above criticisms highlight the point that the implementation of biometric checkpoints should not only be limited to technical accuracy, but also to societal expectations regarding autonomy, transparency, and fair treatment. Advanced technologies are still being developed that combine biometric solutions with other related technologies like blockchain and digital identity models to increase reliability and data integrity. The most recent studies suggest that a biometric blockchain-driven e-passport system based on decentralized smart contracts is possible, so cryptographically secured identity credentials might be used to automate border control and leave tamper-proof audit logs (Xu et al., 2025). Analysis of these systems suggests that processing efficiency and resistance to manipulation could potentially improve, representing a future where the self-sovereign identity and an inalienable record are used to define how biometric checkpoints are used. Nevertheless, the same technological advances are strengthening the necessity of concurrent action in developing common legal and regulatory frameworks that can regulate data processing, interoperability, and user approval in different jurisdictions. Overall, biometric border checks represent a turning point in border security history: on the one hand, they will guarantee crossing faster and more safely, but on the other hand, they will also make society deal with difficult trade-offs between convenience, privacy, and civil liberties. The introduction of such systems should accommodate between the needs of national security and movement across the borders, and the security of the rights of individuals, and the trust of a population to know that technological effectiveness cannot completely replace an element of democracy and moral administration. With the steady increase of global mobility, the trends of biometric border control will certainly not only dictate the mechanics of traveling but also have a more significant value of identity, freedom, and governance in the digital era.

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The introduction of biometric border checkpoints radically alters the mode of identification and handling of travelers at international borders, as manual stamping of passports is being replaced by automated and machine-judged identifications. New technologies use facial recognition, fingerprinting, and iris scanning to match the physiological features of a subject to a biometric in the form of an electronic passport or a national database to identify a person as quickly as possible and possibly shorten the duration of waiting. These modalities are implemented by automated border control (ABC) devices (so-called e-gates), which cross-check live biometric samples with the information stored in biometric travel documents and open physical barriers when the identity of a person is checked successfully. This digital identification change of operations significantly increases the volume of border crossings and mitigates the traveler throughput just as much as it mitigates the security issues in the increasingly globalized movement. This paradigm shift in the use of human officers to algorithmic decision-making in the normal operations of the border is demonstrated by an empirical description of the deployment of ABC in everyday operations at the border. The perception of usefulness, ease of use, and trust in the security of information determine the adoption of the biometric systems by travelers despite their operational promise. Research that uses the technology acceptance model (TAM) to study airport biometrics systems concludes that the perceptions of usefulness and ease of use are key predictors of whether travelers will adopt biometric systems at the airports, which means that speediness and convenience in interacting with the biometric system are valuable to the customers (Kim et al., 2023). Furthermore, the level of trust concerning the airport security of personal data was reflected as the greatest predictor of the adoption intention compared to social influence and
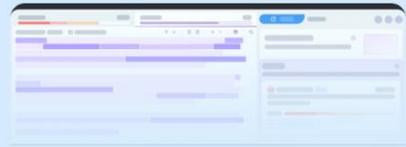

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