media Sections on Websites

First, every SO should establish, regularly update, and maintain a dedicated *Press Release/Media Section* on its official *website*, designed explicitly for laypersons and journalists. Such sections must **go beyond generic announcements to provide clear, contextualized, and evidence-based updates on research findings, laboratory results, and ongoing projects**. For example, the *PCSIR Research Department* should not only release statements on product testing but also provide specific details on which branded milk, spices, or bottled water samples were found contaminated, the exact pathogens or toxic metals identified, and the potential human health implications. This level of transparency would enhance credibility, improve consumer awareness, and provide science journalists with reliable, locally relevant content.

2. Adopt Multimedia Approaches to Science Communication

Science communication today goes far beyond *press releases*, requiring *Science Organizations* to **invest in multimedia channels/tools such as short explainer videos, infographics, podcasts, and audio-visual storytelling**. Establishing in-house podcast studios would **enable scientists to share their work in conversational formats, making complex ideas accessible to non-specialist audiences and communities in local languages**. At the same time, institutional presence on platforms like *LinkedIn* should be strengthened to connect with policymakers, journalists, and industry professionals while highlighting Pakistan's research potential to global audiences. *SOs* should also **encourage scientists to build individual professional communication identities**—through *LinkedIn short-explainer posts, YouTube* channels/*shorts*, and *expert blogs*—providing direct channels to engage with the public and media while reducing dependence on second-hand narratives.

3. Develop Professional Science Communication Cell/Units

Each *SO* should **establish a dedicated *science communication cell/units* staffed with trained science**

communicators and media professionals. Their role would be to translate scientific research into plain language, contextualize findings within societal needs, and respond quickly during crises such as pandemics, smog events, or natural disasters. Moreover, currently, most science content from *SOs* falls into the least impactful category of *A3* (event announcements). The proposed SO-based *science communication cell/unit* should work on making meaningful efforts to **prioritize** *A1*-quality **content that enhances public understanding of science through local research explanations, expert commentary, and peer interviews**. By consistently producing *A1* content, *SOs* can position themselves as reliable sources of science knowledge for the media, schools, and the general public. This would bring *SOs* in line with the practice of advanced countries, where communication is considered as critical as research itself.

4. Strengthen Scientist–Journalist Linkages

Science organizations should **actively facilitate interactions between researchers and journalists**. By hosting regular media briefings, maintaining updated directories of experts, and offering structured opportunities for journalists to visit labs and field sites, *SOs* can ensure that *science reporting* is rooted in credible local evidence rather than imported narratives. This will also strengthen Pakistan's media landscape and allow science journalism to grow organically. **Researchers and institutional communication officers (PROs) should be trained in science communication skills** to ensure that press releases and posts are accurate, engaging, and comprehensible to non-specialist audiences.

5. Use Social Media for Youth Engagement

Given Pakistan's demographic profile, **social media must be seen as the frontline of *science communication***. *SOs* should publish engaging posts on their social media handles that simplify research findings, highlight success stories of young scientists, and spotlight the societal impact of their work. Regular, **youth-friendly digital campaigns**—such as myth-busting threads, live Q&A sessions with researchers, and explainer reels—would significantly enhance public/youth interest and help enhance digital literacy in science.

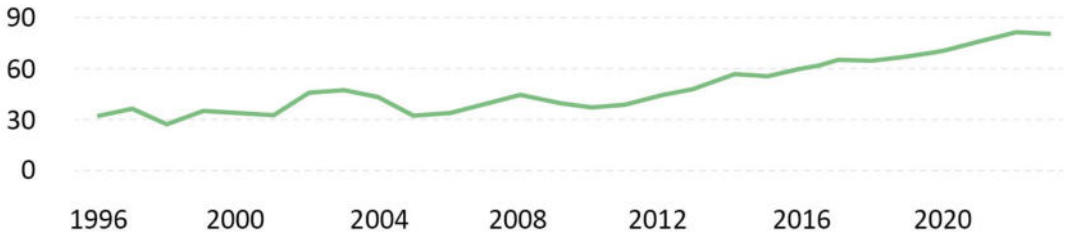
6. Partner with Media Development Organizations and International Bodies

Finally, partnerships with media development organizations such as *IMS, UNESCO, EU* and *DW Akademie* are essential. These organizations can provide technical assistance, capacity-building programs, and training for communication staff within SOs. They can also help in designing standardized templates for press releases, developing communication toolkits, and ensuring that scientific information is shared in accessible formats. Through such collaborations, SOs can institutionalize professional science communication practices that align with global best practices.

CHAPTER 5:
Conclusion

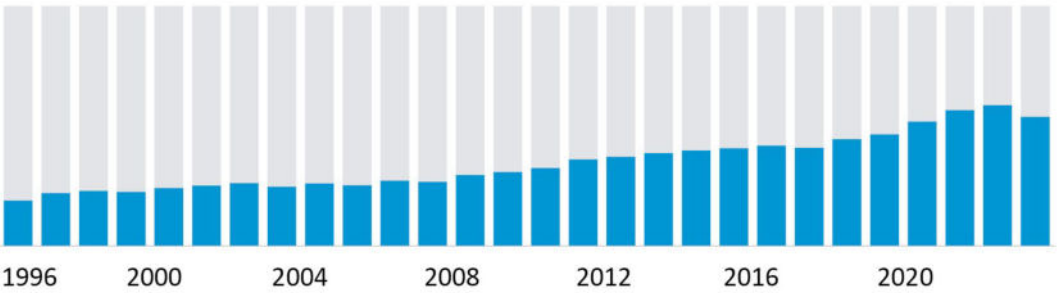
Over the last two decades, Pakistan's scientific community—comprising researchers, professors, and scientists working in both *science academia (SAs)* and *science organizations (SOs)*—has demonstrated remarkable progress in producing high-quality research. According to Scopus (2020) data, international collaborations in science scholarship have significantly increased, reflecting Pakistan's growing integration into the global scientific community. As Figure 1 illustrates, between 1996 and 2020, Pakistani researchers collaborated extensively with scholars worldwide, particularly in critical fields such as *health, energy, space, and environmental sciences*.

Figure 1. Pakistan's international collaborations between 1996 and 2020 in natural science.



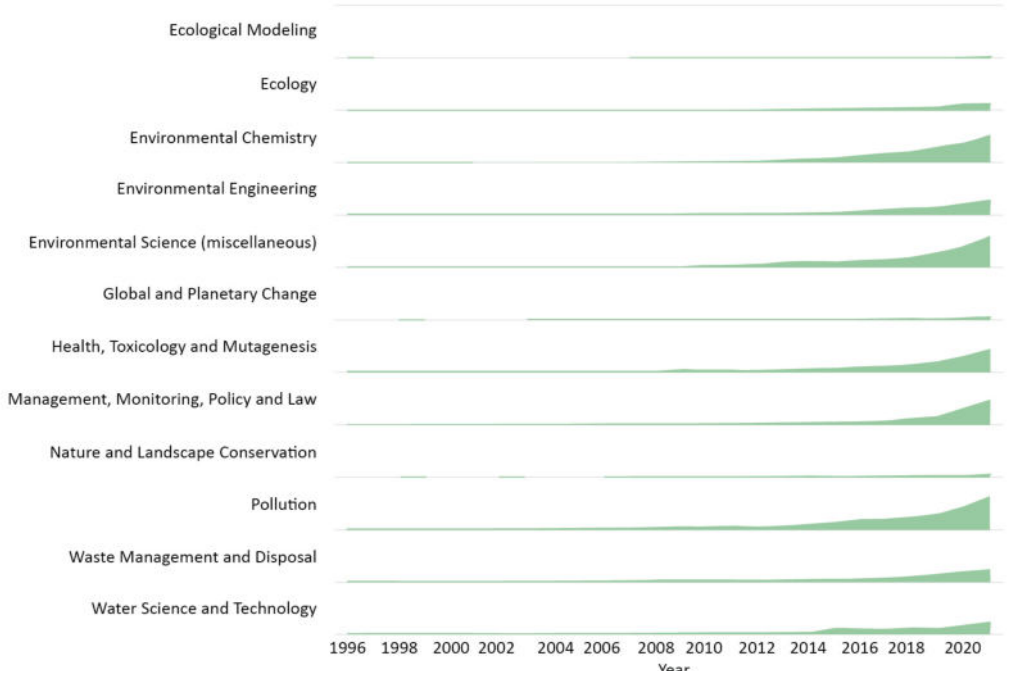
Similarly, Figure 2 highlights a sharp upward trend in publishing within open-access journals, expanding the accessibility of Pakistan's scientific output to global and local audiences.

Figure 2. Open Access Output of Pakistan from 1996 to 2020. (Source: Scopus)



In parallel, Figure 3 shows a steep rise in Pakistan's research production in environmental sciences during the same period, underlining the growing scientific engagement with urgent sustainability and climate-related issues.

Figure 3. Pakistan's research output in environmental science between 1996 and 2020.



Despite these encouraging developments, **a critical gap persists: the substantial body of locally produced scientific knowledge is not being effectively translated into science communication/ journalism in Pakistan**. Research findings published in prestigious global journals often remain locked in academic and professional circles, failing to reach policymakers, journalists, or the broader public in accessible formats. This disconnect undermines the potential of science to inform public debates, shape evidence-based policy, and strengthen public trust in scientific knowledge.

Bridging this gap is critically important. This can be done if relevant **stakeholders, including universities, science organizations, media development agencies, media and policymakers, collaboratively adopt the action recommendations outlined in this report**. By institutionalizing dedicated media sections, investing in science communication training, enhancing collaborations between journalists and scientists, and strategically using digital platforms, Pakistan can convert its growing scientific output into accessible and impactful public knowledge. Doing so will not only strengthen the country's *science communication* ecosystem but also lay the foundation for a robust culture of *science journalism*, which is currently struggling to take root due to a lack of accessible local science content.

In sum, Pakistan has made impressive strides in producing science; the next step is to communicate it effectively. Only then can science serve its rightful role in shaping informed societies, evidence-based policymaking, and sustainable development in an increasingly knowledge-driven world.

Annex 1:

Sample of universities reviewed

No	University Name	Website
1	Agha Khan University, Karachi	https://www.aku.edu/
2	Quaid-i-Azam University, Islamabad	https://qau.edu.pk/
3	Punjab University, Lahore	https://pu.edu.pk/
4	University of Karachi	https://uok.edu.pk/
5	COMSATS, Islamabad	https://comsats.org/
6	NUST, Islamabad	https://nust.edu.pk
7	BUITEMS, Quetta	https://www.buitms.edu.pk/
8	Institute of Space Technology, Islamabad	https://www.ist.edu.pk/
9	NED, Karachi	https://www.neduet.edu.pk/
10	King Edward Medical Uni, Lahore	https://kemu.edu.pk/
11	Dow Uni. Health Sciences, Karachi	https://www.duhs.edu.pk/
12	University of Peshawar	http://www.uop.edu.pk/
13	Bahauddin Zakariya University, Multan	https://bzu.edu.pk/
14	Lasbela Uni of Agriculture, Water & Marine Sciences	https://www.luawms.edu.pk/
15	University of Haripur	https://www.uoh.edu.pk/
16	University of Agriculture, Faisalabad	https://web.uaf.edu.pk/
17	ITU, Lahore	https://itu.edu.pk/
18	IBA, Karachi	https://www.iba.edu.pk/
19	UET, Taxila	https://www.uettaxila.edu.pk/
20	LUMS, Lahore	https://lums.edu.pk/

Annex 2:

Sample of science organizations reviewed

No	Science Organization Name	Website Link
1	National Commission for Human Development (NCHD)	https://www.nchd.org.pk/
2	National Institute of Health (NIH), Islamabad	https://www.nih.org.pk/
3	**Space and Upper Atmosphere Research Commission (SUPARCO)**	**http://www.suparco.gov.pk/**
4	**National Engineering and Scientific Commission (NESCOM)**	**No Website**
5	**Pakistan Meteorological Department (PMD)**	**https://www.pmd.gov.pk/en/**
6	**Pakistan Institute of Development Economics (PIDE)**	**https://pide.org.pk/**
7	**Centre for Economic Research in Pakistan (CERP)**	**https://www.cerp.org.pk/**
8	**Centre for Advanced Studies in Engineering (CASE)**	**https://case.edu.pk/**
9	**National Incubation Center (NIC)**	**https://nicislamabad.com/**
10	**Sustainable Development Policy Institute (SDPI)**	**https://sdpi.org/**
11	**Petroleum Institute of Pakistan (PIP)**	**https://pip.org.pk/**
12	**Pakistan Industrial Technical Assistance Centre (PITAC)**	**http://www.pitac.gov.pk/**
13	**Pakistan Council of Research in Water Resources (PCRWR)**	**https://www.pcrwr.gov.pk/**
14	**National Disaster Management Authority (NDMA)**	**https://www.ndma.gov.pk/**
15	**Pakistan Council of Renewable Energy Technologies (PCRET)**	**http://www.pcret.gov.pk/**
16	**Pakistan Council for Science and Technology (PCST)**	**http://www.pcst.org.pk/**
17	**Centre for Applied Molecular Biology (CAMB), Lahore**	**https://camb.edu.pk/**
18	**National ICT R&D Fund (Ignite)**	**https://ignite.org.pk/**
19	**National Center for Artificial Intelligence (NCAI)**	**https://ncai.pk/**
20	**Shifa International Hospital Research Department**	**https://www.shifa.com.pk/scrc-4/**
21	**National Science Foundation (NSF)**	**https://www.nsf.gov/**
22	**Pakistan Council of Scientific and Industrial Research (PCSIR)**	**https://www.pcsir.gov.pk/**

Institute for Research, Advocacy and Development (IRADA)

Institute for Research, Advocacy, and Development (IRADA), is an independent social enterprise aimed at catalyzing participatory reforms and development through innovative research, proactive policy strategies, and vigorous capacity-building initiatives. Registered as a company limited by shares with the Securities and Exchange Commission of Pakistan (SECP), the organization endeavors to promote inclusivity and pluralism, governance and information, freedom of expression and media development, and the rule of law and access to justice.

IRADA focuses on promoting:

- inclusivity and pluralism through support for civil liberties, peace and rights of minorities and marginalized communities;

- governance and information through support for right to information, transparency and open government;

- freedom of expression and media development through support for professionalism in media, safety of journalists and enabling laws for free speech;

- rule of law and access to justice through support for fundamental rights and equality before the law.

IRADA

Website: www.iradapk.org
Facebook: www.facebook.com/iradapk
X (Twitter): www.twitter.com/iradapk